ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY
Approved by AICTE, New Delhi. Affiliated to Anna University, Chennai
Accredited by NAAC
ANGUCHETTYPALAYAM, PANRUTI – 607 106.

ACADEMIC YEAR 2024-2025

INDEX

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CONSOLIDATED REPORT

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY
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ANGUCHETTYPALAYAM, PANRUTI – 607 106.

PROJECT WORK

DINEFLOW- RESTAURANT MANAGEMENT WITH SMART ORDER PROTECTION

A PROJECT REPORT

Submitted By

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ASHOK NAVEEN KUMAR . A	422121104007
CHANDRAKUMAR.V	422121104010
THAMARAISELVAN.K	422121104053

in partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

ST.ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY
ANGUCHETTYPALAYAM, PANRUTI

ANNA UNIVERSITY::CHENNAI 600 025

MAY 2025

BONAFIDE CERTIFICATE

Certified that this project report "DINEFLOW-RESTAURANT MANAGEMENT WITH SMART ORDER PROTECTION" is the Bonafide work of A.ASATH(422121104006), A.ASHOK NAVEEN KUMAR (422121104007), V.CHANDRAKUMAR (422121104010), K.THAMARAISELVAN (422121104053) who carried out the project work under my supervision.

SIGNATURE

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SIGNATURE

Sr. A. PUNITHA JILT, M.Tech.,
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St.Anne's College of Engineering and Technology, Panruti.

Submitted for the Project Viva-Voce examination held on ..27.:.05.25.

Internal Examiner

External Examiner 27/5/25

ABSTRACT

In the modern era of digitization and smart solutions, the hospitality industry is constantly evolving to enhance customer experience, reduce food waste, and improve operational efficiency. This project, titled "Pre Food Booking and Table Reservation System with Refundable Deposit Mechanism," aims to bridge the gap between customers and restaurants through a seamless web-based platform that allows users to pre-book their table and food while ensuring commitment through a refundable deposit system. The proposed system enables customers to browse restaurants, select a preferred time slot, choose dishes from the digital menu, and complete their reservation by making an online payment. This payment includes the food cost and an extra deposit amount which acts as a security for the booking. Upon successful visit and consumption of the meal, the extra amount is refunded to the customer. Restaurants can configure their available tables, set reservation limits, and categorize them based on seating capacity. This ensures a more personalized and efficient dining experience for customers. From the restaurant's perspective, this system offers a smarter way to manage customer bookings, prepare food in advance based on confirmed orders, and maintain customer records effectively. It reduces uncertainties, enhances planning, and minimizes food wastage. The admin panel allows restaurant owners to track all bookings, handle refunds, enforce cancellation policies, and manage penalty charges according to predefined rules. By implementing this pre-food booking system, restaurants can ensure better customer satisfaction, reduce operational losses, and promote responsible dining behaviour. Customers, on the other hand, benefit from a hassle-free dining experience, guaranteed table availability, and the convenience of pre-ordering their favourite dishes.

TEXT BOOKS:

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
3. Sadalage, Pramod J. "NoSQL distilled", 2013

REFERENCES:

1. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
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3. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
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CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
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4	2	3	3	3	3	-	-	-	2	2	3	2	3	3	2
5	3	3	3	3	3	-	-	-	3	1	3	2	3	2	3
AVg.	2.8	3	2.8	2.8	2.8	-	-	-	2.2	1.8	2.6	2	2.2	2.8	2.6

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS375 **WEB TECHNOLOGIES** **L T P C**
2 0 2 3

COURSE OBJECTIVES:

- To understand different Internet Technologies
- To learn java-specific web services architecture
- To Develop web applications using frameworks

UNIT I WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0 **7**

Web Essentials: Clients, Servers and Communication – The Internet – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations. Bootstrap Framework

UNIT II CLIENT SIDE PROGRAMMING **6**

Java Script: An introduction to JavaScript–JavaScript DOM Model-Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript- JSON introduction – Syntax – Function Files.

UNIT III SERVER SIDE PROGRAMMING **5**

Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies- DATABASE CONNECTIVITY: JDBC.

UNIT IV PHP and XML 6

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions- Form Validation. XML: Basic XML- Document Type Definition- XML Schema, XML Parsers and Validation, XSL ,

UNIT V INTRODUCTION TO ANGULAR and WEB APPLICATIONS FRAMEWORKS 6

Introduction to AngularJS, MVC Architecture, Understanding ng attributes, Expressions and data binding, Conditional Directives, Style Directives, Controllers, Filters, Forms, Routers, Modules, Services; Web Applications Frameworks and Tools – Firebase- Docker- Node JS- React- Django- UI & UX.

COURSE OUTCOMES:

CO1: Construct a basic website using HTML and Cascading Style Sheets

CO2: Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.

CO3: Develop server side programs using Servlets and JSP.

CO4: Construct simple web pages in PHP and to represent data in XML format.

CO5: Develop interactive web applications.

30 PERIODS

PRACTICAL EXERCISES: **30 PERIODS**

List Of Experiments:

1. Create a web page with the following using HTML.
   - To embed an image map in a web page.
   - To fix the hot spots.
   - Show all the related information when the hot spots are clicked.
2. Create a web page with all types of Cascading style sheets.
3. Client Side Scripts for Validating Web Form Controls using DHTML.
4. Installation of Apache Tomcat web server.
5. Write programs in Java using Servlets:
   - To invoke servlets from HTML forms.
   - Session Tracking.
6. Write programs in Java to create three-tier applications using JSP and Databases
   - For conducting on-line examination.
   - For displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
7. Programs using XML – Schema – XSLT/XSL.

TOTAL:60 PERIODS

TEXTBOOKS

1. Deitel and Deitel and Nieto, Internet and World Wide Web - How to Program, Prentice Hall, 5th Edition, 2011.
2. Jeffrey C and Jackson, Web Technologies A Computer Science Perspective, Pearson Education, 2011.
3. Angular 6 for Enterprise-Ready Web Applications, Doguhan Uluca, 1st edition, Packt Publishing

REFERENCES:

1. Stephen Wynkoop and John Burke "Running a Perfect Website", QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.

3. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.
4. UttamK.Roy, "Web Technologies", Oxford University Press, 2011.
5. Angular: Up and Running: Learning Angular, Step by Step, Shyam Seshadri, 1st edition, O'Reilly

CO's-PO's & PSO's MAPPING

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4	2	3	3	1	2	-	-	-	3	1	2	2	2	2	2
5	1	2	3	2	2	-	-	-	2	1	3	1	1	1	2
AVg.	1.8	2	2.8	1.8	2.4	-	-	-	1.8	1.8	2	1.6	1.8	1.8	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS332 APP DEVELOPMENT L T P C
2 0 2 3

COURSE OBJECTIVES:

- To learn development of native applications with basic GUI Components
- To develop cross-platform applications with event handling
- To develop applications with location and data storage capabilities
- To develop web applications with database access

UNIT I FUNDAMENTALS OF MOBILE & WEB APPLICATION DEVELOPMENT 6

Basics of Web and Mobile application development, Native App, Hybrid App, Cross-platform App, What is Progressive Web App, Responsive Web design,

UNIT II NATIVE APP DEVELOPMENT USING JAVA 6

Native Web App, Benefits of Native App, Scenarios to create Native App, Tools for creating Native App, Cons of Native App, Popular Native App Dev elopment Frameworks, Java & Kotlin for Android, Swift & Objective-C for iOS, Basics of React Native, Native Components, JSX, State, Props

UNIT III HYBRID APP DEVELOPMENT 6

Hybrid Web App, Benefits of Hybrid App, Criteria for creating Native App, Tools for creating Hybrid App, Cons of Hybrid App, Popular Hybrid App Development Frameworks, Ionic, Apache Cordova,

UNIT IV CROSS-PLATFORM APP DEVELOPMENT USING REACT-NATIVE 6

What is Cross-platform App, Benefits of Cross-platform App, Criteria for creating Cross-platform App, Tools for creating Cross-platform App, Cons of Cross-platform App, Popular Cross-platform App Development Frameworks, Flutter, Xamarin, React-Native, Basics of React Native, Native Components, JSX, State, Props

UNIT V NON-FUNCTIONAL CHARACTERISTICS OF APP FRAMEWORKS 6

Comparison of different App frameworks, Build Performance, App Performance, Debugging capabilities, Time to Market, Maintainability, Ease of Development, UI/UX, Reusability

EMPOWERING WORKERS & HOMEOWNERS THROUGH SEAMLESS JOB SOLUTIONS

A PROJECT REPORT

Submitted By

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P. SUJAN	422121104047
U. UDHAYAKUMAR	422121104054

in partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

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COMPUTER SCIENCE AND ENGINEERING

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY
ANGUCHETTYPALAYAM, PANRUTI

ANNA UNIVERSITY::CHENNAI 600 025

MAY 2025

BONAFIDE CERTIFICATE

Certified that this project report "**EMPOWERING WORKERS & HOMEOWNERS THROUGH SEAMLESS JOB SOLUTIONS**" is the Bonafide work of **ARUNPANDI R (422121104005), JEYORGIS ALISTON B (422121104021), SUJAN P (422121104047), UDHAYAKUMAR U (422121104045)** who carried out the project work under my supervision.

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Submitted for the Project Viva-Voce examination held on 27.05.2025/FN

Internal Examiner

External Examiner 27/5/25

ABSTRACT

In today's digital age, the demand for dependable home services and accessible employment for blue-collar workers is rising rapidly. However, there remains a clear disconnect between homeowners seeking skilled help and workers looking for consistent job opportunities. Work Connect is a comprehensive, tech-driven platform that bridges this gap by seamlessly connecting blue-collar professionals, such as electricians, plumbers, carpenters, cleaners, and drivers with homeowners in need of reliable services. The platform enables workers to create detailed profiles showcasing their skills, experience, availability, and rates, while homeowners can browse, review, and book trusted professionals based on their needs. Through smart job-matching algorithms, automated scheduling, real-time notifications, secure payments, and a transparent rating system, Work Connect streamlines the entire service process. It empowers workers by reducing job search effort, enhancing income stability, and increasing digital visibility. For homeowners, it offers a stress-free way to find skilled, verified help they can trust. More than just a service platform, Work Connect aims to build a digitally inclusive ecosystem that elevates blue-collar employment, fosters transparency, and transforms how household services are discovered and delivered.

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
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3	3	2	3	2	1	-	-	-	2	1	1	2	2	3	3
4	1	2	3	2	-	-	-	-	3	2	3	3	1	2	3
5	1	1	3	3	2	-	-	-	1	3	3	1	2	2	2
AVg.	2	2	3	2	1	-	-	-	2	2	2	2	2	2	3

1 - low, 2 - medium, 3 - high, '-"- no correlation

CS3401 **ALGORITHMS** **L T P C**
3 0 2 4

COURSE OBJECTIVES:

- To understand and apply the algorithm analysis techniques on searching and sorting algorithms
- To critically analyze the efficiency of graph algorithms
- To understand different algorithm design techniques
- To solve programming problems using state space tree
- To understand the concepts behind NP Completeness, Approximation algorithms and randomized algorithms.

UNIT I INTRODUCTION **9**

Algorithm analysis: Time and space complexity - Asymptotic Notations and its properties Best case, Worst case and average case analysis – Recurrence relation: substitution method - Lower bounds – **searching:** linear search, binary search and Interpolation Search, **Pattern search:** The naïve string-matching algorithm - Rabin-Karp algorithm - Knuth-Morris-Pratt algorithm. **Sorting:** Insertion sort – heap sort

UNIT II GRAPH ALGORITHMS **9**

Graph algorithms: Representations of graphs - Graph traversal: DFS – BFS - applications - Connectivity, strong connectivity, bi-connectivity - Minimum spanning tree: Kruskal's and Prim's algorithm- Shortest path: Bellman-Ford algorithm - Dijkstra's algorithm - Floyd-Warshall algorithm Network flow: Flow networks - Ford-Fulkerson method – Matching: Maximum bipartite matching

UNIT III ALGORITHM DESIGN TECHNIQUES **9**

Divide and Conquer methodology: Finding maximum and minimum - Merge sort - Quick sort **Dynamic programming:** Elements of dynamic programming — Matrix-chain multiplication - Multi stage graph — Optimal Binary Search Trees. **Greedy Technique**: Elements of the greedy strategy - Activity-selection problem — Optimal Merge pattern — Huffman Trees.

UNIT IV STATE SPACE SEARCH ALGORITHMS **9**

Backtracking: n-Queens problem - Hamiltonian Circuit Problem - Subset Sum Problem – Graph colouring problem **Branch and Bound**: Solving 15-Puzzle problem - Assignment problem - Knapsack Problem - Travelling Salesman Problem

UNIT V NP-COMPLETE AND APPROXIMATION ALGORITHM 9

Tractable and intractable problems: Polynomial time algorithms – Venn diagram representation - NP-algorithms - NP-hardness and NP-completeness – Bin Packing problem - Problem reduction: TSP – 3-CNF problem. **Approximation Algorithms**: TSP - **Randomized Algorithms**: concept and application - primality testing - randomized quick sort - Finding k^{th} smallest number

45 PERIODS

PRACTICAL EXERCISES: 30 PERIODS

Searching and Sorting Algorithms

1. Implement Linear Search. Determine the time required to search for an element. Repeat the experiment for different values of *n*, the number of elements in the list to be searched and plot a graph of the time taken versus *n*.
2. Implement recursive Binary Search. Determine the time required to search an element. Repeat the experiment for different values of *n*, the number of elements in the list to be searched and plot a graph of the time taken versus *n*.
3. Given a text txt [0...n-1] and a pattern pat [0...m-1], write a function search (char pat [ ], char txt [ ]) that prints all occurrences of pat [ ] in txt [ ]. You may assume that n > m.
4. Sort a given set of elements using the Insertion sort and Heap sort methods and determine the time required to sort the elements. Repeat the experiment for different values of *n*, the number of elements in the list to be sorted and plot a graph of the time taken versus *n*.

Graph Algorithms

1. Develop a program to implement graph traversal using Breadth First Search
2. Develop a program to implement graph traversal using Depth First Search
3. From a given vertex in a weighted connected graph, develop a program to find the shortest paths to other vertices using Dijkstra's algorithm.
4. Find the minimum cost spanning tree of a given undirected graph using Prim's algorithm.
5. Implement Floyd's algorithm for the All-Pairs- Shortest-Paths problem.
6. Compute the transitive closure of a given directed graph using Warshall's algorithm.

Algorithm Design Techniques

1. Develop a program to find out the maximum and minimum numbers in a given list of *n* numbers using the divide and conquer technique.
2. Implement Merge sort and Quick sort methods to sort an array of elements and determine the time required to sort. Repeat the experiment for different values of *n*, the number of elements in the list to be sorted and plot a graph of the time taken versus *n*.

State Space Search Algorithms

1. Implement N Queens problem using Backtracking.

Approximation Algorithms Randomized Algorithms

1. Implement any scheme to find the optimal solution for the Traveling Salesperson problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.
2. Implement randomized algorithms for finding the k^{th} smallest number.

The programs can be implemented in C/C++/JAVA/ Python.

TOTAL:75 PERIODS

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO1: Analyze the efficiency of algorithms using various frameworks

CO2: Apply graph algorithms to solve problems and analyze their efficiency.
CO3: Make use of algorithm design techniques like divide and conquer, dynamic programming and greedy techniques to solve problems
CO4: Use the state space tree method for solving problems.
CO5: Solve problems using approximation algorithms and randomized algorithms

TEXT BOOKS:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", 3rd Edition, Prentice Hall of India, 2009.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran "Computer Algorithms/C++" Orient Blackswan, 2nd Edition, 2019.

REFERENCES:

1. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson Education, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Reprint Edition, Pearson Education, 2006.
3. S. Sridhar, "Design and Analysis of Algorithms", Oxford university press, 2014.

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3	1	2	3	1	-	-	2	-	-	-	-	-	-	1	1
4	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
5	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
AVg.	2.67	1.8	3	1	-	-	1.33	-	-	-	-	1	-	1	1

1 - low, 2 - medium, 3 - high, '-"- no correlation

CS3451 INTRODUCTION TO OPERATING SYSTEMS L T P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the basics and functions of operating systems.
- To understand processes and threads
- To analyze scheduling algorithms and process synchronization.
- To understand the concept of deadlocks.
- To analyze various memory management schemes.
- To be familiar with I/O management and file systems.
- To be familiar with the basics of virtual machines and Mobile OS like iOS and Android.

UNIT I INTRODUCTION 7

Computer System - Elements and organization; Operating System Overview - Objectives and Functions - Evolution of Operating System; Operating System Structures – Operating System Services - User Operating System Interface - System Calls – System Programs - Design and Implementation - Structuring methods.

AI – POWERED RESUME SCREENING AND INTERVIEW QUESTION GENERATION

A PROJECT REPORT

Submitted By

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S. MUHAMMAD ANAS	422121104032
P. SHANMUGAPRIYAN	422121104045

in partial fulfilment for the award of the degree

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ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

BONAFIDE CERTIFICATE

Certified that this project report **"AI – POWERED RESUME SCREENING AND INTERVIEW QUESTION GENERATION"** is the Bonafide work of **ABILASH I (422121104001), MOHAMED ALI M (422121104030), MUHAMMAD ANAS S (422121104032), SHANMUGAPRIYAN P (422121104045)** who carried out the project work under my supervision.

SIGNATURE

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SIGNATURE

Sr. A. PUNITHA JILT, M.Tech.,
HEAD OF THE DEPARTMENT,
Department of Computer Science and Engineering,
St. Anne's College of Engineering and Technology, Panruti.

Submitted for the Project Viva-Voce examination held on 27/05/2025

Internal Examiner

External Examiner

ABSTRACT

In the recruitment process, HR professionals often spend a lot of time reading resumes and preparing interview questions for each candidate. This manual method can be slow, repetitive, and may lead to errors or inconsistencies. To solve this problem, this project introduces an AI-powered system that automatically analyses resumes and generates personalized interview questions. The system uses Apache Tika to extract text from PDF and Word files, and OpenNLP to identify technical and soft skills mentioned in the resume. If technical skills are missing, the system can also find them from project descriptions. These skills are then passed to the Gemini 1.5 Flash model, integrated with Spring Boot, to generate beginner-friendly and skill-based interview questions. The results are shown in a user-friendly website built using HTML, CSS, and JavaScript. The system is fast, completing the entire process in about 12–13 seconds, and helps HR professionals save time, reduce manual effort, and improve accuracy in evaluating candidates.

TEXT BOOKS:

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
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4	2	3	3	3	3	-	-	-	2	2	3	2	3	3	2
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CCS375 WEB TECHNOLOGIES L T P C 2 0 2 3

COURSE OBJECTIVES:

- To understand different Internet Technologies
- To learn java-specific web services architecture
- To Develop web applications using frameworks

UNIT I WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0 7

Web Essentials: Clients, Servers and Communication – The Internet – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations. Bootstrap Framework

UNIT II CLIENT SIDE PROGRAMMING 6

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UNIT III SERVER SIDE PROGRAMMING 5

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UNIT IV PHP and XML 6

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions- Form Validation. XML: Basic XML- Document Type Definition- XML Schema, XML Parsers and Validation, XSL ,

UNIT V INTRODUCTION TO ANGULAR and WEB APPLICATIONS FRAMEWORKS 6

Introduction to AngularJS, MVC Architecture, Understanding ng attributes, Expressions and data binding, Conditional Directives, Style Directives, Controllers, Filters, Forms, Routers, Modules, Services; Web Applications Frameworks and Tools – Firebase- Docker- Node JS- React- Django- UI & UX.

COURSE OUTCOMES:

CO1: Construct a basic website using HTML and Cascading Style Sheets

CO2: Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.

CO3: Develop server side programs using Servlets and JSP.

CO4: Construct simple web pages in PHP and to represent data in XML format.

CO5: Develop interactive web applications.

30 PERIODS

PRACTICAL EXERCISES: **30 PERIODS**

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6. Write programs in Java to create three-tier applications using JSP and Databases
   - For conducting on-line examination.
   - For displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
7. Programs using XML – Schema – XSLT/XSL.

TOTAL:60 PERIODS

TEXTBOOKS

1. Deitel and Deitel and Nieto, Internet and World Wide Web - How to Program, Prentice Hall, 5th Edition, 2011.
2. Jeffrey C and Jackson, Web Technologies A Computer Science Perspective, Pearson Education, 2011.
3. Angular 6 for Enterprise-Ready Web Applications, Doguhan Uluca, 1st edition, Packt Publishing

REFERENCES:

1. Stephen Wynkoop and John Burke "Running a Perfect Website", QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.

3. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.
4. UttamK.Roy, "Web Technologies", Oxford University Press, 2011.
5. Angular: Up and Running: Learning Angular, Step by Step, Shyam Seshadri, 1st edition, O'Reilly

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	3	3	3	-	-	-	1	3	3	1	3	2	3
2	2	2	2	1	2	-	-	-	2	2	1	3	2	2	2
3	1	1	3	2	3	-	-	-	1	2	1	1	1	2	1
4	2	3	3	1	2	-	-	-	3	1	2	2	2	2	2
5	1	2	3	2	2	-	-	-	2	1	3	1	1	1	2
AVg.	1.8	2	2.8	1.8	2.4	-	-	-	1.8	1.8	2	1.6	1.8	1.8	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS332 APP DEVELOPMENT L T P C
2 0 2 3

COURSE OBJECTIVES:

- To learn development of native applications with basic GUI Components
- To develop cross-platform applications with event handling
- To develop applications with location and data storage capabilities
- To develop web applications with database access

UNIT I FUNDAMENTALS OF MOBILE & WEB APPLICATION DEVELOPMENT 6

Basics of Web and Mobile application development, Native App, Hybrid App, Cross-platform App, What is Progressive Web App, Responsive Web design,

UNIT II NATIVE APP DEVELOPMENT USING JAVA 6

Native Web App, Benefits of Native App, Scenarios to create Native App, Tools for creating Native App, Cons of Native App, Popular Native App Dev elopment Frameworks, Java & Kotlin for Android, Swift & Objective-C for iOS, Basics of React Native, Native Components, JSX, State, Props

UNIT III HYBRID APP DEVELOPMENT 6

Hybrid Web App, Benefits of Hybrid App, Criteria for creating Native App, Tools for creating Hybrid App, Cons of Hybrid App, Popular Hybrid App Development Frameworks, Ionic, Apache Cordova,

UNIT IV CROSS-PLATFORM APP DEVELOPMENT USING REACT-NATIVE 6

What is Cross-platform App, Benefits of Cross-platform App, Criteria for creating Cross-platform App, Tools for creating Cross-platform App, Cons of Cross-platform App, Popular Cross-platform App Development Frameworks, Flutter, Xamarin, React-Native, Basics of React Native, Native Components, JSX, State, Props

UNIT V NON-FUNCTIONAL CHARACTERISTICS OF APP FRAMEWORKS 6

Comparison of different App frameworks, Build Performance, App Performance, Debugging capabilities, Time to Market, Maintainability, Ease of Development, UI/UX, Reusability

SMART ANIMAL DETECTION AND CROP PROTECTION

A PROJECT REPORT

Submitted by

ROSHAN WILLSON.V	422121104041
KAMALEESHWARAN.V	422121104022
GOPINATH.A	422121104015
KAVIYARASAN.V	422121104027

In partial fulfilment for the award degree

of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANGUCHETTYPALAYAM, PANRUTI

ANNA UNIVERSITY::CHENNAI 600 025

MAY 2025

BONAFIDE CERTIFICATE

Certified that this project report "SMART ANIMAL DETECTION AND CROP PROTECTION" is the Bonafide work of ROSHANWILLSON V (422121104041), KAMALEEESHWARAN V (422121104022), GOPINATH A (422121104015), KAVIYARASAN V (422121104027) who carried out the project work under my supervision.

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Submitted for the Project Viva-Voce examination held on 27/05/2025

Internal Examiner

External Examiner

ABSTRACT

This project aims develop a practical, cost-effective, and eco-friendly AI-driven ultrasound technology to detect and deter wild animals from entering agricultural fields, while studying the movement of animals from reserve forests to human habitation areas and implementing a warning system to alert nearby localities for effective crop protection and wildlife management. This project aims to develop and implement AI-driven ultrasound technology to prevent wild animals from entering agricultural fields and reduce human-wildlife conflicts. The system will use advanced ultrasonic sound waves that are specifically designed to deter animals from approaching cultivated areas, thus protecting crops and reducing damage. The culmination of the project will be the development of a real-time warning system, which will alert local farmers and communities when animals are approaching dangerous zones. This system will not only help in proactively protecting agricultural areas but also serve as an important tool in managing wildlife movements in areas with high human wildlife interaction.

3. Developing an Application system using generative model.
4. Developing an Application using conditional inference learning model.
5. Application development using hierarchical model.
6. Application development using Mixture model.

30 PERIODS

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO1: Understand the underlying theory behind cognition.
CO2:Connect to the cognition elements computationally.
CO3: Implement mathematical functions through WebPPL.
CO4:Develop applications using cognitive inference model.
CO5:Develop applications using cognitive learning model.

TOTAL: 60 PERIODS

TEXT BOOK:

1. Vijay V Raghavan,Venkat N.Gudivada, VenuGovindaraju, C.R. Rao, Cognitive Computing: Theory and Applications: (Handbook of Statistics 35), Elsevier publications, 2016
2. Judith Hurwitz, Marcia Kaufman, Adrian Bowles, Cognitive Computing and Big Data Analytics, Wiley Publications, 2015
3. Robert A. Wilson, Frank C. Keil, "The MIT Encyclopedia of the Cognitive Sciences",The MIT Press, 1999.
4. Jose Luis Bermúdez, Cognitive Science -An Introduction to the Science of the Mind, Cambridge University Press 2020

REFERENCES:

1. Noah D. Goodman, Andreas Stuhlmuller, "The Design and Implementation of Probabilistic Programming Languages", Electronic version of book, https://dippl.org/.
2. Noah D. Goodman, Joshua B. Tenenbaum, The ProbMods Contributors, "Probabilistic Models of Cognition", Second Edition, 2016, https://probmods.org/.

CO's-PO's & PSO's MAPPING

	PO's												PSO's		
CO's	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	3	2	2	-	-	-	1	1	2	2	1	2	2
2	2	2	1	1	2	-	-	-	3	2	3	1	2	3	2
3	1	3	1	3	3	-	-	-	1	3	1	3	3	1	2
4	2	1	1	2	3	-	-	-	1	2	3	1	3	3	1
5	1	2	3	2	2	-	-	-	1	2	2	2	2	2	1
AVG	1.8	1.8	1.8	2	2.4	-	-	-	1.4	2	2.2	1.8	2.2	2.2	1.6

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS345 **ETHICS AND AI** **L T P C**
2 0 2 3

COURSE OBJECTIVES:

- Study the morality and ethics in AI
- Learn about the Ethical initiatives in the field of artificial intelligence

- Study about AI standards and Regulations
- Study about social and ethical issues of Robot Ethics
- Study about AI and Ethics- challenges and opportunities

UNIT I INTRODUCTION **6**

Definition of morality and ethics in AI-Impact on society-Impact on human psychology-Impact on the legal system-Impact on the environment and the planet-Impact on trust

UNIT II ETHICAL INITIATIVES IN AI **6**

International ethical initiatives-Ethical harms and concerns-Case study: healthcare robots, Autonomous Vehicles , Warfare and weaponization.

UNIT III AI STANDARDS AND REGULATION **6**

Model Process for Addressing Ethical Concerns During System Design - Transparency of Autonomous Systems-Data Privacy Process- Algorithmic Bias Considerations - Ontological Standard for Ethically Driven Robotics and Automation Systems

UNIT IV ROBOETHICS: SOCIAL AND ETHICAL IMPLICATION OF ROBOTICS **6**

Robot-Roboethics- Ethics and Morality- Moral Theories-Ethics in Science and Technology - Ethical Issues in an ICT Society- Harmonization of Principles- Ethics and Professional Responsibility-Roboethics Taxonomy.

UNIT V AI AND ETHICS- CHALLENGES AND OPPORTUNITIES **6**

Challenges - Opportunities- ethical issues in artificial intelligence- Societal Issues Concerning the Application of Artificial Intelligence in Medicine- decision-making role in industries-National and International Strategies on AI.

30 PERIODS

COURSE OUTCOMES:

On completion of the course, the students will be able to

CO1: Learn about morality and ethics in AI

CO2: Acquire the knowledge of real time application ethics, issues and its challenges.

CO3: Understand the ethical harms and ethical initiatives in AI

CO4: Learn about AI standards and Regulations like AI Agent, Safe Design of Autonomous and Semi-Autonomous Systems

CO5: Understand the concepts of Roboethics and Morality with professional responsibilities.

CO6: Learn about the societal issues in AI with National and International Strategies on AI

PRACTICAL EXERCISES **30 PERIODS**

1. Recent case study of ethical initiatives in healthcare, autonomous vehicles and defense
2. Exploratory data analysis on a 2 variable linear regression model
3. Experiment the regression model without a bias and with bias
4. Classification of a dataset from UCI repository using a perceptron with and without bias
5. Case study on ontology where ethics is at stake
6. Identification on optimization in AI affecting ethics

TOTAL: 60 PERIODS

TEXT BOOKS:

1. y. Eleanor Bird, Jasmin Fox-Skelly, Nicola Jenner, Ruth Larbey, Emma Weitkamp and Alan Winfield ,"The ethics of artificial intelligence: Issues and initiatives", EPRS | European

Parliamentary Research Service Scientific Foresight Unit (STOA) PE 634.452 – March 2020
2. Patrick Lin, Keith Abney, George A Bekey," Robot Ethics: The Ethical and Social Implications of Robotics", The MIT Press- January 2014.

REFERENCES:

1. Towards a Code of Ethics for Artificial Intelligence (Artificial Intelligence: Foundations, Theory, and Algorithms) by Paula Boddington, November 2017
2. Mark Coeckelbergh," AI Ethics", The MIT Press Essential Knowledge series, April 2020
3. Web link:
4. https://sci-hub.mksa.top/10.1007/978-3-540-30301-5_65
5. https://www.scu.edu/ethics/all-about-ethics/artificial-intelligence-and-ethics-sixteen-challenges-and-opportunities/
6. https://www.weforum.org/agenda/2016/10/top-10-ethical-issues-in-artificial-intelligence/
7. https://sci-hub.mksa.top/10.1159/000492428

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	3	3	1	-	-	-	1	2	1	1	3	1	1
2	2	1	1	2	1	-	-	-	1	2	1	1	3	3	1
3	2	3	1	1	3	-	-	-	2	1	1	2	3	2	2
4	3	1	3	3	2	-	-	-	2	2	3	1	2	1	3
5	3	1	1	3	3	-	-	-	2	3	3	3	1	3	3
AVg.	2.6	1.6	1.8	2.4	2	-	-	-	1.6	2	1.8	1.6	2.4	2	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

Detection and Prediction of image transmuting by using PFDNet

A PROJECT REPORT

Submitted by

Vasanth. F	422121104055
Ram Kumar. M	422121104039
Sarmesh. S	422121104044
SunilKumar. S	422121104048

in partial fulfilment for the award of the degree

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BACHELOR OF ENGINEERING

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ANNA UNIVERSITY::CHENNAI 600 025

MAY 2025

BONAFIDE CERTIFICATE

Certified that this project report **"Detection and Prediction of image transmuting by using PFDNet"** is the Bonafide work of **Vasanth. F (422121104055), Ram Kumar. M (422121104039), Sarmesh. S (422121104044), SunilKumar. S (422121104048)** who carried out the project work under my supervision.

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Submitted for the Project Viva-Voce examination held on 27/05/2025

Internal Examiner

27/5/25
External Examiner

Abstract

Digital images face increasing threats from tampering attacks, compromising their authenticity and security, especially on online platforms. Image tampering involves unauthorized modifications that distort content, making it challenging to restore the original integrity using conventional methods. Existing techniques often struggle with compressed or low-resolution images and lack self-recovery capabilities, emphasizing the need for advanced solutions. This project introduces the Photo Forgery Detection Network (PFDNet), a deep learning-based framework designed to detect tampering and enable lossless recovery. PFDNet incorporates a Cyber Vaccinator module, the original image and its edge map are transformed into an immunized version, ensuring consistency with the original content and Forgery Detector module using the Invertible Neural Network for enhanced tamper resistance and self-recovery. In Invertible Neural Network of the forward pass, when an attacked image is received, a localizer predicts a tamper mask to identify altered regions. In the backward pass, the generator converts hidden perturbations into recoverable information, enabling the restoration of the original image along with its edge map. To ensure lossless recovery, Run-Length Encoding (RLE) is employed as a final step to compare the original image and the recovered image. This comparison validates the restoration process, ensuring high fidelity and accuracy. Experimental results demonstrate PFDNet's ability to accurately localize tampered areas and achieve high-quality image recovery, providing a robust solution for combating image forgery and maintaining digital media integrity.

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	1	2	1	-	-	-	1	-	-	1	-	-	-
2	1	2	-	-	1	-	-	-	-	-	-	1	-	-	-
3	2	3	1	-	1	-	-	-	2	-	-	-	-	-	-
4	3	2	2	2	1	-	-	-	2	-	-	2	-	-	-
5	1	1	-	2	1	-	-	-	-	-	-	1	-	-	-
6	2	2	1	1	1	-	-	-	-	-	-	1	-	-	-
AVg	1.83	2	0.83	1.16	1	-	-	-	0.83	-	-	1	-	-	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS355 **NEURAL NETWORKS AND DEEP LEARNING** L T P C
2 0 2 3

COURSE OBJECTIVES:

- To understand the basics in deep neural networks
- To understand the basics of associative memory and unsupervised learning networks
- To apply CNN architectures of deep neural networks
- To analyze the key computations underlying deep learning, then use them to build and train deep neural networks for various tasks.
- To apply autoencoders and generative models for suitable applications.

UNIT I INTRODUCTION 6

Neural Networks-Application Scope of Neural Networks-Artificial Neural Network: An Introduction-Evolution of Neural Networks-Basic Models of Artificial Neural Network- Important Terminologies of ANNs-Supervised Learning Network.

UNIT II ASSOCIATIVE MEMORY AND UNSUPERVISED LEARNING NETWORKS 6

Training Algorithms for Pattern Association-Autoassociative Memory Network-Heteroassociative Memory Network-Bidirectional Associative Memory (BAM)-Hopfield Networks-Iterative Autoassociative Memory Networks-Temporal Associative Memory Network-Fixed Weight Competitive Nets-Kohonen Self-Organizing Feature Maps-Learning Vector Quantization-Counter propagation Networks-Adaptive Resonance Theory Network.

UNIT III THIRD-GENERATION NEURAL NETWORKS 6

Spiking Neural Networks-Convolutional Neural Networks-Deep Learning Neural Networks-Extreme Learning Machine Model-Convolutional Neural Networks: The Convolution Operation – Motivation – Pooling – Variants of the basic Convolution Function – Structured Outputs – Data Types – Efficient Convolution Algorithms – Neuroscientific Basis – Applications: Computer Vision, Image Generation, Image Compression.

UNIT IV DEEP FEEDFORWARD NETWORKS 6

History of Deep Learning- A Probabilistic Theory of Deep Learning- Gradient Learning – Chain Rule and Backpropagation - Regularization: Dataset Augmentation – Noise Robustness -Early Stopping, Bagging and Dropout - batch normalization- VC Dimension and Neural Nets.

UNIT V RECURRENT NEURAL NETWORKS 6

Recurrent Neural Networks: Introduction – Recursive Neural Networks – Bidirectional RNNs – Deep Recurrent Networks – Applications: Image Generation, Image Compression, Natural Language Processing. Complete Auto encoder, Regularized Autoencoder, Stochastic Encoders and Decoders, Contractive Encoders.

30 PERIODS

LAB EXPERIMENTS: **30 PERIODS**

1. Implement simple vector addition in TensorFlow.
2. Implement a regression model in Keras.
3. Implement a perceptron in TensorFlow/Keras Environment.
4. Implement a Feed-Forward Network in TensorFlow/Keras.
5. Implement an Image Classifier using CNN in TensorFlow/Keras.
6. Improve the Deep learning model by fine tuning hyper parameters.
7. Implement a Transfer Learning concept in Image Classification.
8. Using a pre trained model on Keras for Transfer Learning
9. Perform Sentiment Analysis using RNN
10. Implement an LSTM based Autoencoder in TensorFlow/Keras.
11. Image generation using GAN

Additional Experiments:

12. Train a Deep learning model to classify a given image using pre trained model
13. Recommendation system from sales data using Deep Learning
14. Implement Object Detection using CNN
15. Implement any simple Reinforcement Algorithm for an NLP problem

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO1: Apply Convolution Neural Network for image processing.
CO2: Understand the basics of associative memory and unsupervised learning networks.
CO3: Apply CNN and its variants for suitable applications.
CO4: Analyze the key computations underlying deep learning and use them to build and train deep neural networks for various tasks.
CO5: Apply autoencoders and generative models for suitable applications.

TEXT BOOKS:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016.
2. Francois Chollet, "Deep Learning with Python", Second Edition, Manning Publications, 2021.

REFERENCES:

1. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and TensorFlow", Oreilly, 2018.
2. Josh Patterson, Adam Gibson, "Deep Learning: A Practitioner's Approach", O'Reilly Media, 2017.

3. Charu C. Aggarwal, "Neural Networks and Deep Learning: A Textbook", Springer International Publishing, 1st Edition, 2018.
4. Learn Keras for Deep Neural Networks, Jojo Moolayil, Apress,2018
5. Deep Learning Projects Using TensorFlow 2, Vinita Silaparasetty, Apress, 2020
6. Deep Learning with Python, FRANÇOIS CHOLLET, MANNING SHELTER ISLAND,2017.
7. S Rajasekaran, G A Vijayalakshmi Pai, "Neural Networks, FuzzyLogic and Genetic Algorithm, Synthesis and Applications", PHI Learning, 2017.
8. Pro Deep Learning with TensorFlow, Santanu Pattanayak, Apress,2017
9. James A Freeman, David M S Kapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Addison Wesley, 2003.

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
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2	3	1	2	1	-	-	-	-	-	1	2	2	-	1	-
3	3	3	3	3	3	1	-	-	2	1	-	-	2	2	1
4	3	3	3	3	3	-	-	-	2	-	2	3	2	2	2
5	1	1	3	2	3	-	-	-	2	-	-	-	1	1	-
AVg.	2.6	2	2.8	2.2	2.4	0.4	0	0	1.6	0.6	0.8	1	1.4	1.6	0.8

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS369 **TEXT AND SPEECH ANALYSIS** **L T P C**
2 0 2 3

COURSE OBJECTIVES:

- Understand natural language processing basics
- Apply classification algorithms to text documents
- Build question-answering and dialogue systems
- Develop a speech recognition system
- Develop a speech synthesizer

UNIT I NATURAL LANGUAGE BASICS 6

Foundations of natural language processing – Language Syntax and Structure- Text Preprocessing and Wrangling – Text tokenization – Stemming – Lemmatization – Removing stop-words – Feature Engineering for Text representation – Bag of Words model- Bag of N-Grams model – TF-IDF model

Suggested Activities

- Flipped classroom on NLP
- Implementation of Text Preprocessing using NLTK
- Implementation of TF-IDF models

Suggested Evaluation Methods

- Quiz on NLP Basics
- Demonstration of Programs

Virtual Mirror: AI-Powered Size Detection and Virtual Garment Fitting in Physical Stores

A PROJECT REPORT

Submitted By

S . DINESH	422121104012
V. JAGADEESH	422121104017
K. RAJKUMAR	422121104038
R. SATHISHKUMAR	422121104304

in partial fulfilment for the award of the degree

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ANNA UNIVERSITY : CHENNAI 600 025

MAY 2025

BONAFIDE CERTIFICATE

Certified that this project report "**Virtual Mirror : AI-Powered Size Detection and Virtual Garment Fitting in Physical Stores .**" is the Bonafide work of **DINESH S (422121104012), JAGADEESH V (422121104017), RAJKUMAR K(422121104038), SATHISHKUMAR R (422121104304)** who carried out the project work under my supervision.

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Submitted for the Project Viva-Voce examination held on ..27/05/2025 / FN..

Internal Examiner

27/5/25
External Examiner

ABSTRACT

Offline clothing stores continue to offer the advantage of physical interaction with products, but customers often face long waiting times at trial rooms and discomfort in trying on multiple outfits.. Moreover, customers may find it inconvenient to try different sizes and styles, which can lead to missed purchases or dissatisfaction. Existing in-store systems rarely provide any digital assistance to guide users in choosing the right size or visualizing how clothes will look on them without physically wearing them. The lack of intelligent size guidance and realistic previews results in inefficiencies and missed opportunities for enhancing customer satisfaction and store productivity. To address these challenges, this project introduces an advanced Virtual Try-On system that combines body measurement detection, size prediction, and dynamic garment overlay to streamline the offline shopping experience. Using MediaPipe, the system captures body landmarks from a live camera feed and accurately estimates measurements such as shoulder width, chest circumference, and waist size. These measurements are input into a Random Forest Classifier, which predicts the most suitable clothing size (e.g., S, M, L, XL). Based on the predicted size, the system filters and recommends a list of matching garments available in-store. When a customer selects a garment from this list, CP-VTON is used to overlay the selected clothing onto the customer in real-time using the camera feed.This integrated approach enhances in-store shopping by offering personalized size recommendations, reducing the need for physical trials, and allowing customers to virtually visualize how garments will fit making the process faster, more hygienic, and customer-friendly.

CCS349	IMAGE AND VIDEO ANALYTICS	L T P C
		2 0 2 3

COURSE OBJECTIVES:

- To understand the basics of image processing techniques for computer vision.
- To learn the techniques used for image pre-processing.
- To discuss the various object detection techniques.
- To understand the various Object recognition mechanisms.
- To elaborate on the video analytics techniques.

UNIT I INTRODUCTION 6

Computer Vision – Image representation and image analysis tasks - Image representations – digitization – properties – color images – Data structures for Image Analysis - Levels of image data representation - Traditional and Hierarchical image data structures.

UNIT II IMAGE PRE-PROCESSING 6

Local pre-processing - Image smoothing - Edge detectors - Zero-crossings of the second derivative - Scale in image processing - Canny edge detection - Parametric edge models - Edges in multi-speralct images - Local pre-processing in the frequency domain - Line detection by local pre-processing operators - Image restoration.

UNIT III OBJECT DETECTION USING MACHINE LEARNING 6

Object detection– Object detection methods – Deep Learning framework for Object detection– bounding box approach-Intersection over Union (IoU) –Deep Learning Architectures-R-CNN-Faster R-CNN-You Only Look Once(YOLO)-Salient features-Loss Functions-YOLO architectures

UNIT IV FACE RECOGNITION AND GESTURE RECOGNITION 6

Face Recognition-Introduction-Applications of Face Recognition-Process of Face Recognition-DeepFace solution by Facebook-FaceNet for Face Recognition- Implementation using FaceNet-Gesture Recognition.

UNIT V VIDEO ANALYTICS 6

Video Processing – use cases of video analytics-Vanishing Gradient and exploding gradient problem-RestNet architecture-RestNet and skip connections-Inception Network-GoogleNet architecture-Improvement in Inception v2-Video analytics-RestNet and Inception v3.

30 PERIODS

LIST OF EXERCISES **30 PERIODS**

1. Write a program that computes the T-pyramid of an image.
2. Write a program that derives the quad tree representation of an image using the homogeneity criterion of equal intensity
3. Develop programs for the following geometric transforms: (a) Rotation (b) Change of scale (c) Skewing (d) Affine transform calculated from three pairs of corresponding points (e) Bilinear transform calculated from four pairs of corresponding points.
4. Develop a program to implement Object Detection and Recognition
5. Develop a program for motion analysis using moving edges, and apply it to your image sequences.
6. Develop a program for Facial Detection and Recognition
7. Write a program for event detection in video surveillance system

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO1: Understand the basics of image processing techniques for computer vision and video analysis.
CO2: Explain the techniques used for image pre-processing.
CO3: Develop various object detection techniques.
CO4: Understand the various face recognition mechanisms.
CO5: Elaborate on deep learning-based video analytics.

TEXT BOOK:

1. Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image Processing, Analysis, and Machine Vision", 4nd edition, Thomson Learning, 2013.
2. Vaibhav Verdhan,(2021, Computer Vision Using Deep Learning Neural Network Architectures with Python and Keras,Apress 2021(UNIT-III,IV and V)

REFERENCES

1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer Verlag London
2. Limited,2011.
3. Caifeng Shan, FatihPorikli, Tao Xiang, Shaogang Gong, "Video Analytics for Business Intelligence", Springer, 2012.
4. D. A. Forsyth, J. Ponce, "Computer Vision: A Modern Approach", Pearson Education, 2003.
5. E. R. Davies, (2012), "Computer & Machine Vision", Fourth Edition, Academic Press.

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	2	2	2	-	-	-	3	3	2	1	2	1	3
2	2	2	3	3	3	-	-	-	3	2	1	1	2	2	1
3	1	2	2	2	3	-	-	-	1	2	1	2	1	1	3
4	1	2	3	2	3	-	-	-	2	2	2	3	2	2	2
5	3	2	1	3	2	-	-	-	2	1	1	3	3	2	1
AVg.	2	1.8	2.2	2.4	2.6	-	-	-	2.2	2	1.4	2	2	1.6	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS338 **COMPUTER VISION** **L T P C**

2 0 2 3

COURSE OBJECTIVES:

- To understand the fundamental concepts related to Image formation and processing.
- To learn feature detection, matching and detection
- To become familiar with feature based alignment and motion estimation
- To develop skills on 3D reconstruction
- To understand image based rendering and recognition

UNIT I **INTRODUCTION TO IMAGE FORMATION AND PROCESSING** **6**

Computer Vision - Geometric primitives and transformations - Photometric image formation - The digital camera - Point operators - Linear filtering - More neighborhood operators - Fourier transforms - Pyramids and wavelets - Geometric transformations - Global optimization.

A BLOCKCHAIN - BASED FORENSIC EVIDENCE MANAGEMENT SYSTEM

A PROJECT REPORT

Submitted By

ABINAYA.M	422121104002
KANIHA.M	422121104023
SUSI.J	422121104050
SUWATHI.D.N	422121104051

in partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

ST.ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY
ANGUCHETTYPALAYAM, PANRUTI

ANNA UNIVERSITY::CHENNAI 600 025

MAY 2025

BONAFIDE CERTIFICATE

Certified that this project report **"A BLOCKCHAIN-BASED FORENSIC EVIDENCE MANAGEMENT SYSTEM "** is the bonafide work of **M.ABINAYA (422121104002), M.KANIHA (422121104023), J.SUSI (422121104050), D.N.SUWATHI (422121104051)** who carried out the project work under my supervision.

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Submitted for the Project Viva-Voce examination held on 27.05.2025.

Internal Examiner

External Examiner

ABSTRACT

Forensic evidence management is a critical aspect of modern criminal investigations, requiring meticulous handling, secure storage, and accurate chain of custody documentation. Traditional evidence management systems face challenges such as data tampering, unauthorized access, and lack of transparency. To address these issues, this research project presents an innovative implementation of blockchain technology for the forensic evidence management system. The proposed system leverages the decentralized and immutable nature of blockchain to ensure the integrity, security, and transparency of forensic evidence throughout its lifecycle. Smart contracts are employed to automate the chain of custody process, enhancing efficiency and reducing the risk of human errors. In addition, the use of cryptographic hashing techniques enables the verification of evidence authenticity without revealing sensitive details. A prototype of the blockchain-based forensic evidence management system was developed and tested in a controlled environment. The evaluation results demonstrate that the system provides enhanced data integrity, increased accountability, and improved accessibility while protecting sensitive information from unauthorized parties.

CO2: Apply security principles in software development.
CO3: Evaluate the extent of risks.
CO4: Involve selection of testing techniques related to software security in the testing phase of software development.
CO5: Use tools for securing software.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Julia H. Allen, "Software Security Engineering", Pearson Education, 2008
2. Evan Wheeler, "Security Risk Management: Building an Information Security Risk Management Program from the Ground Up", First edition, Syngress Publishing, 2011
3. Chris Wysopal, Lucas Nelson, Dino Dai Zovi, and Elfriede Dustin, "The Art of Software Security Testing: Identifying Software Security Flaws (Symantec Press)", Addison-Wesley Professional, 2006

REFERENCES:

1. Robert C. Seacord, "Secure Coding in C and C++ (SEI Series in Software Engineering)", Addison-Wesley Professional, 2005.
2. Jon Erickson, "Hacking: The Art of Exploitation", 2nd Edition, No Starch Press, 2008.
3. Mike Shema, "Hacking Web Apps: Detecting and Preventing Web Application Security Problems", First edition, Syngress Publishing, 2012
4. Bryan Sullivan and Vincent Liu, "Web Application Security, A Beginner's Guide", Kindle Edition, McGraw Hill, 2012
5. Lee Allen, "Advanced Penetration Testing for Highly-Secured Environments: The Ultimate Security Guide (Open Source: Community Experience Distilled)", Kindle Edition, Packt Publishing,2012
6. Jason Grembi, "Developing Secure Software"

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	3	2	3	2	-	-	-	2	1	2	2	2	2	1
2	2	2	2	3	3	-	-	-	2	1	2	2	1	2	1
3	1	2	2	2	1	-	-	-	1	1	2	1	2	2	1
4	2	3	2	2	2	-	-	-	2	1	2	2	2	2	1
5	2	1	2	2	3	-	-	-	2	1	1	2	2	1	2
AVg.	1.8	2.2	2	2.4	2.2	-	-	-	1.8	1	1.8	1.8	1.8	1.8	1.2

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS339 CRYPTOCURRENCY AND BLOCKCHAIN TECHNOLOGIES L T P C
2 0 2 3

COURSE OBJECTIVES:

- To understand the basics of Blockchain
- To learn Different protocols and consensus algorithms in Blockchain
- To learn the Blockchain implementation frameworks
- To understand the Blockchain Applications
- To experiment the Hyperledger Fabric, Ethereum networks

UNIT I **INTRODUCTION TO BLOCKCHAIN** **7**

Blockchain- Public Ledgers, Blockchain as Public Ledgers - Block in a Blockchain, Transactions- The Chain and the Longest Chain - Permissioned Model of Blockchain, Cryptographic -Hash Function, Properties of a hash function-Hash pointer and Merkle tree

UNIT II **BITCOIN AND CRYPTOCURRENCY** **6**

A basic crypto currency, Creation of coins, Payments and double spending, FORTH – the precursor for Bitcoin scripting, Bitcoin Scripts , Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay

UNIT III **BITCOIN CONSENSUS** **6**

Bitcoin Consensus, Proof of Work (PoW)- Hashcash PoW , Bitcoin PoW, Attacks on PoW ,monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases.

UNIT IV **HYPERLEDGER FABRIC & ETHEREUM** **5**

Architecture of Hyperledger fabric v1.1- chain code- Ethereum: Ethereum network, EVM, Transaction fee, Mist Browser, Ether, Gas, Solidity.

UNIT V **BLOCKCHAIN APPLICATIONS** **6**

Smart contracts, Truffle Design and issue- DApps- NFT. Blockchain Applications in Supply Chain Management, Logistics, Smart Cities, Finance and Banking, Insurance,etc- Case Study.

COURSE OUTCOMES:

CO1: Understand emerging abstract models for Blockchain Technology

CO2: Identify major research challenges and technical gaps existing between theory and practice in the crypto currency domain.

CO3: It provides conceptual understanding of the function of Blockchain as a method of securing distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable.

CO4: Apply hyperledger Fabric and Ethereum platform to implement the Block chain Application.

30 PERIODS

PRACTICAL **30 PERIODS**

1. Install and understand Docker container, Node.js, Java and Hyperledger Fabric, Ethereum and perform necessary software installation on local machine/create instance on cloud to run.
2. Create and deploy a blockchain network using Hyperledger Fabric SDK for Java Set up and initialize the channel, install and instantiate chain code, and perform invoke and query on your blockchain network.
3. Interact with a blockchain network. Execute transactions and requests against a blockchain network by creating an app to test the network and its rules.
4. Deploy an asset-transfer app using blockchain. Learn app development within a Hyperledger Fabric network.
5. Use blockchain to track fitness club rewards. Build a web app that uses Hyperledger Fabric to track and trace member rewards.

6. Car auction network: A Hello World example with Hyperledger Fabric Node SDK and IBM Blockchain Starter Plan. Use Hyperledger Fabric to invoke chain code while storing results and data in the starter plan

TOTAL: 60 PERIODS

TEXT BOOKS

1. Bashir and Imran, Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks, 2017.
2. 2.Andreas Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reilly, 2014.

REFERENCES:

1. Daniel Drescher, "Blockchain Basics", First Edition, Apress, 2017.
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.
3. Melanie Swan, "Blockchain: Blueprint for a New Economy", O'Reilly, 2015
4. Ritesh Modi, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Blockchain", Packt Publishing
5. Handbook of Research on Blockchain Technology, published by Elsevier Inc. ISBN: 9780128198162, 2020.

CO's-PO's & PSO's MAPPING

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3	3	3	3	3	2	-	-	-	3	-	-	2	2	3	3
4	3	2	3	2	3	-	-	-	3	-	-	2	2	2	3
AVg.	3	2.75	2.75	2.5	1.75				2.25			2	3	2.75	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS354 NETWORK SECURITY L T P C
2 0 2 3

COURSE OBJECTIVES:

- To learn the fundamentals of cryptography.
- To learn the key management techniques and authentication approaches.
- To explore the network and transport layer security techniques.
- To understand the application layer security standards.
- To learn the real time security practices.

UNIT I INTRODUCTION 8

Basics of cryptography, conventional and public-key cryptography, hash functions, authentication, and digital signatures.

UNIT II KEY MANAGEMENT AND AUTHENTICATION 7

Key Management and Distribution: Symmetric Key Distribution, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure. User Authentication: Remote User-Authentication Principles, Remote User-Authentication Using Symmetric Encryption, Kerberos Systems, Remote User Authentication Using Asymmetric Encryption.

DOCTOR APPOINTMENT BOOKING WEBSITE USING CLOUDINARY AND NEXT.JS

A PROJECT REPORT

Submitted by

K. VIDHYA	(422121104057)
R. RAGAVINOTHINI	(422117104037)
R. KAMALI	(422121104302)
R. KAVIYAPRIYA	(422121104026)

in partial fulfilment for the award of the degree

of

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ANNA UNIVERSITY::CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY::CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report "DOCTOR APPOINTMENT BOOKING WEBSITE USING CLOUDINARY AND NEXT.JS" is the bonafide work of K.VIDHYA (422121104057), R.RAGAVINOTHINI (422117104037), R.KAMALI (422121104302), R.KAVIYAPRIYA (422121104026), who carried out the project work under my supervision.

K. Kayalvizhi 26/05/25

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HEAD OF THE DEPARTMENT,

Department of Computer Science and Engineering.

St.Anne's College of Engineering and Technology, Panruti.

Submitted for the Project Viva-Voce examination held on ...27.05.2025

Internal Examiner

27/5/25

External Examiner

ABSTRACT

The Doctor Appointment Booking System is an advanced web-based application designed to streamline and digitize the process of scheduling medical appointments. In an era where digital healthcare solutions are in high demand, this system leverages modern web technologies to enhance accessibility, efficiency, and security in healthcare management.

The project is built using Next.js for the frontend, Node.js and Express.js for the backend, and MongoDB as the database. Additionally, Cloudinary is integrated to manage and store medical records, prescriptions, and other media securely. Razorpay enables seamless online payment transactions for hassle-free booking. The system is designed to support patients, doctors, and administrators through a well-defined role-based access control (RBAC) mechanism.

Patients can search for doctors based on specialization, availability, and location, book appointments, and receive notifications and reminders via email or SMS. Doctors can manage appointments, view patient details, and access medical records securely. The admin panel facilitates system-wide management, allowing administrators to oversee users, appointments, and transactions efficiently.

This project addresses key challenges in traditional appointment scheduling, such as long waiting times, scheduling conflicts, and inefficient communication. By integrating encryption mechanisms, two-factor authentication (2FA), and token-based authentication, the system ensures data security and compliance with healthcare privacy standards.

The Doctor Appointment Booking System is designed for hospitals, clinics, and individual practitioners, making healthcare services more accessible and organized. Future enhancements include advanced doctor recommendations, telemedicine integration, and enhanced medical history tracking.

TEXT BOOKS:

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
3. Sadalage, Pramod J. "NoSQL distilled", 2013

REFERENCES:

1. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
2. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
3. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
4. Alan Gates, "Programming Pig", O'Reilley, 2011.

CO's-PO's & PSO's MAPPING

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3	3	3	3	2	3	-	-	-	2	2	1	2	2	3	3
4	2	3	3	3	3	-	-	-	2	2	3	2	3	3	2
5	3	3	3	3	3	-	-	-	3	1	3	2	3	2	3
AVg.	2.8	3	2.8	2.8	2.8	-	-	-	2.2	1.8	2.6	2	2.2	2.8	2.6

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS375 WEB TECHNOLOGIES L T P C
2 0 2 3

COURSE OBJECTIVES:

- To understand different Internet Technologies
- To learn java-specific web services architecture
- To Develop web applications using frameworks

UNIT I WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0 7

Web Essentials: Clients, Servers and Communication – The Internet – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations. Bootstrap Framework

UNIT II CLIENT SIDE PROGRAMMING 6

Java Script: An introduction to JavaScript–JavaScript DOM Model-Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript- JSON introduction – Syntax – Function Files.

UNIT III SERVER SIDE PROGRAMMING 5

Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies- DATABASE CONNECTIVITY: JDBC.

UNIT IV PHP and XML 6

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions- Form Validation. XML: Basic XML- Document Type Definition- XML Schema, XML Parsers and Validation, XSL ,

UNIT V INTRODUCTION TO ANGULAR and WEB APPLICATIONS FRAMEWORKS 6

Introduction to AngularJS, MVC Architecture, Understanding ng attributes, Expressions and data binding, Conditional Directives, Style Directives, Controllers, Filters, Forms, Routers, Modules, Services; Web Applications Frameworks and Tools – Firebase- Docker- Node JS- React- Django- UI & UX.

COURSE OUTCOMES:

CO1: Construct a basic website using HTML and Cascading Style Sheets

CO2: Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.

CO3: Develop server side programs using Servlets and JSP.

CO4: Construct simple web pages in PHP and to represent data in XML format.

CO5: Develop interactive web applications.

30 PERIODS

PRACTICAL EXERCISES: **30 PERIODS**

List Of Experiments:

1. Create a web page with the following using HTML.
   - To embed an image map in a web page.
   - To fix the hot spots.
   - Show all the related information when the hot spots are clicked.
2. Create a web page with all types of Cascading style sheets.
3. Client Side Scripts for Validating Web Form Controls using DHTML.
4. Installation of Apache Tomcat web server.
5. Write programs in Java using Servlets:
   - To invoke servlets from HTML forms.
   - Session Tracking.
6. Write programs in Java to create three-tier applications using JSP and Databases
   - For conducting on-line examination.
   - For displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
7. Programs using XML – Schema – XSLT/XSL.

TOTAL:60 PERIODS

TEXTBOOKS

1. Deitel and Deitel and Nieto, Internet and World Wide Web - How to Program, Prentice Hall, 5th Edition, 2011.
2. Jeffrey C and Jackson, Web Technologies A Computer Science Perspective, Pearson Education, 2011.
3. Angular 6 for Enterprise-Ready Web Applications, Doguhan Uluca, 1st edition, Packt Publishing

REFERENCES:

1. Stephen Wynkoop and John Burke "Running a Perfect Website", QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.

3. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.
4. UttamK.Roy, "Web Technologies", Oxford University Press, 2011.
5. Angular: Up and Running: Learning Angular, Step by Step, Shyam Seshadri, 1st edition, O'Reilly

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
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3	1	1	3	2	3	-	-	-	1	2	1	1	1	2	1
4	2	3	3	1	2	-	-	-	3	1	2	2	2	2	2
5	1	2	3	2	2	-	-	-	2	1	3	1	1	1	2
AVg.	1.8	2	2.8	1.8	2.4	-	-	-	1.8	1.8	2	1.6	1.8	1.8	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS332 APP DEVELOPMENT L T P C
2 0 2 3

COURSE OBJECTIVES:

- To learn development of native applications with basic GUI Components
- To develop cross-platform applications with event handling
- To develop applications with location and data storage capabilities
- To develop web applications with database access

UNIT I FUNDAMENTALS OF MOBILE & WEB APPLICATION DEVELOPMENT 6

Basics of Web and Mobile application development, Native App, Hybrid App, Cross-platform App, What is Progressive Web App, Responsive Web design,

UNIT II NATIVE APP DEVELOPMENT USING JAVA 6

Native Web App, Benefits of Native App, Scenarios to create Native App, Tools for creating Native App, Cons of Native App, Popular Native App Dev elopment Frameworks, Java & Kotlin for Android, Swift & Objective-C for iOS, Basics of React Native, Native Components, JSX, State, Props

UNIT III HYBRID APP DEVELOPMENT 6

Hybrid Web App, Benefits of Hybrid App, Criteria for creating Native App, Tools for creating Hybrid App, Cons of Hybrid App, Popular Hybrid App Development Frameworks, Ionic, Apache Cordova,

UNIT IV CROSS-PLATFORM APP DEVELOPMENT USING REACT-NATIVE 6

What is Cross-platform App, Benefits of Cross-platform App, Criteria for creating Cross-platform App, Tools for creating Cross-platform App, Cons of Cross-platform App, Popular Cross-platform App Development Frameworks, Flutter, Xamarin, React-Native, Basics of React Native, Native Components, JSX, State, Props

UNIT V NON-FUNCTIONAL CHARACTERISTICS OF APP FRAMEWORKS 6

Comparison of different App frameworks, Build Performance, App Performance, Debugging capabilities, Time to Market, Maintainability, Ease of Development, UI/UX, Reusability

DIABETIC RETINOPATHY PREDICTION USING DIANET

A PROJECT REPORT

Submitted by

AGNES MARIA M	422121104004
GEETHA R	422121104014
KARTHIKA A	422121104024
VISHNUPRIYA V	422121104060

in partial fulfilment for the award of the degree

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ANNA UNIVERSITY:CHENNAI 600 025

MAY 2025

BONAFIDE CERTIFICATE

Certified that this project report **"DIABETIC RETINOPATHY PREDICTION USING DIANET"** is the bonafide work of **M.AGNES MARIA (422121104004), R.GEETHA (422121104014), A.KARTHIKA (422121104024), V.VISHNU PRIYA (422121104060)** who carried out the project work under my supervision.

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SIGNATURE

Sr.A.PUNITHA JILT, M.Tech.,
HEAD OF THE DEPARTMENT,
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Department of Computer Science and Engineering,
St.Anne's College of Engineering and Technology,Panruti.

Submitted for the Project Viva-Voce examination held on 27.05.2025

Internal Examiner

External Examiner

ABSTRACT

Diabetes is one of the leading fatal diseases globally, putting a huge burden on the global healthcare system. Early diagnosis of diabetes is hence, of utmost importance and could save many lives. However, current techniques to determine whether a person has diabetes or has the risk of developing diabetes are primarily reliant upon clinical biomarkers. In this article, they propose a novel deep learning architecture to predict if a person has diabetes or not from a photograph of his/her retina. Using a relatively small-sized dataset, here develop a multi-stage convolutional neural network (CNN)-based model DiaNet that can reach an accuracy level of over 94% on this task, and in doing so, successfully identifies the regions on the retina images that contribute to its decision-making process, as corroborated by the medical experts in the field. Comparing the performance of DiaNet against the existing clinical data-based deep learning models, then conclude that the retinal images contain sufficient information to distinguish the Qatari diabetes cohort from the control group. In addition, our study reveals that retinal images may contain prognosis markers for diabetes and other comorbidities like hypertension and ischemic heart disease. The results led us to believe that the inclusion of retinal images into the clinical setup for the diagnosis of diabetes is warranted in the near future.

CCS349 IMAGE AND VIDEO ANALYTICS L T P C

2 0 2 3

COURSE OBJECTIVES:

- To understand the basics of image processing techniques for computer vision.
- To learn the techniques used for image pre-processing.
- To discuss the various object detection techniques.
- To understand the various Object recognition mechanisms.
- To elaborate on the video analytics techniques.

UNIT I INTRODUCTION 6

Computer Vision – Image representation and image analysis tasks - Image representations – digitization – properties – color images – Data structures for Image Analysis - Levels of image data representation - Traditional and Hierarchical image data structures.

UNIT II IMAGE PRE-PROCESSING 6

Local pre-processing - Image smoothing - Edge detectors - Zero-crossings of the second derivative - Scale in image processing - Canny edge detection - Parametric edge models - Edges in multi-speralct images - Local pre-processing in the frequency domain - Line detection by local pre-processing operators - Image restoration.

UNIT III OBJECT DETECTION USING MACHINE LEARNING 6

Object detection– Object detection methods – Deep Learning framework for Object detection– bounding box approach-Intersection over Union (IoU) –Deep Learning Architectures-R-CNN-Faster R-CNN-You Only Look Once(YOLO)-Salient features-Loss Functions-YOLO architectures

UNIT IV FACE RECOGNITION AND GESTURE RECOGNITION 6

Face Recognition-Introduction-Applications of Face Recognition-Process of Face Recognition-DeepFace solution by Facebook-FaceNet for Face Recognition- Implementation using FaceNet-Gesture Recognition.

UNIT V VIDEO ANALYTICS 6

Video Processing – use cases of video analytics-Vanishing Gradient and exploding gradient problem-RestNet architecture-RestNet and skip connections-Inception Network-GoogleNet architecture-Improvement in Inception v2-Video analytics-RestNet and Inception v3.

30 PERIODS

LIST OF EXERCISES **30 PERIODS**

1. Write a program that computes the T-pyramid of an image.
2. Write a program that derives the quad tree representation of an image using the homogeneity criterion of equal intensity
3. Develop programs for the following geometric transforms: (a) Rotation (b) Change of scale (c) Skewing (d) Affine transform calculated from three pairs of corresponding points (e) Bilinear transform calculated from four pairs of corresponding points.
4. Develop a program to implement Object Detection and Recognition
5. Develop a program for motion analysis using moving edges, and apply it to your image sequences.
6. Develop a program for Facial Detection and Recognition
7. Write a program for event detection in video surveillance system

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO1: Understand the basics of image processing techniques for computer vision and video analysis.
CO2: Explain the techniques used for image pre-processing.
CO3: Develop various object detection techniques.
CO4: Understand the various face recognition mechanisms.
CO5: Elaborate on deep learning-based video analytics.

TEXT BOOK:

1. Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image Processing, Analysis, and Machine Vision", 4nd edition, Thomson Learning, 2013.
2. Vaibhav Verdhan,(2021, Computer Vision Using Deep Learning Neural Network Architectures with Python and Keras,Apress 2021(UNIT-III,IV and V)

REFERENCES

1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer Verlag London
2. Limited,2011.
3. Caifeng Shan, FatihPorikli, Tao Xiang, Shaogang Gong, "Video Analytics for Business Intelligence", Springer, 2012.
4. D. A. Forsyth, J. Ponce, "Computer Vision: A Modern Approach", Pearson Education, 2003.
5. E. R. Davies, (2012), "Computer & Machine Vision", Fourth Edition, Academic Press.

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3	1	2	2	2	3	-	-	-	1	2	1	2	1	1	3
4	1	2	3	2	3	-	-	-	2	2	2	3	2	2	2
5	3	2	1	3	2	-	-	-	2	1	1	3	3	2	1
AVg.	2	1.8	2.2	2.4	2.6	-	-	-	2.2	2	1.4	2	2	1.6	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS338 COMPUTER VISION L T P C

2 0 2 3

COURSE OBJECTIVES:

- To understand the fundamental concepts related to Image formation and processing.
- To learn feature detection, matching and detection
- To become familiar with feature based alignment and motion estimation
- To develop skills on 3D reconstruction
- To understand image based rendering and recognition

UNIT I INTRODUCTION TO IMAGE FORMATION AND PROCESSING 6

Computer Vision - Geometric primitives and transformations - Photometric image formation - The digital camera - Point operators - Linear filtering - More neighborhood operators - Fourier transforms - Pyramids and wavelets - Geometric transformations - Global optimization.

TIRE CRACK DETECTION USING RESNET MODEL

A PROJECT REPORT

Submitted By

ISHWARYA. M	422121104016
JEEVA. A	422121104019
PARKAVI. B	422121104035
SARGUNADEVI. C	422121104043

in partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANGUCHETTYPALAYAM, PANRUTI

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

BONAFIDE CERTIFICATE

Certified that this project report "TIRE CRACK DETECTION USING RESNET MODEL" is the Bonafide work of ISHWARYA. M (422121104016), JEEVA. A (422121104019), PARKAVI. B (422121104035), SARGUNADEVI. C (422121104043) who carried out the project work under my supervision.

SIGNATURE

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Assistant Professor,
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SIGNATURE

Sr. A. PUNITHA JILT, M.Tech.,

HEAD OF THE DEPARTMENT,

Assistant Professor,
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St. Anne's College of Engineering and Technology, Panruti.

Submitted for the project viva-voce held on..27.05.2025

INTERNAL EXAMINER

EXTERNAL EXAMINER

ABSTRACT

In the evolving landscape of automotive safety and maintenance, the assessment of tire health stands as a crucial component, influencing not only vehicle performance but also passenger safety. This project introduces a comprehensive machine learning model designed to classify tire health by leveraging the robust capabilities of deep convolutional neural networks (CNNs), specifically ResNet34 and ResNet50 architectures. These networks, renowned for their depth and ability to learn from residual mappings, have been adapted to analyze and interpret tire tread images, enabling the accurate classification of tire conditions into categories such as 'good' and 'defective'. The methodology encompasses pre-processing of tire image datasets to ensure uniformity and enhance feature recognition, followed by the implementation of ResNet34 and ResNet50 models for feature extraction and classification tasks. The performance of both architectures was meticulously evaluated, revealing their efficacy in capturing the intricate patterns and anomalies indicative of varying tire health statuses. The comparative analysis highlights the strengths of each model in handling complex image-based classification challenges, with ResNet50 demonstrating marginally superior accuracy due to its increased depth and complexity, which is beneficial for capturing finer details in tire tread images. This project not only underscores the potential of deep learning in the automotive industry's shift towards predictive maintenance but also provides a scalable model for future applications in vehicle diagnostics and safety assessments. Methodologically, the project embarked on an extensive preprocessing phase, wherein tire images were standardized to mitigate variations in lighting, angle, and scale.

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	1	2	1	-	-	-	1	-	-	1	-	-	-
2	1	2	-	-	1	-	-	-	-	-	-	1	-	-	-
3	2	3	1	-	1	-	-	-	2	-	-	-	-	-	-
4	3	2	2	2	1	-	-	-	2	-	-	2	-	-	-
5	1	1	-	2	1	-	-	-	-	-	-	1	-	-	-
6	2	2	1	1	1	-	-	-	-	-	-	1	-	-	-
AVg	1.83	2	0.83	1.16	1	-	-	-	0.83	-	-	1	-	-	-

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS355 NEURAL NETWORKS AND DEEP LEARNING L T P C
2 0 2 3

COURSE OBJECTIVES:

- To understand the basics in deep neural networks
- To understand the basics of associative memory and unsupervised learning networks
- To apply CNN architectures of deep neural networks
- To analyze the key computations underlying deep learning, then use them to build and train deep neural networks for various tasks.
- To apply autoencoders and generative models for suitable applications.

UNIT I INTRODUCTION 6

Neural Networks-Application Scope of Neural Networks-Artificial Neural Network: An Introduction-Evolution of Neural Networks-Basic Models of Artificial Neural Network- Important Terminologies of ANNs-Supervised Learning Network.

UNIT II ASSOCIATIVE MEMORY AND UNSUPERVISED LEARNING NETWORKS 6

Training Algorithms for Pattern Association-Autoassociative Memory Network-Heteroassociative Memory Network-Bidirectional Associative Memory (BAM)-Hopfield Networks-Iterative Autoassociative Memory Networks-Temporal Associative Memory Network-Fixed Weight Competitive Nets-Kohonen Self-Organizing Feature Maps-Learning Vector Quantization-Counter propagation Networks-Adaptive Resonance Theory Network.

UNIT III THIRD-GENERATION NEURAL NETWORKS 6

Spiking Neural Networks-Convolutional Neural Networks-Deep Learning Neural Networks-Extreme Learning Machine Model-Convolutional Neural Networks: The Convolution Operation – Motivation – Pooling – Variants of the basic Convolution Function – Structured Outputs – Data Types – Efficient Convolution Algorithms – Neuroscientific Basis – Applications: Computer Vision, Image Generation, Image Compression.

UNIT IV DEEP FEEDFORWARD NETWORKS 6

History of Deep Learning- A Probabilistic Theory of Deep Learning- Gradient Learning – Chain Rule and Backpropagation - Regularization: Dataset Augmentation – Noise Robustness -Early Stopping, Bagging and Dropout - batch normalization- VC Dimension and Neural Nets.

UNIT V RECURRENT NEURAL NETWORKS 6

Recurrent Neural Networks: Introduction – Recursive Neural Networks – Bidirectional RNNs – Deep Recurrent Networks – Applications: Image Generation, Image Compression, Natural Language Processing. Complete Auto encoder, Regularized Autoencoder, Stochastic Encoders and Decoders, Contractive Encoders.

30 PERIODS

LAB EXPERIMENTS: **30 PERIODS**

1. Implement simple vector addition in TensorFlow.
2. Implement a regression model in Keras.
3. Implement a perceptron in TensorFlow/Keras Environment.
4. Implement a Feed-Forward Network in TensorFlow/Keras.
5. Implement an Image Classifier using CNN in TensorFlow/Keras.
6. Improve the Deep learning model by fine tuning hyper parameters.
7. Implement a Transfer Learning concept in Image Classification.
8. Using a pre trained model on Keras for Transfer Learning
9. Perform Sentiment Analysis using RNN
10. Implement an LSTM based Autoencoder in TensorFlow/Keras.
11. Image generation using GAN

Additional Experiments:

12. Train a Deep learning model to classify a given image using pre trained model
13. Recommendation system from sales data using Deep Learning
14. Implement Object Detection using CNN
15. Implement any simple Reinforcement Algorithm for an NLP problem

TOTAL: 60 PERIODS

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO1: Apply Convolution Neural Network for image processing.
CO2: Understand the basics of associative memory and unsupervised learning networks.
CO3: Apply CNN and its variants for suitable applications.
CO4: Analyze the key computations underlying deep learning and use them to build and train deep neural networks for various tasks.
CO5: Apply autoencoders and generative models for suitable applications.

TEXT BOOKS:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016.
2. Francois Chollet, "Deep Learning with Python", Second Edition, Manning Publications, 2021.

REFERENCES:

1. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and TensorFlow", Oreilly, 2018.
2. Josh Patterson, Adam Gibson, "Deep Learning: A Practitioner's Approach", O'Reilly Media, 2017.

3. Charu C. Aggarwal, "Neural Networks and Deep Learning: A Textbook", Springer International Publishing, 1st Edition, 2018.
4. Learn Keras for Deep Neural Networks, Jojo Moolayil, Apress,2018
5. Deep Learning Projects Using TensorFlow 2, Vinita Silaparasetty, Apress, 2020
6. Deep Learning with Python, FRANÇOIS CHOLLET, MANNING SHELTER ISLAND,2017.
7. S Rajasekaran, G A Vijayalakshmi Pai, "Neural Networks, FuzzyLogic and Genetic Algorithm, Synthesis and Applications", PHI Learning, 2017.
8. Pro Deep Learning with TensorFlow, Santanu Pattanayak, Apress,2017
9. James A Freeman, David M S Kapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Addison Wesley, 2003.

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	3	2	3	1	-	-	2	1	-	-	2	2	1
2	3	1	2	1	-	-	-	-	-	1	2	2	-	1	-
3	3	3	3	3	3	1	-	-	2	1	-	-	2	2	1
4	3	3	3	3	3	-	-	-	2	-	2	3	2	2	2
5	1	1	3	2	3	-	-	-	2	-	-	-	1	1	-
AVg.	2.6	2	2.8	2.2	2.4	0.4	0	0	1.6	0.6	0.8	1	1.4	1.6	0.8

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS369 TEXT AND SPEECH ANALYSIS L T P C
2 0 2 3

COURSE OBJECTIVES:

- Understand natural language processing basics
- Apply classification algorithms to text documents
- Build question-answering and dialogue systems
- Develop a speech recognition system
- Develop a speech synthesizer

UNIT I NATURAL LANGUAGE BASICS 6

Foundations of natural language processing – Language Syntax and Structure- Text Preprocessing and Wrangling – Text tokenization – Stemming – Lemmatization – Removing stop-words – Feature Engineering for Text representation – Bag of Words model- Bag of N-Grams model – TF-IDF model

Suggested Activities

- Flipped classroom on NLP
- Implementation of Text Preprocessing using NLTK
- Implementation of TF-IDF models

Suggested Evaluation Methods

- Quiz on NLP Basics
- Demonstration of Programs

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO1: Understand the basics of image processing techniques for computer vision and video analysis.
CO2: Explain the techniques used for image pre-processing.
CO3: Develop various object detection techniques.
CO4: Understand the various face recognition mechanisms.
CO5: Elaborate on deep learning-based video analytics.

TEXT BOOK:

1. Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image Processing, Analysis, and Machine Vision", 4nd edition, Thomson Learning, 2013.
2. Vaibhav Verdhan,(2021, Computer Vision Using Deep Learning Neural Network Architectures with Python and Keras,Apress 2021(UNIT-III,IV and V)

REFERENCES

1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer Verlag London
2. Limited,2011.
3. Caifeng Shan, FatihPorikli, Tao Xiang, Shaogang Gong, "Video Analytics for Business Intelligence", Springer, 2012.
4. D. A. Forsyth, J. Ponce, "Computer Vision: A Modern Approach", Pearson Education, 2003.
5. E. R. Davies, (2012), "Computer & Machine Vision", Fourth Edition, Academic Press.

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	2	2	2	-	-	-	3	3	2	1	2	1	3
2	2	2	3	3	3	-	-	-	3	2	1	1	2	2	1
3	1	2	2	2	3	-	-	-	1	2	1	2	1	1	3
4	1	2	3	2	3	-	-	-	2	2	2	3	2	2	2
5	3	2	1	3	2	-	-	-	2	1	1	3	3	2	1
AVg.	2	1.8	2.2	2.4	2.6	-	-	-	2.2	2	1.4	2	2	1.6	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS338 **COMPUTER VISION** **L T P C**

2 0 2 3

COURSE OBJECTIVES:

- To understand the fundamental concepts related to Image formation and processing.
- To learn feature detection, matching and detection
- To become familiar with feature based alignment and motion estimation
- To develop skills on 3D reconstruction
- To understand image based rendering and recognition

UNIT I **INTRODUCTION TO IMAGE FORMATION AND PROCESSING** **6**

Computer Vision - Geometric primitives and transformations - Photometric image formation - The digital camera - Point operators - Linear filtering - More neighborhood operators - Fourier transforms - Pyramids and wavelets - Geometric transformations - Global optimization.

CCS349 IMAGE AND VIDEO ANALYTICS L T P C

2 0 2 3

COURSE OBJECTIVES:

- To understand the basics of image processing techniques for computer vision.
- To learn the techniques used for image pre-processing.
- To discuss the various object detection techniques.
- To understand the various Object recognition mechanisms.
- To elaborate on the video analytics techniques.

UNIT I INTRODUCTION 6

Computer Vision – Image representation and image analysis tasks - Image representations – digitization – properties – color images – Data structures for Image Analysis - Levels of image data representation - Traditional and Hierarchical image data structures.

UNIT II IMAGE PRE-PROCESSING 6

Local pre-processing - Image smoothing - Edge detectors - Zero-crossings of the second derivative - Scale in image processing - Canny edge detection - Parametric edge models - Edges in multi-speralct images - Local pre-processing in the frequency domain - Line detection by local pre-processing operators - Image restoration.

UNIT III OBJECT DETECTION USING MACHINE LEARNING 6

Object detection– Object detection methods – Deep Learning framework for Object detection– bounding box approach-Intersection over Union (IoU) –Deep Learning Architectures-R-CNN-Faster R-CNN-You Only Look Once(YOLO)-Salient features-Loss Functions-YOLO architectures

UNIT IV FACE RECOGNITION AND GESTURE RECOGNITION 6

Face Recognition-Introduction-Applications of Face Recognition-Process of Face Recognition-DeepFace solution by Facebook-FaceNet for Face Recognition- Implementation using FaceNet-Gesture Recognition.

UNIT V VIDEO ANALYTICS 6

Video Processing – use cases of video analytics-Vanishing Gradient and exploding gradient problem-RestNet architecture-RestNet and skip connections-Inception Network-GoogleNet architecture-Improvement in Inception v2-Video analytics-RestNet and Inception v3.

30 PERIODS

LIST OF EXERCISES **30 PERIODS**

1. Write a program that computes the T-pyramid of an image.
2. Write a program that derives the quad tree representation of an image using the homogeneity criterion of equal intensity
3. Develop programs for the following geometric transforms: (a) Rotation (b) Change of scale (c) Skewing (d) Affine transform calculated from three pairs of corresponding points (e) Bilinear transform calculated from four pairs of corresponding points.
4. Develop a program to implement Object Detection and Recognition
5. Develop a program for motion analysis using moving edges, and apply it to your image sequences.
6. Develop a program for Facial Detection and Recognition
7. Write a program for event detection in video surveillance system

TOTAL: 60 PERIODS

ABSTRACT

Deep learning approach is used to predict the chance of acquiring several types of malignancies, including breast, lung and skin cancer. To find patterns and risk factors linked to each kind of cancer, deep learning algorithms, such as convolutional neural networks and recurrent neural networks, are trained on enormous databases of patient data, including genetic markers, lifestyle variables, and medical history. Deep learning algorithms can accurately forecast an individual's risk of acquiring lung, Skin, breast cancer by evaluating these intricate datasets. Results indicate varied performance across cancer types, with breast, lung, and skin cancer models exhibiting high accuracy (>98%) and lower validation losses, suggesting strong generalization capabilities. These findings high lights the DL's potential in enhancing cancer detection, early diagnosis, and personalized treatment planning.

BONAFIDE CERTIFICATE

Certified that this project report "MULTI CANCER PREDICTION USING DEEP LEARNING" is the Bonafide work of JENISHA L (422121104020), SUSHMITHA A (422121104049), VIJAYALAKSHMI B (422121104058), ANUKA S (422121104301) who carried out the project work under my supervision.

SIGNATURE

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SIGNATURE

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Submitted for the Project Viva-Voce examination held on 27.03.2025

Internal Examiner

External Examiner

MULTI CANCER PREDICTION USING DEEP LEARNING

A PROJECT REPORT

Submitted By

JENISHA L	422121104020
SUSHMITHA A	422121104049
VIJAYALAKSHMI S	422121104058
ASHIKA S	422121104301

in partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

ST.ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY
ANGUCHETTYPALAYAM, PANRUTI

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

Vision-Powered Computing: A Virtual Mouse via Eye Tracking

A PROJECT REPORT

Submitted by

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PIOSHALBLA	422121104036
JAYASRI.B	422121104018

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of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

ST.ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANNA UNIVERSITY::CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY::CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **Vision-Powered Computing: A Virtual Mouse via Eye Tracking** is the bonafide work of **BHAGYASRI.S (422121104009) JAYASRI.B (422121104018) PIOSHALBI.A (422121104036)** who carried out the project work under my supervision.

24/05/2025

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27/05/25

SIGNATURE
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St.Anne's College of Engineering
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Submitted for the Project Viva-Voce examination held on 27.05.2025

Internal Examiner

External Examiner

ABSTRACT

In the field of Human-Computer Interaction (HCI), the demand for hands-free and accessible computing solutions is increasing. Traditional input devices like mice and keyboards impose physical limitations, making them less accessible to individuals with disabilities. To address this challenge, the proposed system, "A Vision-Powered Computing: Virtual Mouse Via Eye Tracking ," introduces an innovative, AI-driven, contactless interface for controlling a computer cursor using eye movements.

This system leverages Computer Vision Techniques, OpenCV, and Python to detect and track the user's eye position, enabling cursor movement, clicking, and scrolling functions. A standard webcam is used to capture real-time video frames, which are processed to analyze gaze direction and blinking patterns. Unlike traditional eye-tracking systems that require specialized hardware, this approach makes use of cost-effective and widely available resources, ensuring accessibility and ease of deployment on PC platforms.

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO1: Understand the basics of image processing techniques for computer vision and video analysis.
CO2: Explain the techniques used for image pre-processing.
CO3: Develop various object detection techniques.
CO4: Understand the various face recognition mechanisms.
CO5: Elaborate on deep learning-based video analytics.

TEXT BOOK:

1. Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image Processing, Analysis, and Machine Vision", 4nd edition, Thomson Learning, 2013.
2. Vaibhav Verdhan,(2021, Computer Vision Using Deep Learning Neural Network Architectures with Python and Keras,Apress 2021(UNIT-III,IV and V)

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4. D. A. Forsyth, J. Ponce, "Computer Vision: A Modern Approach", Pearson Education, 2003.
5. E. R. Davies, (2012), "Computer & Machine Vision", Fourth Edition, Academic Press.

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	2	2	2	-	-	-	3	3	2	1	2	1	3
2	2	2	3	3	3	-	-	-	3	2	1	1	2	2	1
3	1	2	2	2	3	-	-	-	1	2	1	2	1	1	3
4	1	2	3	2	3	-	-	-	2	2	2	3	2	2	2
5	3	2	1	3	2	-	-	-	2	1	1	3	3	2	1
AVg.	2	1.8	2.2	2.4	2.6	-	-	-	2.2	2	1.4	2	2	1.6	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS338 **COMPUTER VISION** **L T P C**

2 0 2 3

COURSE OBJECTIVES:

- To understand the fundamental concepts related to Image formation and processing.
- To learn feature detection, matching and detection
- To become familiar with feature based alignment and motion estimation
- To develop skills on 3D reconstruction
- To understand image based rendering and recognition

UNIT I **INTRODUCTION TO IMAGE FORMATION AND PROCESSING** **6**

Computer Vision - Geometric primitives and transformations - Photometric image formation - The digital camera - Point operators - Linear filtering - More neighborhood operators - Fourier transforms - Pyramids and wavelets - Geometric transformations - Global optimization.

UNIT II **FEATURE DETECTION, MATCHING AND SEGMENTATION** **6**

Points and patches - Edges - Lines - Segmentation - Active contours - Split and merge - Mean shift and mode finding - Normalized cuts - Graph cuts and energy-based methods.

UNIT III **FEATURE-BASED ALIGNMENT & MOTION ESTIMATION** **6**

2D and 3D feature-based alignment - Pose estimation - Geometric intrinsic calibration - Triangulation - Two-frame structure from motion - Factorization - Bundle adjustment - Constrained structure and motion - Translational alignment - Parametric motion - Spline-based motion - Optical flow - Layered motion.

UNIT IV **3D RECONSTRUCTION** **6**

Shape from X - Active rangefinding - Surface representations - Point-based representations- Volumetric representations - Model-based reconstruction - Recovering texture maps and albedosos.

UNIT V **IMAGE-BASED RENDERING AND RECOGNITION** **6**

View interpolation Layered depth images - Light fields and Lumigraphs - Environment mattes - Video-based rendering-Object detection - Face recognition - Instance recognition - Category recognition - Context and scene understanding- Recognition databases and test sets.

30 PERIODS

PRACTICAL EXERCISES: **30 PERIODS**

LABORATORY EXPERIMENTS:

Software needed:

OpenCV computer vision Library for OpenCV in Python / PyCharm or C++ / Visual Studio or or equivalent

- OpenCV Installation and working with Python
- Basic Image Processing - loading images, Cropping, Resizing, Thresholding, Contour analysis, Bolb detection
- Image Annotation – Drawing lines, text circle, rectangle, ellipse on images
- Image Enhancement - Understanding Color spaces, color space conversion, Histogram equialization, Convolution, Image smoothing, Gradients, Edge Detection
- Image Features and Image Alignment – Image transforms – Fourier, Hough, Extract ORB Image features, Feature matching, cloning, Feature matching based image alignment
- Image segmentation using Graphcut / Grabcut
- Camera Calibration with circular grid
- Pose Estimation
- 3D Reconstruction – Creating Depth map from stereo images
- Object Detection and Tracking using Kalman Filter, Camshift

1. docs.opencv.org
2. https://opencv.org/opencv-free-course/

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of this course, the students will be able to:

CO1: To understand basic knowledge, theories and methods in image processing and computer vision.

CO2: To implement basic and some advanced image processing techniques in OpenCV.

CO3: To apply 2D a feature-based based image alignment, segmentation and motion estimations.

CO4: To apply 3D image reconstruction techniques

CO5: To design and develop innovative image processing and computer vision applications.

TEXT BOOKS:

1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer- Texts in Computer Science, Second Edition, 2022.
2. Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Pearson Education, Second Edition, 2015.

REFERENCES:

1. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004.
2. Christopher M. Bishop; Pattern Recognition and Machine Learning, Springer, 2006
3. E. R. Davies, Computer and Machine Vision, Fourth Edition, Academic Press, 2012.

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
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2	3	3	3	2	3	-	1	-	2	1	2	2	3	1	2
3	3	3	2	2	3	-	-	-	1	1	2	2	3	2	2
4	2	3	3	2	3	-	-	-	2	1	2	3	2	2	3
5	2	3	3	2	2	2	-	-	3	1	2	3	3	3	3
AVg.	2.6	2.6	2.4	1.8	2.4	0.4	0.25	0	2	1	2.2	2.4	2.6	1.8	2.2

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS334 BIG DATA ANALYTICS L T P C
2 0 2 3

COURSE OBJECTIVES:

- To understand big data.
- To learn and use NoSQL big data management.
- To learn mapreduce analytics using Hadoop and related tools.
- To work with map reduce applications
- To understand the usage of Hadoop related tools for Big Data Analytics

UNIT I UNDERSTANDING BIG DATA 5

Introduction to big data – convergence of key trends – unstructured data – industry examples of big data – web analytics – big data applications– big data technologies – introduction to Hadoop – open

SMART COMPLAINT TRACKING AND ESCALATION SYSTEM

A PROJECT REPORT

Submitted by

G. SOWMIYA	422121104046
S. KAVIYA	422121104023
D. NATHIYA	422121104033

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of

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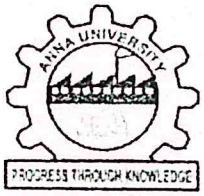

ANNA UNIVERSITY :: CHENNAI 600 025

MAY 2025

BONAFIDE CERTIFICATE

Certified that this project report **"PEDNet:Smart Complaint Tracking And Escalation System"** is the bonafide work of **SOWMIYA. G (422121104046), KAVIYA. S (422121104023), NATHIYA. D (422121104033)** who carried out the project work under my supervision.

SIGNATURE

Mrs. M. SUBATHIRADEVI, M.Tech.,

SUPERVISOR,

ASSISTANT PROFESSOR,

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SIGNATURE

Sr. A. PUNITHA JILT, M.Tech.,

HEAD OF THE DEPARTMENT,

ASSISTANT PROFESSOR,

Department of Computer Science and Engineering,

St. Anne's College of Engineering and Technology, Panruti.

Submitted for the project viva - voce held on 27/05/2025

INTERNAL EXAMINER

EXTERNAL EXAMINER

ABSTRACT

In today's fast-paced digital world, effective governance relies on prompt and efficient public grievance redressal. However, traditional complaint systems are often slow, inefficient, and lack transparency, leading to frustration among citizens and delays in resolving critical issues. To address these challenges, this project proposes a digital petition management system designed to streamline the process of lodging and resolving public grievances efficiently. This system provides a centralized platform where citizens can register their complaints, submit petitions with detailed descriptions, attach relevant images, and provide GPS-based location proof to ensure the authenticity of their issues. Built using Node.js, Express.js, React.js, and MongoDB, the platform ensures secure authentication, role-based access, and a user-friendly dashboard for both complainants and administrators. extracting and comparing different characteristics between legitimate and phishing URLs, the suggested method uses gradient boosting classifier to identify phishing URLs. The studies' findings demonstrate that the suggested approach successfully identifies legitimate websites from bogus ones in real time.

TEXT BOOKS:

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
3. Sadalage, Pramod J. "NoSQL distilled", 2013

REFERENCES:

1. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
2. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
3. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
4. Alan Gates, "Programming Pig", O'Reilley, 2011.

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	3	3	3	-	-	-	2	2	3	1	1	3	3
2	3	3	2	3	2	-	-	-	2	2	3	3	2	3	2
3	3	3	3	2	3	-	-	-	2	2	1	2	2	3	3
4	2	3	3	3	3	-	-	-	2	2	3	2	3	3	2
5	3	3	3	3	3	-	-	-	3	1	3	2	3	2	3
AVg.	2.8	3	2.8	2.8	2.8	-	-	-	2.2	1.8	2.6	2	2.2	2.8	2.6

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS375 WEB TECHNOLOGIES L T P C
2 0 2 3

COURSE OBJECTIVES:

- To understand different Internet Technologies
- To learn java-specific web services architecture
- To Develop web applications using frameworks

UNIT I WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0 7

Web Essentials: Clients, Servers and Communication – The Internet – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations. Bootstrap Framework

UNIT II CLIENT SIDE PROGRAMMING 6

Java Script: An introduction to JavaScript–JavaScript DOM Model-Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript- JSON introduction – Syntax – Function Files.

UNIT III SERVER SIDE PROGRAMMING 5

Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies- DATABASE CONNECTIVITY: JDBC.

UNIT IV PHP and XML 6

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions- Form Validation. XML: Basic XML- Document Type Definition- XML Schema, XML Parsers and Validation, XSL ,

UNIT V INTRODUCTION TO ANGULAR and WEB APPLICATIONS FRAMEWORKS 6

Introduction to AngularJS, MVC Architecture, Understanding ng attributes, Expressions and data binding, Conditional Directives, Style Directives, Controllers, Filters, Forms, Routers, Modules, Services; Web Applications Frameworks and Tools – Firebase- Docker- Node JS- React- Django- UI & UX.

COURSE OUTCOMES:

CO1: Construct a basic website using HTML and Cascading Style Sheets

CO2: Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.

CO3: Develop server side programs using Servlets and JSP.

CO4: Construct simple web pages in PHP and to represent data in XML format.

CO5: Develop interactive web applications.

30 PERIODS

PRACTICAL EXERCISES: **30 PERIODS**

List Of Experiments:

1. Create a web page with the following using HTML.
   - To embed an image map in a web page.
   - To fix the hot spots.
   - Show all the related information when the hot spots are clicked.
2. Create a web page with all types of Cascading style sheets.
3. Client Side Scripts for Validating Web Form Controls using DHTML.
4. Installation of Apache Tomcat web server.
5. Write programs in Java using Servlets:
   - To invoke servlets from HTML forms.
   - Session Tracking.
6. Write programs in Java to create three-tier applications using JSP and Databases
   - For conducting on-line examination.
   - For displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
7. Programs using XML – Schema – XSLT/XSL.

TOTAL:60 PERIODS

TEXTBOOKS

1. Deitel and Deitel and Nieto, Internet and World Wide Web - How to Program, Prentice Hall, 5th Edition, 2011.
2. Jeffrey C and Jackson, Web Technologies A Computer Science Perspective, Pearson Education, 2011.
3. Angular 6 for Enterprise-Ready Web Applications, Doguhan Uluca, 1st edition, Packt Publishing

REFERENCES:

1. Stephen Wynkoop and John Burke "Running a Perfect Website", QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, 2009.

3. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India, 2011.
4. UttamK.Roy, "Web Technologies", Oxford University Press, 2011.
5. Angular: Up and Running: Learning Angular, Step by Step, Shyam Seshadri, 1st edition, O'Reilly

CO's-PO's & PSO's MAPPING

CO's	PO's												PSO's		
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3	1	1	3	2	3	-	-	-	1	2	1	1	1	2	1
4	2	3	3	1	2	-	-	-	3	1	2	2	2	2	2
5	1	2	3	2	2	-	-	-	2	1	3	1	1	1	2
AVg.	1.8	2	2.8	1.8	2.4	-	-	-	1.8	1.8	2	1.6	1.8	1.8	2

1 - low, 2 - medium, 3 - high, '-' - no correlation

CCS332 APP DEVELOPMENT L T P C
2 0 2 3

COURSE OBJECTIVES:

- To learn development of native applications with basic GUI Components
- To develop cross-platform applications with event handling
- To develop applications with location and data storage capabilities
- To develop web applications with database access

UNIT I FUNDAMENTALS OF MOBILE & WEB APPLICATION DEVELOPMENT 6

Basics of Web and Mobile application development, Native App, Hybrid App, Cross-platform App, What is Progressive Web App, Responsive Web design,

UNIT II NATIVE APP DEVELOPMENT USING JAVA 6

Native Web App, Benefits of Native App, Scenarios to create Native App, Tools for creating Native App, Cons of Native App, Popular Native App Dev elopment Frameworks, Java & Kotlin for Android, Swift & Objective-C for iOS, Basics of React Native, Native Components, JSX, State, Props

UNIT III HYBRID APP DEVELOPMENT 6

Hybrid Web App, Benefits of Hybrid App, Criteria for creating Native App, Tools for creating Hybrid App, Cons of Hybrid App, Popular Hybrid App Development Frameworks, Ionic, Apache Cordova,

UNIT IV CROSS-PLATFORM APP DEVELOPMENT USING REACT-NATIVE 6

What is Cross-platform App, Benefits of Cross-platform App, Criteria for creating Cross-platform App, Tools for creating Cross-platform App, Cons of Cross-platform App, Popular Cross-platform App Development Frameworks, Flutter, Xamarin, React-Native, Basics of React Native, Native Components, JSX, State, Props

UNIT V NON-FUNCTIONAL CHARACTERISTICS OF APP FRAMEWORKS 6

Comparison of different App frameworks, Build Performance, App Performance, Debugging capabilities, Time to Market, Maintainability, Ease of Development, UI/UX, Reusability

AI POWERED STUDY AND STUDENT ASSISTANT

A PROJECT REPORT

Submitted by

V. VASANTHAKUMAR	**(422121104056)**
R. BALAMURUGAN	**(422121104008)**
A. LOGITH KUMAR	**(422117104029)**
V. VINOTH	**(422121104059)**

in partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

ST.ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANNA UNIVERSITY::CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY::CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report "**AI POWERED STUDY AND STUDENT ASSISTANT**" is the bonafide work of **V. VASANTHAKUMAR (422121104056), R. BALAMURUGAN (422121104008), A. LOGITH KUMAR (422117104029), V. VINOTH (422121104059)** who carried out the project work under my supervision.

SIGNATURE
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SUPERVISOR,
Associate Professor,
Department of Computer Science
and Engineering,
St.Anne's College of Engineering
and Technology, Panruti.

SIGNATURE
Sr. A. PUNITHA JILT, M.Tech.,
HEAD OF THE DEPARTMENT,
Department of Computer Science
and Engineering,
St.Anne's College of Engineering
and Technology, Panruti.

Submitted for the Project Viva-Voce examination held on 27/05/2025

Internal Examiner

27/5/25
External Examiner

ABSTRACT

The AI Study Assistant Using JavaScript (React, Node.js, and API Key Integration) is a web-based conversational assistant that enables real-time interactions with users by leveraging artificial intelligence. This project integrates Open AI's GPT-4 API into a full-stack JavaScript application, creating an intelligent Study Assistant capable of generating dynamic and contextually relevant responses. The Study Assistant is designed to simulate human-like conversations, enhancing user engagement and providing instant replies based on natural language input.

The system is built using React.js for the frontend, providing an intuitive and user-friendly chat interface, while the backend, developed using Node.js and Express.js, acts as an intermediary between the frontend and the AI model, processing API requests securely and efficiently. This Study Assistant dynamically processes user inputs, understands context, and formulates relevant replies on the go, making it suitable for applications such as customer service automation, AI-driven tutoring systems, virtual assistants, and knowledge-based inquiry platforms.

This project demonstrates how modern web technologies can seamlessly integrate with AI services, offering a scalable and interactive Study Assistant experience for various domains. By combining JavaScript-based frontend and backend technologies with AI-driven language models, this Study Assistant serves as a foundation for future advancements in AI-powered web applications.

TEXT BOOKS:

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
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4	2	3	3	1	2	-	-	-	3	1	2	2	2	2	2
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AVg.	1.8	2	2.8	1.8	2.4	-	-	-	1.8	1.8	2	1.6	1.8	1.8	2

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CCS332 APP DEVELOPMENT L T P C
2 0 2 3

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UNIT V NON-FUNCTIONAL CHARACTERISTICS OF APP FRAMEWORKS 6

Comparison of different App frameworks, Build Performance, App Performance, Debugging capabilities, Time to Market, Maintainability, Ease of Development, UI/UX, Reusability

/

B|

SMART LIGHTNING ARRESTER WITH ENERGY HARVESTING AND EARLY WARNING SYSTEM FOR ENHANCED SAFETY IN FIREWORK INDUSTRY

A PROJECT REPORT

Submitted by

ADHIRAI V	**422121105002**
ASRAF ALI A	**422121105006**
JAGANATHAN S	**422121105018**
VINOTH M	**422121105311**

in partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

in

ELECTRICAL AND ELECTRONICS ENGINEERING

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report "**SMART LIGHTNING ARRESTER WITH ENERGY HARVESTING AND EARLY WARNING SYSTEM FOR ENHANCED SAFETY IN FIREWORK INDUSTRY**" is the bonafide work of " **ADHIRAI. V, ASRAF ALI. A, JEGANATHAN. S, VINOTH. M** " who carried out the project work under my supervision.

SIGNATURE

V.Balaji

HEAD OF THE DEPARTMENT

Department of Electrical and Electronics Engineering,

St. Anne's College of Engineering and Technology,

Panruti.

SIGNATURE 29/5/25

J. Ramesh

SUPERVISOR

Assistant Professor,

Department of Electrical and Electronics Engineering,

St. Anne's College of Engineering and Technology,

Panruti.

Submitted for the university examination held on 30.5.25

30/5/25

INTERNAL EXAMINER

30/5/25

EXTERNAL EXAMINER

ABSTRACT

➢Lightning strikes pose a significant threat to high-risk facilities, including **oil and gas plants, mines, explosive storage sites such as firework industry** , and **data centres**. These environments house sensitive equipment, hazardous materials, and critical infrastructure that, if struck, can suffer severe damage, leading to costly downtime or, worse, catastrophic incidents like fires or explosions.

➢Therefore, to reduce the risk of the firework accident in Tamilnadu, we have proposed the advanced lightning protection system which has isolated LPS to reduce the risk of step and touch potential from lightning strikes.

➢Aside from installation purpose we have focused on the safety through grounding filters through natural material to make it cost effective.

➢And also speciality of our project is to harvest energy from lightning safely which is only about 10 % of energy using **Early Streamer Emision** Lightning arrester and it can be used as sustainable renewable energy.

EE3701 HIGH VOLTAGE ENGINEERING L T P C
3 0 0 3

COURSE OBJECTIVES:

- Various types of over voltages in power system and protection methods.
- Generation of over voltages in laboratories.
- Measurement of over voltages.
- Nature of Breakdown mechanism in solid, liquid and gaseous dielectrics.
- Testing of power apparatus and insulation coordination.

UNIT I OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS 9

Causes of over voltages and its effects on power system – Lightning, switching surges and temporary over voltages – Reflection and Refraction of Travelling waves- protection against over voltages_ Insulation Coordination.

UNIT II DIELECTRIC BREAKDOWN 9

Properties of Dielectric materials - Gaseous breakdown in uniform and non-uniform fields –Corona discharges – Vacuum breakdown – Conduction and breakdown in pure and commercial liquids, Maintenance of oil Quality – Breakdown mechanisms in solid and composite dielectrics- Applications of insulating materials in electrical equipment.

UNIT III GENERATION AND MEASUREMENTS OF HIGH VOLTAGES AND HIGH CURRENTS 9

Generation of High DC, AC, impulse voltages and currents - Analysis of DC/AC and Impulse generator circuits - Tripping and control of impulse generators, Measurement of High voltages and High currents – High Resistance with series ammeter – Dividers - Resistance, Capacitance and Mixed dividers - Peak Voltmeter, Generating Voltmeters, Electrostatic Voltmeters – Sphere Gaps, High current shunts- Digital techniques in high voltage measurement.

UNIT IV HIGH VOLTAGE TESTING & INSULATION COORDINATION 9

High voltage testing of electrical power apparatus- International and Indian standards – Power frequency, impulse voltage and DC testing of Insulators, circuit breakers, bushing, isolators and transformers - Insulation Coordination.

UNIT V APPLICATION IN INDUSTRY 9

Introduction – electrostatic applications- electrostatic precipitation, separation, painting / coating, spraying, imaging, printing, Transport of materials – manufacturing of sand paper – Smoke particle detector – Electrostatic spinning, pumping, propulsion – Ozone generation – Biomedical applications.

TOTAL: 45 PERIODS

TEXT BOOKS

1. M.S.Naidu and V. Kamaraju, 'High Voltage Engineering', Tata McGraw Hill, Fifth Edition, 2013.
2. E. Kuffel and W.S. Zaengl, J.Kuffel, 'High voltage Engineering fundamentals', Newnes Second Edition, Elsevier , New Delhi, 2005.
3. C.L. Wadhwa, 'High voltage Engineering', New Age International Publishers, Fourth Edition, 2020.

REFERENCES

1. L.L.Alston, High Voltage Technology, Oxford University Press, First Indian Edition 2006.
2. C.L.Wadhwa, High voltage Engineering, New Age International Publishers, Fourth Edition,

B2

SMART ENERGY HARVESTING SYSTEM USING EMI AND THERMAL ENERGY FROM TRANSMISSION LINES WITH IoT MONITORING

A PROJECT REPORT

Submitted by

JEGATHESWARI. A	**422121105020**
ELUMALAI. G	**422121105013**
MICHAEL AASIC. B	**422121105021**
SOWMIYA . S	**422121105035**

in partial fulfillment for the award of the degree of

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BONAFIDE CERTIFICATE

Certified that this project report "**SMART ENERGY HARVESTING SYSTEM USING EMI AND THERMAL ENERGY FROM TRANSMISSION LINES WITH IoT MONITORING**" is the bonafide work of **"JEGATHESWARI. A, ELUMALAI.G, MICHAEL AASIC. B, SOWMIYA . S"** who carried out the project work under my supervision.

SIGNATURE

V. Balaji

HEAD OF THE DEPARTMENT

Department of Electrical and Electronics Engineering,

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SIGNATURE

V. Yogambari

SUPERVISOR

Assistant Professor

Department of Electrical and Electronics Engineering,

St. Anne's College of Engineering and Technology Panruti.

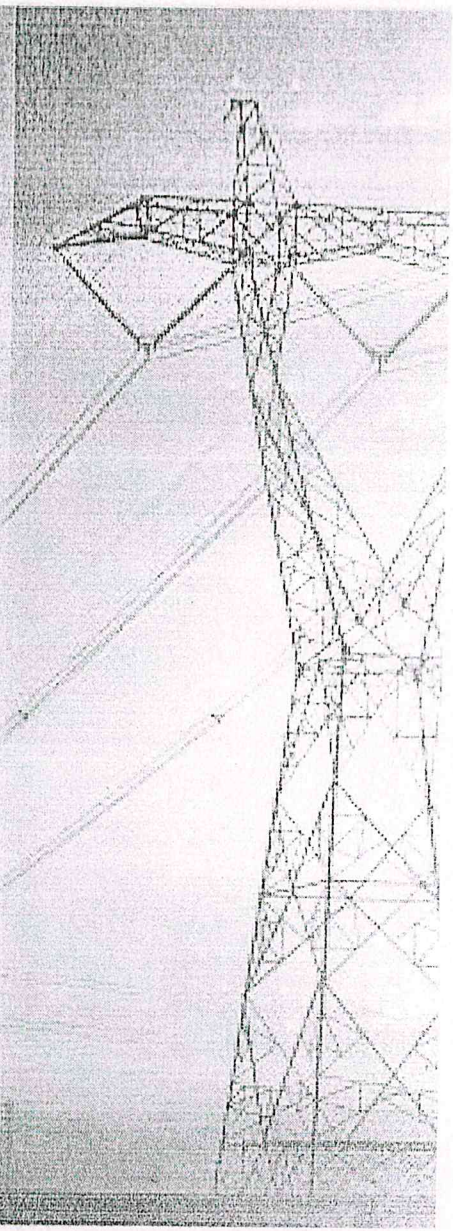
Submitted for the university examination held on 30/05/2025

INTERNAL EXAMINER 30/5/25

EXTERNAL EXAMINER 30/05/25

ABSTRACT

- This project introduces a novel smart energy harvesting system that captures electromagnetic interference (EMI) and thermal energy from transmission lines, converting them into usable electrical power.
- It employs RF-to-DC converters and thermoelectric generators (TEGs) for energy capture, while DC-DC choppers regulate voltage for storage in supercapacitors and batteries.
- An Arduino microcontroller manages real-time monitoring, supported by an ESP8266 module for IoT-based remote data transmission. AI and machine learning algorithms predict energy output and optimize storage efficiency.
- This system offers a sustainable, data-driven solution for industrial environments, integrating renewable energy harvesting with intelligent energy management to enhance grid resilience and reduce power wastage.



EE3007 **SMART GRID** LT P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the evolution of Smart and Interconnected energysystems.
- To understand the various challenges and benefits of smart grid and the national and international initiatives taken
- To understand the concepts related with transmission and distribution in smart grid technologies.
- To get an insight of the various smart measurementtechnologies.
- To understand the various computing technologies for Smart Operation of the Grid.

UNIT I INTRODUCTION **(7+2 SKILL) 9**

Evolution of Energy Systems, Concept, Definitions and Need, Difference between Conventional & Smart Grid, Drivers, structures, functions, opportunities, challenges and benefits of Smart Grid, Basics of Micro grid, National and International Initiatives in Smart Grid.

UNIT II SMART METERING **(7+2 SKILL) 9**

Introduction to Advanced Metering infrastructure (AMI) - drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Real time management and control, Phasor Measurement Unit (PMU).

UNIT III SMART GRID TECHNOLOGIES (Transmission) **(7+2 SKILL) 9**

Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation, Transmission systems: EMS, Wide area Monitoring, Protection and control.

UNIT IV SMART GRID TECHNOLOGIES (Distribution) **(7+2 SKILL) 9**

DMS, Volt/VAr control, Fault Detection, Isolation and service restoration, Outage management, High-Efficiency Distribution Transformers, Phase Shifting Transformers, Electric Vehicles.

UNIT V HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS **(7+2 SKILL) 9**

Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN), Broadband over Power line (BPL), IP based Protocols, Computing technologies for Smart Grid applications (Web Service to CLOUD Computing), Role of big data and IoT, Cyber Security for Smart Grid.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Smart Grids Advanced Technologies and Solutions, Second Edition, Edited by Stuart Borlase,CRC, 2018.
2. Janaka Ekanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", John Wiley,2012
3. James Momoh ,Smart Grid Fundamentals of Design and Analysis, IEEE press 2012.

REFERENCES:

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3. X. Fang, S. Misra, G. Xue and D. Yang, "Smart Grid — The New and Improved Power Grid: A Survey," in IEEE Communications Surveys & Tutorials, vol. 14, no. 4, pp. 944-980, Fourth Quarter 2012. doi: 10.1109/SURV.2011.101911.00087.

B-3

SMART ENHANCEMENT OF ELECTRIC V2V COMMUNICATION SYSTEM USING IOT IN ITS

A PROJECT REPORT

Submitted by

SIVABALAN B.L	**422121105033**
MEGHARJUN S	**422121105306**
UMAR BIN HUSSAIN M	**422121105310**

in partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

in

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ST.ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANNA UNIVERSITY::CHENNAI 600 025

MAY 2025

BONAFIDE CERTIFICATE

Certified that this project report "SMART ENHANCEMENT OF ELECTRIC V2V COMMUNICATION SYSTEM USING IOT IN ITS" is the bonafide work of SIVABALAN B.L (422121105033), MEGHARJUN S (422121105306), UMAR BIN HUSSAIN M (422121105310) who carried out the project work under my supervision.

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Mr.V.BALAJI, M.E,
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Mr.A.SUNDARAPANDIYAN, M.E,
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Submitted for the Project Viva-Voce examination held on 30/05/2025

Internal Examiner

External Examiner

ABSTRACT

Intelligent Transportation Systems (ITSs) have grown rapidly to accommodate the increasing need for safer, more efficient, and environmentally friendly transportation options. These systems cover a wide range of applications, from transportation control and management to self- driving vehicles to improve mobility while tackling urbanization concerns. It focuses on the different types of communication architectures that are out there, including decentralized mesh networks, cloud-integrated hubs, Iot's and etc... this future technological advancements, encouraging the development of robust and interconnected V2V communication systems in ITSs.

EE3007 **SMART GRID** LT P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the evolution of Smart and Interconnected energysystems.
- To understand the various challenges and benefits of smart grid and the national and international initiatives taken
- To understand the concepts related with transmission and distribution in smart grid technologies.
- To get an insight of the various smart measurement technologies.
- To understand the various computing technologies for Smart Operation of the Grid.

UNIT I INTRODUCTION **(7+2 SKILL) 9**

Evolution of Energy Systems, Concept, Definitions and Need, Difference between Conventional & Smart Grid, Drivers, structures, functions, opportunities, challenges and benefits of Smart Grid, Basics of Micro grid, National and International Initiatives in Smart Grid.

UNIT II SMART METERING **(7+2 SKILL) 9**

Introduction to Advanced Metering infrastructure (AMI) - drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Real time management and control, Phasor Measurement Unit (PMU).

UNIT III SMART GRID TECHNOLOGIES (Transmission) **(7+2 SKILL) 9**

Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation, Transmission systems: EMS, Wide area Monitoring, Protection and control.

UNIT IV SMART GRID TECHNOLOGIES (Distribution) **(7+2 SKILL) 9**

DMS, Volt/VAr control, Fault Detection, Isolation and service restoration, Outage management, High-Efficiency Distribution Transformers, Phase Shifting Transformers, Electric Vehicles.

UNIT V HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS **(7+2 SKILL) 9**

Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN), Broadband over Power line (BPL), IP based Protocols, Computing technologies for Smart Grid applications (Web Service to CLOUD Computing), Role of big data and IoT, Cyber Security for Smart Grid.

TOTAL: 45 PERIODS

TEXT BOOKS:

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B- 4

INTEGRATED CHARGING SYSTEM FOR ELECTRIC VEHICLES

A PROJECT REPORT

Submitted by

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NIJANTHKUMAR D	**422121105308**

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ANNA UNIVERSITY :: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY : CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"INTEGRATED CHARGING SYSTEM FOR ELECTRIC VEHICLES"** is the bonafide work of **"A. AKASH, V. HARIHARAN, K. MOHANRAJ, D. NIJANTHKUMAR"** who carried out the project work under my supervision.

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A. Sundara Pandiyan

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INTERNAL EXAMINER

EXTERNAL EXAMINER

Abstract

- The rapidly developing electric vehicles (EVs) calls for improvement in the charging system for the high-voltage (HV) and low-voltage (LV) batteries in EVs.
- In the conventional EV charger, wireless power transfer (WPT), onboard charger (OBC), and auxiliary power module (APM) are three separate structures.
- This project proposes an integrated charger for WPT, OBC, and APM by sharing power conversion stages with the advantages of cost effectiveness and high-power density.

Abstract

- The transformer of OBC can be seen as two strongly coupled coils, and the secondary-side coil can be loosely coupled with the transmitting coil of the WPT system, serving as a receiving coil.
- A transformer can be employed on the receiving side to integrate the APM with WPT.
- In this way, the receiving coil, the compensation network, and the power electronics converter can be shared.
- The integrated structure can work in three modes.
  - In the first mode (wireless charging mode) and
  - the second mode (conductive charging mode), the utility delivers power to the HV and LV batteries simultaneously.
  - In the third mode (HV-LV mode), the LV battery is charged by the HV battery through APM.

EE3007 SMART GRID LT P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the evolution of Smart and Interconnected energy systems.
- To understand the various challenges and benefits of smart grid and the national and international initiatives taken
- To understand the concepts related with transmission and distribution in smart grid technologies.
- To get an insight of the various smart measurement technologies.
- To understand the various computing technologies for Smart Operation of the Grid.

UNIT I INTRODUCTION (7+2 SKILL) 9

Evolution of Energy Systems, Concept, Definitions and Need, Difference between Conventional & Smart Grid, Drivers, structures, functions, opportunities, challenges and benefits of Smart Grid, Basics of Micro grid, National and International Initiatives in Smart Grid.

UNIT II SMART METERING (7+2 SKILL) 9

Introduction to Advanced Metering infrastructure (AMI) - drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Real time management and control, Phasor Measurement Unit (PMU).

UNIT III SMART GRID TECHNOLOGIES (Transmission) (7+2 SKILL) 9

Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation, Transmission systems: EMS, Wide area Monitoring, Protection and control.

UNIT IV SMART GRID TECHNOLOGIES (Distribution) (7+2 SKILL) 9

DMS, Volt/VAr control, Fault Detection, Isolation and service restoration, Outage management, High-Efficiency Distribution Transformers, Phase Shifting Transformers, Electric Vehicles.

UNIT V HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS (7+2 SKILL) 9

Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN), Broadband over Power line (BPL), IP based Protocols, Computing technologies for Smart Grid applications (Web Service to CLOUD Computing), Role of big data and IoT, Cyber Security for Smart Grid.

TOTAL: 45 PERIODS

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REFERENCES:

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3. X. Fang, S. Misra, G. Xue and D. Yang, "Smart Grid — The New and Improved Power Grid: A Survey," in IEEE Communications Surveys & Tutorials, vol. 14, no. 4, pp. 944-980, Fourth Quarter 2012. doi: 10.1109/SURV.2011.101911.00087.

B5

DRIVING – CHARGING INTEGRATED CONTROLLER FOR ELECTRIC VEHICLES

A PROJECT REPORT

Submitted by

DENIS S	**422121105009**
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JANA M	**422121105019**
ANBU A	**422121105302**

in partial fulfillment for the award of the degree

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in

ELECTRICAL AND ELECTRONICS ENGINEERING

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ANNA UNIVERSITY :: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY : CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"DRIVING – CHARGING INTEGRATED CONTROLLER FOR ELECTRIC VEHICLES"** is the bonafide work of **"S. DENIS, M. DISHAN, M. JANA, A. ANBU"** who carried out the project work under my supervision.

V.B 29/5/25

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V. Balaji

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Submitted for the university examination held on 30/05/25

30/5/25

INTERNAL EXAMINER

30/5/25

EXTERNAL EXAMINER

Abstract

- Motor driving technology and battery charging technology are the two core technologies of electric vehicles (EVs).
- They have a profound impact on the performance and mileage of EVs.
- Based on the topology of a traditional EV motor controller, this project employs the time-sharing multiplexing insulated gate bipolar transistor (IGBT) power module form to expand the functions of the motor controller.
- This project proposes an integrated driving–charging controller structure that enables the controller to realize the motor driving and on-board charging simultaneously.
- A decoupling analysis was performed at the topology level, mathematical models of two bidirectional converters in the integrated topology were established, and a reasonable control strategy for the double-closed-loop control system was designed.
- The simulation system was built in Simulink, and the simulation results verified the effectiveness of the system topology and control strategy. The experimental to be done to demonstrated the driving–charging integrated controller's feasibility for electric vehicles.

EE3007 SMART GRID LT P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the evolution of Smart and Interconnected energysystems.
- To understand the various challenges and benefits of smart grid and the national and international initiatives taken
- To understand the concepts related with transmission and distribution in smart grid technologies.
- To get an insight of the various smart measurementtechnologies.
- To understand the various computing technologies for Smart Operation of the Grid.

UNIT I INTRODUCTION (7+2 SKILL) 9

Evolution of Energy Systems, Concept, Definitions and Need, Difference between Conventional & Smart Grid, Drivers, structures, functions, opportunities, challenges and benefits of Smart Grid, Basics of Micro grid, National and International Initiatives in Smart Grid.

UNIT II SMART METERING (7+2 SKILL) 9

Introduction to Advanced Metering infrastructure (AMI) - drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Real time management and control, Phasor Measurement Unit (PMU).

UNIT III SMART GRID TECHNOLOGIES (Transmission) (7+2 SKILL) 9

Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation, Transmission systems: EMS, Wide area Monitoring, Protection and control.

UNIT IV SMART GRID TECHNOLOGIES (Distribution) (7+2 SKILL) 9

DMS, Volt/VAr control, Fault Detection, Isolation and service restoration, Outage management, High-Efficiency Distribution Transformers, Phase Shifting Transformers, Electric Vehicles.

UNIT V HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS (7+2 SKILL) 9

Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN), Broadband over Power line (BPL), IP based Protocols, Computing technologies for Smart Grid applications (Web Service to CLOUD Computing), Role of big data and IoT, Cyber Security for Smart Grid.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Smart Grids Advanced Technologies and Solutions, Second Edition, Edited by Stuart Borlase,CRC, 2018.
2. Janaka Ekanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", John Wiley,2012
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B-6

GREY WOLF OPTIMIZATION ALGORITHM BASED ECONOMIC DISPATCH

A PROJECT REPORT

Submitted by

PREM S	**422121105027**
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VISHNUCHANDHIRAN T	**422121105042**

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ELECTRICAL AND ELECTRONICS ENGINEERING

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ANNA UNIVERSITY :: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY : CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"GREY WOLF OPTIMIZATION ALGORITHM BASED ECONOMIC DISPATCH"** is the bonafide work of **"S.PREM, S. PREMKUMAR, S. SURESHKUMAR, T.VISHNUCHANDHIRAN "** who carried out the project work under my supervision.

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Submitted for the university examination held on 30-5-25

INTERNAL EXAMINER

EXTERNAL EXAMINER

ABSTRACT

- Dynamic economic dispatch is a economic dispatch combination with renewable energy has recently attracted much attention.
- It is a problem of determining the output power of each generating unit of the power system such that the total fuel cost is minimum by considering all the system constraints like generation limits, renewable energy generation etc.
- The project is to obtain the feasible solution of optimal generation cost for the power system by using Grey Wolf Optimization Algorithm (GWO).
- GWO is most advanced and fastest method for optimization problem and can be implemented for any generated bus data in power system.

EE3602 POWER SYSTEM OPERATION AND CONTROL L T P C
3 0 0 3

COURSE OBJECTIVES:

To impart knowledge on,

- The significance of power system operation and control.
- Real power– frequency interaction and design of power– frequency controller.
- Reactive power– voltage interaction and the compensators for maintaining the voltage profile.
- The generation scheduling and economic operation of power system.
- SCADA and its application for real time operation and control of power systems.

UNIT I INTRODUCTION 9

Power scenario in Indian grid – National and Regional load dispatching centres – Requirements of good power system – Necessity of voltage and frequency regulation – real power vs frequency and reactive power vs voltage control loops - System load variation, load curves – Load forecasting – Computational methods in load forecasting – Load shedding and Islanding – deregulation - Basics of electrical energy tariff.

UNIT II REAL POWER FREQUENCY CONTROL 9

Basics of speed governing mechanisms and modelling – Speed regulation of two generators in parallel Load Frequency Control (LFC) of single area system – Static and dynamic analysis – LFC of two area system –Tie line modelling – Block diagram representation of two area system – Static and dynamic analysis – Tie line with frequency bias control – State variable model – Integration of economic dispatch control with LFC.

UNIT III REACTIVE POWER – VOLTAGE CONTROL 9

Generation and absorption of reactive power – Basics of reactive power control – Automatic Voltage Regulator (AVR) – Brushless AC excitation system – Block diagram representation of AVR loop static and dynamic analysis – Stability compensation – Voltage drop in transmission line – Methods of reactive power injection – Tap changing transformer, SVC and STATCOM for voltage control.

UNIT IV ECONOMIC OPERATION OF POWER SYSTEM 9

Statement of economic dispatch problem – Input and output characteristics of thermal plant incremental cost curve – Optimal operation of thermal units without and with transmission losses (no derivation of transmission loss coefficients) – Lambda–iteration method – Base point and participation factors method. Statement of Unit Commitment (UC) problem – Constraints on UC problem – Solution of UC problem using priority list – Special aspects of short term and long-term hydrothermal scheduling problems.

UNIT V COMPUTER AIDED CONTROL OF POWER SYSTEM 9

Need of computer control of power system – Concept of energy control centers and functions – PMU system monitoring, Data acquisition and controls – System hardware configurations – SCADA and EMS functions – State estimation – Measurements and errors – Weighted least square estimation – Various operating states – State transition diagram.

TOTAL: 45 PERIODS

TEXTBOOKS:

1. Olle. I. Elgerd, 'Electric Energy Systems theory – An introduction', McGraw Hill Education Pvt. Ltd., New Delhi, 2nd edition, 2017.
2. Allen. J. Wood and Bruce F. Wollen berg, 'Power Generation, Operation and Control', John Wiley & Sons, Inc., 3rd edition, 2013.
3. Abhijit Chakrabarti and Sunita Halder, 'Power System Analysis Operation and Control', PHI learning Pvt. Ltd., New Delhi, Fourth Edition, 2018.

REFERENCE BOOKS:

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2. Hadi Saadat, 'Power System Analysis', McGraw Hill Education Pvt. Ltd., New Delhi, 23rd reprint, 2015.
3. Kundur P., 'Power System Stability and Control, McGraw Hill Education Pvt. Ltd., New Delhi, 12th reprint, 2015.
4. B.M. Weedy, B.J. Cory et al, 'Electric Power systems', Wiley, Fifth Edition, 2012.

B-7

OPTIMAL RECONFIGURATION OF DISTRIBUTION NETWORK CONSIDERING LOAD VARIATION USING CHAMELEON SWARM OPTIMIZATION ALGORITHM

A PROJECT REPORT

Submitted by

ABITHA.A	**422121105001**
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MANIVASAGAN.M	**422121105305**

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ELECTRICAL AND ELECTRONICS ENGINEERING

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ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600025

BONAFIDE CERTIFICATE

Certified that this project report **"OPTIMAL RECONFIGURATION OF DISTRIBUTION NETWORK CONSIDERING LOAD VARIATION USING CHAMELEON SWARM OPTIMIZATION ALGORITHM"** is the bonafide work of **"ABITHA.A, PRAVEEN.K, UDHAYALAKSHMI.T, MANIVASAGAN.M"** who carried out the project work under my supervision.

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Submitted for the university examination held on 30/05/2025

INTERNAL EXAMINER

EXTERNAL EXAMINER

ABSTRACT

- The efficient operation of electrical distribution networks is crucial for ensuring reliable power delivery and minimizing energy losses.
- This project presents an optimal reconfiguration approach for radial distribution systems by incorporating load variation and employing the Chameleon Swarm Optimization (CSO) algorithm.
- The objective is to minimize real power losses, improve voltage profiles, and enhance overall system efficiency.
- The CSO algorithm, inspired by the adaptive and hunting behavior of chameleons, offers a robust solution framework for the complex, nonlinear optimization challenges inherent in network reconfiguration.
- By dynamically adjusting to varying load conditions, the proposed method ensures better adaptability and responsiveness compared to traditional optimization techniques.
- Simulation results on standard IEEE test systems validate the effectiveness of the proposed approach, showcasing significant improvements in loss reduction and voltage stability.
- This methodology demonstrates the potential of bio-inspired algorithms like CSO in modern smart grid applications.

EE3602 POWER SYSTEM OPERATION AND CONTROL L T P C
3 0 0 3

COURSE OBJECTIVES:

To impart knowledge on,

- The significance of power system operation and control.
- Real power– frequency interaction and design of power– frequency controller.
- Reactive power– voltage interaction and the compensators for maintaining the voltage profile.
- The generation scheduling and economic operation of power system.
- SCADA and its application for real time operation and control of power systems.

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UNIT II REAL POWER FREQUENCY CONTROL 9

Basics of speed governing mechanisms and modelling – Speed regulation of two generators in parallel Load Frequency Control (LFC) of single area system – Static and dynamic analysis – LFC of two area system –Tie line modelling – Block diagram representation of two area system – Static and dynamic analysis – Tie line with frequency bias control – State variable model – Integration of economic dispatch control with LFC.

UNIT III REACTIVE POWER – VOLTAGE CONTROL 9

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UNIT IV ECONOMIC OPERATION OF POWER SYSTEM 9

Statement of economic dispatch problem – Input and output characteristics of thermal plant incremental cost curve – Optimal operation of thermal units without and with transmission losses (no derivation of transmission loss coefficients) – Lambda–iteration method – Base point and participation factors method. Statement of Unit Commitment (UC) problem – Constraints on UC problem – Solution of UC problem using priority list – Special aspects of short term and long-term hydrothermal scheduling problems.

UNIT V COMPUTER AIDED CONTROL OF POWER SYSTEM 9

Need of computer control of power system – Concept of energy control centers and functions – PMU system monitoring, Data acquisition and controls – System hardware configurations – SCADA and EMS functions – State estimation – Measurements and errors – Weighted least square estimation – Various operating states – State transition diagram.

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4. B.M. Weedy, B.J. Cory et al, 'Electric Power systems', Wiley, Fifth Edition, 2012.

Batch - 8

MINIMIZATION OF TRANSMISSION LOSS USING FACTS DEVICES USING IMPROVED WHALE ALGORITHM

A PROJECT REPORT

Submitted by

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SRIDHAR B	**422121105036**
SUBASH B	**422121105037**

in partial fulfillment for the award of the degree

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ANNA UNIVERSITY :: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY : CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"MINIMIZATION OF TRANSMISSION LOSS USING FACTS DEVICES USING IMPROVED WHALE ALGORITHM"** is the bonafide work of **"S.SARANRAJ, M. SEETHAPATHI, B. SRIDHAR, B. SUBASH"** who carried out the project work under my supervision.

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INTERNAL EXAMINER

EXTERNAL EXAMINER

Abstract

- The proposed method is used to determine the best control variables, such as reactive power generation, transformer tap settings, and reactive power sources.
- The power flow analysis method is used to determine where the flexible AC transmission system (FACTS) devices should be placed.
- The results of applying the MWOA approach are shown and contrasted with those of other promising optimization techniques, including the sine cosine algorithm (SCA), whale optimization algorithm (WOA), moth flame optimization (MFO), grey wolf optimization (GWO), and particle swarm optimization (PSO).
- The system performance was assessed with and without each FACTS device under different scenarios of load increase at up to 150% of the base case in IEEE 30 bus system.

Abstract

- demands with an acceptable level of reliability in an economic manner.
- Flexible AC Transmission Systems (FACTS) devices have been widely used to increase power system operation flexibility and controllability to meet this need.
- Differential Evolution (DE) to optimise the allocation of a Thyristor Controlled Series Capacitor (TCSC), a Static Var Compensator (SVC), and Unified Power Flow Controller (UPFC), as example FACTS devices.
- The objective of the project was to optimally place a FACTS device to reduce power losses and improve the voltage profile in an IEEE 30-bus test system.
- A modified whale optimization algorithm (MWOA) is presented in this study to minimize transmission losses.

EE3401 TRANSMISSION AND DISTRIBUTION

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To impart knowledge about the configuration of the electrical power systems.
- To study the line parameters and interference with neighboring circuits.
- To understand the mechanical design and performance analysis of transmission lines.
- To learn about different insulators and underground cables.
- To understand and analyze the distribution system.

UNIT I TRANSMISSION LINE PARAMETERS 9

Structure of electric power system - Parameters of single and three phase transmission lines with single and double circuits -Resistance, inductance, and capacitance of solid, stranded, and bundled conductors - Typical configuration, conductor types - Symmetrical and unsymmetrical spacing and transposition – application of self and mutual GMD; skin and proximity effects - Effects of earth on the capacitance of the transmission line - interference with neighboring communication circuits.

UNIT II MODELLING AND PERFORMANCE OF TRANSMISSION LINES 9

Performance of Transmission lines – short line, medium line and long line – equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance – transmission efficiency and voltage regulation, real and reactive power flow in lines – Power Circle diagrams – Ferranti effect – Formation of Corona – Critical Voltages – Effect on line Performance.

UNIT III SAG CALCULATION AND LINE SUPPORTS 9

Mechanical design of overhead lines – Line Supports –Types of towers – Tension and Sag Calculation for different weather conditions – Methods of grounding - Insulators: Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators.

UNIT IV UNDERGROUND CABLES 9

Underground cables – Types of cables – Construction of single-core and 3-core belted cables – Insulation Resistance – Potential Gradient – Capacitance of single-core and 3-core belted cables – Grading of cables – Power factor and heating of cables– DC cables.

UNIT V DISTRIBUTION SYSTEMS 9

Distribution Systems – General Aspects – Kelvin's Law – AC and DC distributions –Concentrated and Distributed loading- Techniques of Voltage Control and Power factor improvement – Distribution Loss – Types of Substations – Trends in Transmission and Distribution: EHVAC, HVDC and FACTS (Qualitative treatment only).

TOTAL: 45 PERIODS

TEXT BOOKS:

1. D.P.Kothari, I.J. Nagarath, 'Power System Engineering', Mc Graw-Hill Publishing Company limited, New Delhi, Third Edition, 2019.
2. C.L.Wadhwa, 'Electrical Power Systems', New Age International Ltd, seventh edition 2022.
3. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2008.

REFERENCE BOOKS:

1. B.R.Gupta, 'Power System Analysis and Design' S. Chand, New Delhi, Sixth Edition, 2011.
2. Luces M.Fualken berry, Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, 2007.
3. Arun Ingole, "Power transmission and distribution" Pearson Education, first edition, 2018
4. J.Brian Hardy and Colin R.Bayliss 'Transmission and Distribution in Electrical Engineering', Newnes; Fourth Edition, 2011.
5. G.Ramamurthy, "Handbook of Electrical power Distribution," Universities Press, 2013.
6. V.K.Mehta, Rohit Mehta, 'Principles of power system', S. Chand & Company Ltd, New Delhi,

B-9

SOLAR ION PROPULSION HARNESSING ELECTRIC FIELD FOR DEEP SPACE TRAVEL

A PROJECT REPORT

Submitted by

RAGURAMAN S	422121105029
DHIVAKAR M	422121105304
PRAVEEN KUMAR R	422121105309

in partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

in

ELECTRICAL AND ELECTRONICS ENGINEERING

ST.ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANNA UNIVERSITY::CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY::CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"SOLAR ION PROPULSION HARNESSING ELECTRIC FIELD FOR DEEP SPACE TRAVEL"** is the bonafide work of **RAGURAMAN S (422121105029), DHIVAKAR M (422121105304), PRAVEEN KUMAR R (422121105309)** who carried out the project work under my supervision.

V. Balaji 29/5/25

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Submitted for the Project Viva-Voce examination held on 30/5/2025

INTERNAL EXAMINER

R. Kavitha 30/5/25

EXTERNAL EXAMINER

ABSTRACT

Solar ion propulsion is an advanced space propulsion technology that utilizes solar energy to ionize and accelerate particles using electric fields, enabling highly efficient and sustained thrust for deep-space missions.

Unlike chemical propulsion, it operates on electrostatic acceleration, improving fuel efficiency and mission longevity.

ACKNOWLEDGMENT

We would like to extend our sincere thanks to many individuals and organizations as it would not have been possible to complete this project without their kind support and help.

We would like to express our special gratitude and thanks to our beloved Mother **Rev. Sr. Dr. B. J. QUEENSLY JEYANTHI, SAT.,** Secretary, St. Anne's College of Engineering and Technology and we are highly indebted to our respected Principal **Dr. R. AROKIADASS, M.E, Ph.D.,** for giving us the opportunity to display our professional skill through this project.

We convey our exceptional gratitude to **Mr. V. BALAJI, M.E.,** Head of the Department for giving valuable motivation to complete this project in time.

We acknowledge our sincere thanks to **Mr. J. RAMESH, M.E.,** Project coordinator of the Department of Electrical and Electronics Engineering, for his valuable suggestions and help towards us to develop our Project.

We are highly grateful to **Mrs.T. ARTHI, M.E.,**Assistant professor for her guidance, support and providing necessary information to complete this project.

We thank all our teaching staff members of the Department of Electrical And Electronics Engineering for their passionate support for helping us to identify our mistakes and also for the appreciation they gave us in achieving our goal

EE 3301 ELECTROMAGNETIC FIELDS L T P C 3 1 0 4

- To introduce the basic mathematical concepts related to electromagnetic vector fields
- To impart knowledge on the concepts of
  - ✓ Electrostatic fields, electric potential, energy density and their applications.
  - ✓ Magneto static fields, magnetic flux density, vector potential and its applications.
  - ✓ Different methods of emf generation and Maxwell's equations
  - ✓ Electromagnetic waves and characterizing parameters

UNIT I ELECTROSTATICS – I **12**

Sources and effects of electromagnetic fields – Coordinate Systems – Vector fields –Gradient, Divergence, Curl – theorems and applications - Coulomb's Law – Electric field intensity – Field due to discrete and continuous charges – Gauss's law and applications.

UNIT II ELECTROSTATICS – II **12**

Electric potential – Electric field and equipotential plots, Uniform and Non-Uniform field, Utilization factor – Electric field in free space, conductors, dielectrics - Dielectric polarization –Dielectric strength - Electric field in multiple dielectrics – Boundary conditions, Poisson's and Laplace's equations, Capacitance, Energy density, Applications.

UNIT III MAGNETOSTATICS **12**

Lorentz force, magnetic field intensity (H) – Biot–Savart's Law - Ampere's Circuit Law – H due to straight conductors, circular loop, infinite sheet of current, Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization, Magnetic field in multiple media –Boundary conditions, scalar and vector potential, Poisson's Equation, Magnetic force, Torque, Inductance, Energy density, Applications.

UNIT IV ELECTRODYNAMIC FIELDS **12**

Magnetic Circuits - Faraday's law – Transformer and motional EMF – Displacement current -Maxwell's equations (differential and integral form) – Relation between field theory and circuit theory – Applications.

UNIT V ELECTROMAGNETIC WAVES **12**

Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors- skin depth - Poynting vector – Plane wave reflection and refraction.

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Mathew N. O. Sadiku, S.V. Kulkarni 'Principles of Electromagnetics', 6th Edition, Oxford University Press Inc. Asian edition, 2015.
2. William H. Hayt and John A. Buck, 'Engineering Electromagnetics', McGraw Hill Special Indian edition, 2014.
3. Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, Fifth Edition, 2010.

REFERENCES

1. V.V.Sarwate, 'Electromagnetic fields and waves', Second Edition, Newage Publishers, 2018.
2. J.P.Tewari, 'Engineering Electromagnetics - Theory, Problems and Applications', Second Edition, Khanna Publishers 2013.
3. Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Fifth Edition (Schaum's Outline Series), McGraw Hill, 2018.
4. S.P.Ghosh, Lipika Datta, 'Electromagnetic Field Theory', First Edition, McGraw Hill Education(India) Private Limited, 2017.
5. K A Gangadhar, 'Electromagnetic Field Theory', Khanna Publishers; Sixteenth Edition Eighth

B-10

MULTI OBJECTIVE PLANNING MODEL OF SOLAR PV, WIND AND BATTERY STORAGE BASED DERS IN SMART GRID DISTRIBUTION SYSTEM

A PROJECT REPORT

Submitted by

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MAY 2025

BONAFIDE CERTIFICATE

Certified that this project report " **MULTI OBJECTIVE PLANNING MODEL OF SOLAR PV, WIND AND BATTERY STORAGE BASED DERS IN SMART GRID DISTRIBUTION SYSTEM**" is the bonafide work of "**S BALAMUGURAN, N. PRAVEEN, T. SUMAN RAJ, M. I MOHAMED IRFAN**" who carried out the project work under my supervision.

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INTERNAL EXAMINER

EXTERNAL EXAMINER

Abstract

- The increasing adoption of renewable energy sources, particularly solar photovoltaic (PV) systems, wind system, has necessitated the development of robust planning strategies for their integration into smart grid distribution systems (SGDS).
- This project presents a comprehensive bi-level multi-objective planning model for the optimal utilisation of solar PV, wind and battery storage (BS) based Distributed Energy Resources (DERs) in SGDS.
- At Level-1, the model determines optimal component capacities and DER penetration levels through a multi-objective optimization framework that minimizes life cycle cost, unserved energy cost, grid dependency, and carbon emission cost.
- At Level-2, the optimal placement of DERs is identified to minimize total active power losses and improve bus voltage profiles and to maximize the revenue of the DER owners.
- Simulation results on the test system, demonstrate significant improvements: voltage profile enhancements of up to 4% and power loss reductions of over 45%.
- The study offers valuable insights for system planners seeking to achieve technically efficient, economically viable, and environmentally sustainable DER integration in modern smart grids.

EE3014	POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS	L T P C 2 0 2 3

COURSE OBJECTIVES:

- To learn the various types of renewable sources of energy.
- To understand the electrical machines to be used for wind energy conversion systems.
- To learn the principles of power converters used in solar PV system.
- To study the principle of power converters used in Wind system.
- To simulate the AC-DC, AC-AC Converters, Matrix Converters and PWM Inverters.

UNIT I INTRODUCTION TO RENEWABLE ENERGY SYSTEMS 6

Classification of Energy Sources – Importance of Non-conventional energy sources – Advantages and disadvantages of conventional energy sources - Environmental aspects of energy - Impacts of renewable energy generation on the environment - Qualitative study of renewable energy resources: Ocean energy, Biomass energy, Hydrogen energy, - Solar Photovoltaic (PV), Fuel cells: Operating principles and characteristics, Wind Energy: Nature of wind, Types, control strategy, operating area.

UNIT II ELECTRICAL MACHINES FOR WIND ENERGY CONVERSION SYSTEMS (WECS) 6

Construction, Principle of operation and analysis: Squirrel Cage Induction Generator (SCIG), Doubly Fed Induction Generator (DFIG) - Permanent Magnet Synchronous Generator (PMSG).

UNIT III POWER CONVERTERS AND ANALYSIS OF SOLAR PV SYSTEMS 6

Power Converters: Line commutated converters (inversion-mode) - Boost and buck-boost converters- selection of inverter, battery sizing, array sizing. Simulation of line commutated converters, buck/boost converters. Analysis: Block diagram of the solar PV systems - Types of Solar PV systems: Stand-alone PV systems, Grid integrated solar PV Systems - Grid Connection Issues.

UNIT IV POWER CONVERTERS FOR WIND SYSTEMS 6

Power Converters: Three-phase AC voltage controllers- AC-DC-AC converters: uncontrolled rectifiers, PWM Inverters, Grid-Interactive Inverters - Matrix converter.

UNIT V HYBRID RENEWABLE ENERGY SYSTEMS 9

Need for Hybrid Systems- Range and type of Hybrid systems- Case studies of Diesel-PV, Wind-PV, Micro hydel-PV, Biomass-Diesel systems - Maximum Power Point Tracking (MPPT).

REFERENCES:

1. S.N.Bhadra, D. Kastha, & S. Banerjee "Wind Electrical Systems", Oxford University Press, 2009, 7th impression.
2. Rashid .M. H "Power electronics Hand book", Academic press,2nd Edition, 2006 4th Edition, 2017
3. Rai. G.D, "Non-conventional energy sources", Khanna publishers, 6th Edition, 2017.

B-11

OPTIMAL ALLOCATION OF ELECTRIC VEHICLE CHARGING STATIONS IN DISTRIBUTION NETWORKS

A PROJECT REPORT

Submitted by

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AGASH A	**422121105301**

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MAY 2025

ANNA UNIVERSITY : CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"OPTIMAL ALLOCATION OF ELECTRIC VEHICLE CHARGING STATIONS AND DISTRIBUTED GENERATION IN RADIAL DISTRIBUTION NETWORKS"** is the bonafide work of **"S. CHITHIRAISELVAN, K. SIVARAJ, A. AGASH"** who carried out the project work under my supervision.

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Submitted for the university examination held on 30/05/2025

30/5/25

INTERNAL EXAMINER

30/5/25

EXTERNAL EXAMINER

Abstract

- The widespread spread of electric vehicles requires the establishment of charging stations (EVCSs), and this is considered a large load on the network.
- This gives priority to distributing the stations in a way that reduces the load on the network, and in parallel, re-planning the network and supplying it with the necessary energy to maintain energy efficiency and power quality.
- Total energy loss minimization, voltage deviation minimization, and voltage stability index improvement are the considered power quality indices in the multi-objective function.
- Vehicle to grid (V2G) feature, distributed generation units (DG), and capacitor banks are used for improving system performance, by injecting the required active and reactive power.

EE3007 SMART GRID LT P C
3 0 0 3

COURSE OBJECTIVES:

- To understand the evolution of Smart and Interconnected energysystems.
- To understand the various challenges and benefits of smart grid and the national and international initiatives taken
- To understand the concepts related with transmission and distribution in smart grid technologies.
- To get an insight of the various smart measurementtechnologies.
- To understand the various computing technologies for Smart Operation of the Grid.

UNIT I INTRODUCTION (7+2 SKILL) 9

Evolution of Energy Systems, Concept, Definitions and Need, Difference between Conventional & Smart Grid, Drivers, structures, functions, opportunities, challenges and benefits of Smart Grid, Basics of Micro grid, National and International Initiatives in Smart Grid.

UNIT II SMART METERING (7+2 SKILL) 9

Introduction to Advanced Metering infrastructure (AMI) - drivers and benefits, AMI protocols, standards and initiatives, AMI needs in the smart grid, Real time management and control, Phasor Measurement Unit (PMU).

UNIT III SMART GRID TECHNOLOGIES (Transmission) (7+2 SKILL) 9

Technology Drivers, Smart energy resources, Smart substations, Substation Automation, Feeder Automation, Transmission systems: EMS, Wide area Monitoring, Protection and control.

UNIT IV SMART GRID TECHNOLOGIES (Distribution) (7+2 SKILL) 9

DMS, Volt/VAr control, Fault Detection, Isolation and service restoration, Outage management, High-Efficiency Distribution Transformers, Phase Shifting Transformers, Electric Vehicles.

UNIT V HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS (7+2 SKILL) 9

Local Area Network (LAN), House Area Network (HAN), Wide Area Network (WAN), Broadband over Power line (BPL), IP based Protocols, Computing technologies for Smart Grid applications (Web Service to CLOUD Computing), Role of big data and IoT, Cyber Security for Smart Grid.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Smart Grids Advanced Technologies and Solutions, Second Edition, Edited by Stuart Borlase,CRC, 2018.
2. Janaka Ekanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", John Wiley,2012
3. James Momoh ,Smart Grid Fundamentals of Design and Analysis, IEEE press 2012.

REFERENCES:

1. Ahmed F. Zobaa, Trevor J. Bihl, Big data analytics in future power systems, 1st Edition, CRC press 2018.
2. C. Gungor et al., "Smart Grid Technologies: Communication Technologies and Standards," in IEEE Transactions on Industrial Informatics, vol. 7, no. 4, pp. 529-539, Nov. 2011.doi: 10.1109/TII.2011.2166794.
3. X. Fang, S. Misra, G. Xue and D. Yang, "Smart Grid — The New and Improved Power Grid: A Survey," in IEEE Communications Surveys & Tutorials, vol. 14, no. 4, pp. 944-980, Fourth Quarter 2012. doi: 10.1109/SURV.2011.101911.00087.

B-12

OPTIMAL POWER FLOW OF POWER SYSTEM WITH LOCATION MARGINAL PRICE USING BROWN BEAR OPTIMISATION

A PROJECT REPORT

Submitted by

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MAY 2025

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BONAFIDE CERTIFICATE

Certified that this project report **" OPTIMAL POWER FLOW OF POWER SYSTEM WITH LOCATION MARGINAL PRICE USING BROWN BEAR OPTIMISATION"** is the bonafide work of **"E. ELAVARASAN, D. DHANUSH, S. GNANARAJ, P . SANTHOSH"** who carried out the project work under my supervision.

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Submitted for the university examination held on 30.05.2025

30/5/25

INTERNAL EXAMINER

30/5/25

EXTERNAL EXAMINER

ABSTRACT

Optimal power flow (OPF) is one of the most significant and extensively performed optimization problems from the past few decades. In general, OPF is a mathematical optimization technique used to determine the most efficient operation of a power system by minimizing fuel cost, losses, emission and maximizing the system's performance.

It is used to determine the optimal operation of a power system in terms of active and reactive power flow, voltage levels, and generation and load capacities. It also implemented to optimize the operation of the power system given constraints such as transmission line capacity, generation and load limits, and other system constraints.

This project focuses with the application of brown bear optimization algorithm (BBOA), for OPF solution, in an efficient approach. The planned OPF is devised by many formulations with constraints, objective functions inspected in IEEE 30 bus system. In addition, the value of objective function deemed in which case, all additional non optimized values are also compared to show the performance of the BBOA algorithm.

EE3602 POWER SYSTEM OPERATION AND CONTROL L T P C
3 0 0 3

COURSE OBJECTIVES:

To impart knowledge on,

- The significance of power system operation and control.
- Real power– frequency interaction and design of power– frequency controller.
- Reactive power– voltage interaction and the compensators for maintaining the voltage profile.
- The generation scheduling and economic operation of power system.
- SCADA and its application for real time operation and control of power systems.

UNIT I INTRODUCTION 9

Power scenario in Indian grid – National and Regional load dispatching centres – Requirements of good power system – Necessity of voltage and frequency regulation – real power vs frequency and reactive power vs voltage control loops - System load variation, load curves – Load forecasting – Computational methods in load forecasting – Load shedding and Islanding – deregulation - Basics of electrical energy tariff.

UNIT II REAL POWER FREQUENCY CONTROL 9

Basics of speed governing mechanisms and modelling – Speed regulation of two generators in parallel Load Frequency Control (LFC) of single area system – Static and dynamic analysis – LFC of two area system –Tie line modelling – Block diagram representation of two area system – Static and dynamic analysis – Tie line with frequency bias control – State variable model – Integration of economic dispatch control with LFC.

UNIT III REACTIVE POWER – VOLTAGE CONTROL 9

Generation and absorption of reactive power – Basics of reactive power control – Automatic Voltage Regulator (AVR) – Brushless AC excitation system – Block diagram representation of AVR loop static and dynamic analysis – Stability compensation – Voltage drop in transmission line – Methods of reactive power injection – Tap changing transformer, SVC and STATCOM for voltage control.

UNIT IV ECONOMIC OPERATION OF POWER SYSTEM 9

Statement of economic dispatch problem – Input and output characteristics of thermal plant incremental cost curve – Optimal operation of thermal units without and with transmission losses (no derivation of transmission loss coefficients) – Lambda–iteration method – Base point and participation factors method. Statement of Unit Commitment (UC) problem – Constraints on UC problem – Solution of UC problem using priority list – Special aspects of short term and long-term hydrothermal scheduling problems.

UNIT V COMPUTER AIDED CONTROL OF POWER SYSTEM 9

Need of computer control of power system – Concept of energy control centers and functions – PMU system monitoring, Data acquisition and controls – System hardware configurations – SCADA and EMS functions – State estimation – Measurements and errors – Weighted least square estimation – Various operating states – State transition diagram.

TOTAL: 45 PERIODS

TEXTBOOKS:

1. Olle. I. Elgerd, 'Electric Energy Systems theory – An introduction', McGraw Hill Education Pvt. Ltd., New Delhi, 2nd edition, 2017.
2. Allen. J. Wood and Bruce F. Wollen berg, 'Power Generation, Operation and Control', John Wiley & Sons, Inc., 3rd edition, 2013.
3. Abhijit Chakrabarti and Sunita Halder, 'Power System Analysis Operation and Control', PHI learning Pvt. Ltd., New Delhi, Fourth Edition, 2018.

REFERENCE BOOKS:

1. Kothari D.P. and Nagrath I.J., 'Power System Engineering', Tata McGraw– Hill Education, Second Edition, Reprint 2018.
2. Hadi Saadat, 'Power System Analysis', McGraw Hill Education Pvt. Ltd., New Delhi, 23rd reprint, 2015.
3. Kundur P., 'Power System Stability and Control, McGraw Hill Education Pvt. Ltd., New Delhi, 12th reprint, 2015.
4. B.M. Weedy, B.J. Cory et al, 'Electric Power systems', Wiley, Fifth Edition, 2012.

AUTOMATED IRRIGATION SYSTEM FOR PADDY UTILIZING SENSORS

A PROJECT REPORT

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MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025

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28/5/25

INTERNAL EXAMINER

28/5/25

EXTERNAL EXAMINER

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ABSTRACT

The aim of our project is to develop a smart irrigation system specifically designed for paddy, flood irrigation crops using precision farming techniques. By incorporating advanced technologies, the system utilizing (water level sensor & Rain drop sensor) for accurately measuring the level of water in paddy field and rain drop sensor is used to find rainfall. The primary function of a raindrop sensor is to determine when it is raining and how much rainfall has occurred, helping automate systems like irrigation to avoid overflow in field. It is an innovative and efficient approach to make the specific water level need of paddy growth, it integrates and analyse sensors data to monitor the paddy water level and weather conditions. Automated irrigation controllers use real-time data to adjust water applications, it ensuring accurate distribution and reducing waste of water. The farmers can monitor and control the irrigation remotely through the mobile device. This innovative approach promotes sustainable agriculture, boosts crop growth, and conserves water resources.

EC8652 **WIRELESS COMMUNICATION** **L T P C 3 0 0 3**

OBJECTIVES:

- To study the characteristic of wireless channel
- To understand the design of a cellular system
- To study the various digital signaling techniques and multipath mitigation techniques
- To understand the concepts of multiple antenna techniques 68

UNIT I- WIRELESS CHANNELS **9**

Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters- Coherence bandwidth – Doppler spread & Coherence time, fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

UNIT II-CELLULARARCHITECTUR **9**

Multiple Access techniques - FDMA, TDMA, CDMA – Capacity calculations–Cellular concept- Frequency reuse - channel assignment- hand off- interference & system capacitytrunking & grade of service – Coverage and capacity improvement.

UNIT III- DIGITAL SIGNALING FOR FADING CHANNELS **9**

Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

UNIT IV- MULTIPATH MITIGATION TECHNIQUES **9**

Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macro diversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver.

UNIT V -MULTIPLE ANTENNA TECHNIQUES **9**

MIMO systems – spatial multiplexing -System model -Pre-coding - Beam forming - transmitter diversity, receiver diversity- Channel state information-capacity in fading and non-fading channels.

TOTAL: 45 PERIODS

OUTCOMES:

The student should be able to:

- Characterize a wireless channel and evolve the system design specifications
- Design a cellular system based on resource availability and traffic demands
- Identify suitable signaling and multipath mitigation techniques for the wireless channel and system under consideration.

TEXT BOOKS:

1. Rappaport.T.S., —Wireless communications‖, Pearson Education, Second Edition, 2010.(UNIT I, II, IV)
2. Andreas.F. Molisch, —Wireless Communications‖, John Wiley – India, 2006. (UNIT III,V)

REFERENCES:

1. Wireless Communication –Andrea Goldsmith, Cambridge University Press, 2011
2. Van Nee, R. and Ramji Prasad, —OFDM for wireless multimedia communications, Artech House, 2000 3. David Tse and Pramod Viswanath, —Fundamentals of Wireless Communication, Cambridge University Press, 2005.
4. Upena Dalal, —Wireless Communication‖, Oxford University Press, 2009.

PUBLIC TOILET MAINTANANCE USING IOT

A PROJECT REPORT

Submitted by

DURAIMURUGAN . A (422121106013)

IMMANVEL . T (422121106015)

KARTHIKEYAN . U (422121106017)

SRIHARI . K (422121106034)

In partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

in

ELECTRONICS AND COMMUNICATION ENGINEERING

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025
BONAFIDE CERTIFICATE

Certified that this project report "PUBLIC TOILET MAINTANANCE USING IOT" is the Bonafide work of A.DURAIMURUGAN (422121106013),T.IMMANVEL (422121106015), U.KARTHIKEYAN (422121106017), K.SRIHARI (422121106034)" who carried out the project work under my supervision.

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Panruti – 607106

Submitted for the ANNA UNIVERSITY examination held on 28/05/2025

28/5/25

INTERNAL EXAMINER

28/5/25

EXTERNAL EXAMINER

Head of the Department
Department of Electronics and Communication Engineering
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Anguchettypalayam, Panruti-(T.k) Cuddalore-(Dist.),Pin:607 106

ABSTRACT

Public toilet maintanance is a smart IoT-based healthcare and hygiene monitoring system designed to improve environmental cleanliness in public health facilities. Utilizing sensors such as the MQ-4 gas sensor for pollution detection and IR sensors for door activity, the system intelligently manages fan/light control and automates sanitation through a water cleaning module. Controlled by an Atmel microcontroller and connected to the cloud via NodeMCU, it enables real-time monitoring and remote alerts to municipal authorities. Key features include a mini servo motor for automated door operation and a mini water pump for cleaning purposes, making it a complete solution for maintaining hygiene in critical public spaces.. This reduces maintenance costs, optimizes resource consumption, and enhances sanitation standards through real-time monitoring and predictive maintenance, providing a cost-effective and scalable solution for public restroom.

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CEC369 **IoT PROCESSOR** L T P C 2 0 2 3

COURSE OBJECTIVE

- Learn the architecture and features of ARM.
- Study the exception handling and interrupts in the CORTEX M3
- Program the CORTEX M3
- Learn the architecture of the STM 32L15XXX ARM CORTEX M3/M4 microcontroller.
- Understand the concepts of System – On – Chip(SoC)

UNIT I - OVERVIEW OF ARM AND CORTEX-M3 6

ARM Architecture – Versions, Instruction Set Development, Thumb 2 and Instruction Set Architecture, Cortex M3 Basics: Registers, Stack Pointer, Link Register, Program Counter, Special Registers, Operation Mode, Exceptions and Interrupts, Vector Tables, Stack Memory Operations, Reset Sequence , CORTEX M3 Instruction Sets: Assembly Basics, Instruction List, Instruction Descriptions. CORTEX M3 – Implementation Overview: Pipeline, Block Diagram. Bus Interfaces, I – Code Bus, D – Code Bus, System Bus- External PPB and DAP Bus.

UNIT II - CORTEX EXCEPTION HANDLING AND INTERRUPTS 6

Exception Types, Priority, Vector Tables, Interrupt Inputs and Pending behaviour, Fault Exceptions, Supervisor Call and Pendable Service Call, NVIC: Nested Vector Interrupt Controller, Overview, Basic Interrupts, SYSTICK Time, Interrupt Behaviourm Interrupt/Exception Sequences, Exception Exits, Nested Interrupts, Tail – Chaining Interrupts, Late Arrivals and Interrupt Latency.

UNIT III - CORTEX M3/M4 PROGRAMMING 6

Cortex M3/M4 Programming: Overview, Typical Development Flow, Using C, CMSIS Using Assembly, Excepiton Programming Using Interrupts, Exception/Interrupt Handlers, Software Interrupts, Vector Table Relocation, Memory Protection Unit and other CORTEX M3 Features, MPU Registers, Setting up the MPU, Power Management, Multiprocessor Configuration.

UNIT IV - STM32L15XXX ARMCORTEX M3/M4 MICROCONTROLLER AND DEBUGGING TOOLS 6

STM32L15XXX ARM CORTEX M3/M4 Microcontroller: Memory and Bus Architecture, Power Control, Reset and Clock Control, STM32L15XXX Peripherals: GPIOs, System Configuration Controller, NVIC, ADC, Comparators, GP Timers, USART Development and Debugging Tools: Software and Hardware tools like Cross Assemblerm Compiler, Debugger, Simulator, In – Circuit Emulator(ICE), Logic Analyser.

UNIT V - INTRODUCTION TO SYSTEM – ON – CHIP 6

System Architecture: An Overview, Components of the System Processors, Memories and Interconnects, Processor Architectures, Memory and Addressing, System Level Interconnection – An Approach for SOC Design – Chip basics – Cycle Time – Die Area Power and Cost – Area, Power and Time Trade – Offs in Processor Design – Reliability and Configurability – SOC Design Approach – Application Studies – AES, 3D Graphics Processor. Image Compression and Video Compression.

TOTAL:30 PERIODS

TEXT BOOKS

Tx1. Joseph Yiu, The Definitive Guide to the ARM CORTEX M3/M4, Second Edition, Elsevier, 2010.(Unit – I, II)

Tx2. Andrew N Sloss, Dominic Symes, Chris Wright, ARM System Developers Guide Designing and Optimising System Software, Elsevier, 2006 (Unit – III, IV)

Tx3. Michael J Flynn and Wayne Luk, Computer System Design, System On Chip, Wiley India 2011.(Unit – V)

REFERENCES:

Rx1. Steve Furber, ARM System – on – Chip Architecture, 2nd Edition, Pearson, 2015.

Rx2. CORTEX M Series ARM Reference Manual

Rx3. CORTEX M3 Technical Reference Manual

Rx4. STM32L152XX ARM CORTEX M3 Microcontroller Reference Manual 5/97

GPS TRACKING SYSTEM FOR GOVERNMENT BUS

A PROJECT REPORT

Submitted by

VAISHALI.S	422121106037
DEEPIKA.K	422121106009
ANITHA.R	422121106003

in partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

in

ELECTRONICS AND COMMUNICATION ENGINEERING

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANGUCHETTYPALAYAM, PANRUTI – 607 106

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"GPS TRACKING SYSTEM FOR GOVERNMENT BUS"** is the bonafide work of **"VAISHALI.S (422121106037), DEEPIKA.K(422121106009),ANITHA.R (422121106003)"** who carried out the project work under my supervision.

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INTERNAL EXAMINER 28/5

EXTERNALEXAMINER 28/5/25

Head of the Department
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ABSTRACT

Public transportation systems face challenges in providing real-time bus tracking, accurate passenger count, and seamless stop requests. This project proposes a Smart IOT-Based Bus Tracking and Passenger Management System using Arduino, GPS, and IOT to enhance commuter convenience and efficiency. A GPS module continuously tracks the bus location. Manually update the seat count. The system is connected to the IOT cloud, where passengers can access real-time bus location updates and availability status. Commuters can send a virtual stop request via a website, which is transmitted to the bus unit. In response, the bus system automatically updates the ETA (Estimated Time of Arrival) and passenger occupancy data to the IOT platform. The bus module consists of an Arduino Uno, ESP8266 (or another IOT module), and a display unit to show stop requests for the driver. When a request is received, the system calculates the nearest stop and alerts the driver. Additionally, it sends periodic updates on bus location, estimated arrival time, and passenger count to the cloud. This system improves transparency, efficiency, and accessibility in public transportation, reducing waiting times and enhancing passenger convenience. Future enhancements may include AI-based route optimization and predictive arrival time estimation based on traffic data. Smart IOT-Based Bus Tracking and Passenger Management System using Arduino, GPS, and IOT to enhance bus operations and passenger convenience. The GPS module continuously tracks the bus location. This data is sent to an IOT platform, where passengers can monitor real-time.

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EC8791 **EMBEDDED AND REAL TIME SYSTEMS** **L T P C 3 0 2 4**

OBJECTIVES:

- Learn the architecture and features of 8051.
- Study the design process of an embedded system.
- Understand the real – time processing in an embedded system.
- Learn the architecture and design flow of IoT.
- Build an IoT based system.

UNIT I 8051 MICROCONTROLLER 9

Microcontrollers for an Embedded System – 8051 – Architecture – Addressing Modes – Instruction Set – Program and Data Memory – Stacks – Interrupts – Timers/Counters – Serial Ports –Programming.

UNIT II EMBEDDED SYSTEMS 9

Embedded System Design Process – Model Train Controller – ARM Processor – Instruction Set Preliminaries – CPU – Programming Input and Output – Supervisor Mode – Exceptions and Trap –Models for programs – Assembly, Linking and Loading – Compilation Techniques – Program Level Performance Analysis.

UNIT III PROCESSES AND OPERATING SYSTEMS 9

Structure of a real–time system – Task Assignment and Scheduling – Multiple Tasks and Multiple Processes – Multirate Systems – Preemptive real–time Operating systems – Priority based scheduling – Interprocess Communication Mechanisms – Distributed Embedded Systems – MPSoCs and Shared Memory Multiprocessors – Design Example – Audio Player, Engine Control
Unit and Video Accelerator.

UNIT IV IOT ARCHITECTURE AND PROTOCOLS 9

Internet – of – Things – Physical Design, Logical Design – IoT Enabling Technologies – Domain Specific IoTs – IoT and M2M – IoT System Management with NETCONF – YANG – IoT Platform Design – Methodology – IoT Reference Model – Domain Model - Communication Model – IoT Reference Architecture – IoT Protocols - MQTT, XMPP, Modbus, CANBUS and BACNet.

UNIT V IOT SYSTEM DESIGN 9

Basic building blocks of an IoT device – Raspberry Pi – Board – Linux on Raspberry Pi – Interfaces – Programming with Python – Case Studies: Home Automation, Smart Cities, Environment and Agriculture.

TOTAL: 45 PERIODS

TEXT BOOKS:

1)Tx1. Mohammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D.McKinlay, The 8051 Microcontroller and Embedded Systems Using Assembly and C, Second Edition, Pearson Education, 2008.(Unit – I)
2)Tx2. Marilyn Wolf, Computers as Components – Principles of Embedded Computing System Design, Third Edition, Morgan Kaufmann, 2012.(Unit – II,III)
3)Tx3. Arshdeep Bahga, Vijay Madisetti, Internet – of- Things – A Hands on Approach, Universities Press, 2015.(Unit – IV,V)

REFERENCES:

1)Rx1. Mayur Ramgir, Internet – of – Things, Architecture, Implementation and Security, First Edition, Pearson Education, 2020.
2)Rx 2. Lyla B.Das, Embedded Systems: An Integrated Approach, Pearson Education 2013.
3)Rx 3. Jane.W.S .Liu, Real – Time Systems, Pearson Education, 2003.

SMARTCROP PROTECTION AND ALERT SYSTEM FOR DETECTING WILD ANIMALS

A PROJECT REPORT

Submitted by

GOPINATH.V (422121106014)

INBARAJ .D (422121106016)

SURENDHAR .A (422121106035)

In partial fulfillment for the award degree

of

BACHELOR OF ENGINEERING

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ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"SMARTCROP PROTECTION AND ALERT SYSTEM FOR DETECTING WILD ANIMALS "**is the Bonafide work of **"GOPINATH.V (422121106014) INBARAJ.D (422121106016), SURENDHAR .A (422121106035) "** who carried out the project work under my supervision.

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Submitted for the ANNA UNIVERSITY examination held on 28/05/2025

INTERNAL EXAMINER

EXTERNAL EXAMINER

ABSTRACT

In modern agricultural practices, managing and protecting crops from animal intrusions is a significant challenge for farmers. The emergence of intelligent surveillance systems powered by artificial intelligence (AI) and machine learning has presented a promising solution to this issue. he system integrates AI-powered image processing techniques, such as OpenCV for pre-processing, along with automatic notification and control mechanisms to enhance farm security and management. The core functionality of the proposed system relies on the YOLO V8 algorithm for real-time animal detection. YOLO V8 is an advanced deep learning framework capable of identifying objects in images quickly and efficiently. In this system, a camera continuously captures images of the environment, and YOLO V8 detects and recognizes the presence of animals in these images. Once an animal is detected, the camera system captures an image and uploads it to a remote server for further processing. This process not only helps identify the animal but also ensures minimal storage usage as the images are deleted after being processed. Before being fed into the YOLO V8 model, each captured image undergoes a series of pre-processing steps using OpenCV. These steps include noise reduction, resizing, and normalization to enhance the image quality for better detection accuracy. To optimize the system's performance and ensure real-time operation, the images are compressed using advanced techniques like dimensionality reduction, feature extraction, and image fusion. These techniques help in reducing computational load while maintaining the quality of the input data, ensuring fast and reliable detection in real-world conditions. Once the image is processed and analyzed, the system automatically triggers a set of actions. First, a notification is sent via email to the farmer, alerting them of the intrusion. This email contains vital information such as the timestamp of detection and the type of animal detected.

CEC366 IMAGE PROCESSING L T P C 3 0 0 3

COURSE OBJECTIVES:

- To become familiar with digital image fundamentals
- To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
- To learn concepts of degradation function and restoration techniques.
- To study the image segmentation and representation techniques.
- To become familiar with image compression and recognition methods

UNIT I DIGITAL IMAGE FUNDAMENTALS 9

Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT.

UNIT II IMAGE ENHANCEMENT 9

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement. **UNIT III IMAGE RESTORATION 9**

Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering

UNIT IV IMAGE SEGMENTATION 9

Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation,Segmentation by morphological watersheds – basic concepts – Dam construction – Watershedsegmentation algorithm.

UNIT V IMAGE COMPRESSION AND RECOGNITION 9

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL :45 PERIODS

COURSE OUTCOMES

At the end of the course, the students should be able to:

CO1 :Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.

CO2: Operate on images using the techniques of smoothing, sharpening and enhancement.

CO3:Understand the restoration concepts and filtering techniques. Padeepz App Padeepz App 111

CO4: Learn the basics of segmentation, features extraction, compression and recognition methods for color models.

CO5:Comprehend image compression concepts.

TEXT BOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, 'Digital Image Processing', Pearson, Third Edition,2010.
2. Anil K. Jain, 'Fundamentals of Digital Image Processing', Pearson, 2002.

REFERENCES

1. Kenneth R. Castleman, 'Digital Image Processing', Pearson, 2006.
2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, 'Digital Image Processing using MATLAB', Pearson Education, Inc., 2011.
3. D,E. Dudgeon and RM. Mersereau, 'Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.
4. William K. Pratt, 'Digital Image Processing', John Wiley, New York, 2002
5. Milan Sonka et al 'Image processing, analysis and machine vision', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

THAWF SENSE: Artificial Intelligence for Poultry Management System

A PROJECT REPORT

Submitted by

ASHWIN A	**422121106007**
RAGUNATH A	**422121106026**
SANJAI S	**422121106029**
SURIYA R	**422121106036**

In partial fulfillment of the award of the degree of

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in

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ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report "THAWF SENSE: Artificial Intelligence for Poultry Management System" is the bonafide work of "ASHWIN A (422121106007), RAGUNATH A (422121106026), SANJAI S (422121106029), SURIYA R (422121106036)" who carried out the project work under my supervision.

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INTERNAL EXAMINER

EXTERNAL EXAMINER

Head of the Department
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ABSTRACT

Our Project introduces an innovative AI-based poultry farming and automation system designed to optimize environmental control and resource allocation, addressing these challenges through advanced technology. The proposed system leverages the Raspberry Pi Pico W microcontroller as its core, integrating a suite of sensors to monitor key parameters, including temperature, humidity, air quality, water level, and feed supply. These sensors interface with automated control mechanisms for heating, cooling, exhaust fans, water pumps, and feeders, enabling precise and responsive management of the poultry environment. Real-time data collected from the sensors is transmitted to a Firebase database, where it is stored securely and made accessible for remote monitoring. A web-based dashboard provides an intuitive visualization of the data, empowering farmers to oversee environmental conditions and system performance from any location.

To further enhance decision-making, the system employs linear regression models to predict temperature and humidity trends, offering actionable insights for proactive environmental management. Both real-time sensor data and predictive analytics are displayed on an Liquid Crystal Display (LCD) interface, providing on-site accessibility for farm operators. Experimental results demonstrate that the system significantly improves environmental stability, reduces the need for manual interventions, and enhances resource efficiency. By minimizing labour demands and optimizing resource use, this Internet of Things (IoT) based solution aligns with the principles of modern smart agriculture, offering a scalable and sustainable approach to poultry farming. The integration of predictive analytics and automation not only improves operational efficiency but also supports animal welfare, positioning this system as a transformative tool for the poultry industry.

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Accredited by NAAC
ANGUCHETTYPALAYAM, PANRUTI – 607 106.

ET3491 EMBEDDED SYSTEMS AND IOT DESIGN L T P C 3 0 2 4

COURSE OBJECTIVES :

- Learn the architecture and features of 8051.
- Study the design process of an embedded system.
- Understand the real – time processing in an embedded system.
- Learn the architecture and design flow of IoT.
- Build an IoT based system.

UNIT I 8051 MICROCONTROLLER 9

Microcontrollers for an Embedded System – 8051 – Architecture – Addressing Modes – Instruction Set – Program and Data Memory – Stacks – Interrupts – Timers/Counters – Serial Ports – Programming. **UNIT II EMBEDDED SYSTEMS 9**

Embedded System Design Process – Model Train Controller – ARM Processor – Instruction Set Preliminaries – CPU – Programming Input and Output – Supervisor Mode – Exceptions and Trap – Models for programs – Assembly, Linking and Loading – Compilation Techniques – Program Level Performance Analysis.

UNIT III PROCESSES AND OPERATING SYSTEMS 9

Structure of a real – time system – Task Assignment and Scheduling – Multiple Tasks and Multiple Processes – Multirate Systems – Pre emptive real – time Operating systems – Priority based scheduling – Interprocess Communication Mechanisms – Distributed Embedded Systems – MPSoCs and Shared Memory Multiprocessors – Design Example – Audio Player, Engine Control Unit and Video Accelerator.

UNIT IV IOT ARCHITECTURE AND PROTOCOLS 9

Internet – of – Things – Physical Design, Logical Design – IoT Enabling Technologies – Domain Specific IoTs – IoT and M2M – IoT System Management with NETCONF – YANG – IoT Platform Design – Methodology – IoT Reference Model – Domain Model – Communication Model – IoT Reference Architecture – IoT Protocols - MQTT, XMPP, Modbus, CANBUS and BACNet.

UNIT V IOT SYSTEM DESIGN 9

Basic building blocks of an IoT device – Raspberry Pi – Board – Linux on Raspberry Pi – Interfaces – Programming with Python – Case Studies: Home Automation, Smart Cities, Environment and Agriculture

COURSE OUTCOMES:

CO1: Explain the architecture and features of 8051.
CO2: Develop a model of an embedded system.
CO3: List the concepts of real time operating systems.
CO4: Learn the architecture and protocols of IoT.
CO5: Design an IoT based system for any application.

TEXTBOOKS :

1. Mohammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D.McKinlay, The 8051 Microcontroller and Embedded Systems Using Assembly and C, Second Edition, Pearson Education, 2008.(Unit – I)
2. 2.Marilyn Wolf, Computers as Components – Principles of Embedded Computing System Design, Third Edition, Morgan Kaufmann, 2012.(Unit – II,III)
3. Arshdeep Bahga, Vijay Madisetti, Internet – of- Things – A Hands on Approach, Universities Press, 2015.(Unit – IV,V)

REFERENCES :

1. Mayur Ramgir, Internet – of – Things, Architecture, Implementation and Security, First Edition, Pearson Education, 2020.
2. Lyla B.Das, Embedded Systems: An Integrated Approach, Pearson Education 2013. 3. Jane.W.S .Liu, Real – Time Systems, Pearson Education, 2003.

SMART VEGETABLE PRICE MONITORING : DATA COLLECTION, ANALYSIS, VISUALIZATION AND INSIGHTS FOR FARMERS

A PROJECT REPORT

Submitted by

BALAGURU. P **422121106008**

SELVAKUMAR. S **422121106031**

SATHISHKUMAR. P **422121106030**

in partial fulfilment for the award of the degree of

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ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report "SMART VEGETABLE PRICE MONITORING : DATA COLLECTION , ANALYSIS, VISUALIZATION AND INSIGHTS FOR FARMERS" is the bonafide work of "BALAGURU. P(422121106008), SELVAKUMAR . S(422121106031), SATHISHKUMAR .P(422121106030)" who carried out the project work under my supervision.

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INTERNAL EXAMINER

28/5/25

EXTERNAL EXAMINER

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ABSTRACT

The **Smart Vegetable Price Monitoring** project aims to assist farmers in the Panruti market by utilizing predictive analytics to forecast vegetable prices, enabling them to make informed decisions about when to sell and how to optimize their income. The project collects historical market data on key vegetables like tomatoes, potatoes, and onions, and uses the **ARIMA (Auto Regressive Integrated Moving Average)** algorithm to forecast prices for the next three months. The ARIMA model, a time-series forecasting technique, is employed to analyse past price trends, account for seasonality, and generate accurate predictions for future market conditions.

Data collection and preprocessing are crucial steps in this project, ensuring that the dataset is cleaned, aggregated, and formatted for analysis. The ARIMA model is trained on this cleaned dataset, followed by testing for stationary and parameter tuning to optimize forecasting accuracy. The project's ultimate goal is to create a user-friendly dashboard that offers real-time price predictions and market analysis, helping farmers in Panruti.

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CEC369 **IoT PROCESSOR** L T P C 2 0 2 3

COURSE OBJECTIVE

- Learn the architecture and features of ARM.
- Study the exception handling and interrupts in the CORTEX M3
- Program the CORTEX M3
- Learn the architecture of the STM 32L15XXX ARM CORTEX M3/M4 microcontroller.
- Understand the concepts of System – On – Chip(SoC)

UNIT I - OVERVIEW OF ARM AND CORTEX-M3 6

ARM Architecture – Versions, Instruction Set Development, Thumb 2 and Instruction Set Architecture, Cortex M3 Basics: Registers, Stack Pointer, Link Register, Program Counter, Special Registers, Operation Mode, Exceptions and Interrupts, Vector Tables, Stack Memory Operations, Reset Sequence , CORTEX M3 Instruction Sets: Assembly Basics, Instruction List, Instruction Descriptions. CORTEX M3 – Implementation Overview: Pipeline, Block Diagram. Bus Interfaces, I – Code Bus, D – Code Bus, System Bus- External PPB and DAP Bus.

UNIT II - CORTEX EXCEPTION HANDLING AND INTERRUPTS 6

Exception Types, Priority, Vector Tables, Interrupt Inputs and Pending behaviour, Fault Exceptions, Supervisor Call and Pendable Service Call, NVIC: Nested Vector Interrupt Controller, Overview, Basic Interrupts, SYSTICK Time, Interrupt Behaviourm Interrupt/Exception Sequences, Exception Exits, Nested Interrupts, Tail – Chaining Interrupts, Late Arrivals and Interrupt Latency.

UNIT III - CORTEX M3/M4 PROGRAMMING 6

Cortex M3/M4 Programming: Overview, Typical Development Flow, Using C, CMSIS Using Assembly, Excepiton Programming Using Interrupts, Exception/Interrupt Handlers, Software Interrupts, Vector Table Relocation, Memory Protection Unit and other CORTEX M3 Features, MPU Registers, Setting up the MPU, Power Management, Multiprocessor Configuration.

UNIT IV - STM32L15XXX ARMCORTEX M3/M4 MICROCONTROLLER AND DEBUGGING TOOLS 6

STM32L15XXX ARM CORTEX M3/M4 Microcontroller: Memory and Bus Architecture, Power Control, Reset and Clock Control, STM32L15XXX Peripherals: GPIOs, System Configuration Controller, NVIC, ADC, Comparators, GP Timers, USART Development and Debugging Tools: Software and Hardware tools like Cross Assemblerm Compiler, Debugger, Simulator, In – Circuit Emulator(ICE), Logic Analyser.

UNIT V - INTRODUCTION TO SYSTEM – ON – CHIP 6

System Architecture: An Overview, Components of the System Processors, Memories and Interconnects, Processor Architectures, Memory and Addressing, System Level Interconnection – An Approach for SOC Design – Chip basics – Cycle Time – Die Area – Power and Cost – Area, Power and Time Trade – Offs in Processor Design – Reliability and Configurability – SOC Design Approach – Application Studies – AES, 3D Graphics Processor. Image Compression and Video Compression.

TOTAL:30 PERIODS

TEXT BOOKS

Tx1. Joseph Yiu, The Definitive Guide to the ARM CORTEX M3/M4, Second Edition, Elsevier, 2010.(Unit – I, II)

Tx2. Andrew N Sloss, Dominic Symes, Chris Wright, ARM System Developers Guide Designing and Optimising System Software, Elsevier, 2006 (Unit – III, IV)

Tx3. Michael J Flynn and Wayne Luk, Computer System Design, System On Chip, Wiley India 2011.(Unit – V)

REFERENCES:

Rx1. Steve Furber, ARM System – on – Chip Architecture, 2nd Edition, Pearson, 2015.

Rx2. CORTEX M Series ARM Reference Manual

Rx3. CORTEX M3 Technical Reference Manual

Rx4. STM32L152XX ARM CORTEX M3 Microcontroller Reference Manual 5/97

AUTOMATED AND DECENTRALIZED CLOUD BASED WATER LEVEL AND QUALITY AUDIT SYSTEM USING IOT

A PROJECT REPORT

Submitted by

VISWANATH. N (422121106039)

MANGALESHWAR. U (422121106019)

RAJAMOHAN. P (422121106027)

In partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

In

ELECTRONICS AND COMMUNICATION ENGINEERING

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025
BONAFIDE CERTIFICATE

Certified that this project report "AUTOMATED AND DECENTRALIZED CLOUD BASED WATER LEVEL AND QUALITY AUDIT SYSTEM USING IOT" is the Bonafide work of **"N.VISWANATH (422121106039), U.MANGALESHWAR (422121106019), P.RAJAMOHAN (422121106027),"** who carried out the project work under my supervision.

SIGNATURE

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HEAD OF THE DEPARTMENT

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27/5/2025
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Panruti – 607106

Submitted for the ANNA UNIVERSITY examination held on 28/05/2025

28/5/25
Internal Examiner

26/5/25
External Examiner

Head of the Department
Department of Electronics and Communication Engineering
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Anguchettypalayam, Panruti-(T.k) Cuddalore-(Dist.),Pin:607 106

ABSTRACT

This work proposes an IoT- and blockchain-based distributed system for the automated measurement and monitoring of water levels and water quality in rural area water tanks. The primary goal of this system is to enhance transparency, efficiency, and safety in water resource management, particularly in remote and underdeveloped regions where manual monitoring is often impractical or unreliable. The proposed water level audit system is designed to be fully decentralized by leveraging the Ethereum blockchain to store and retrieve data collected by IoT sensors. This decentralized approach eliminates the reliance on a Trusted Third Party (TTP), ensuring that the data recorded is tamper-proof, transparent, and verifiable by any stakeholder. Blockchain technology not only guarantees data integrity and immutability but also provides a secure and auditable record of all events and sensor readings over time. The system integrates various sensors, including water level sensors, pH sensors, and turbidity sensors, to collect real-time data. These sensors continuously monitor critical water parameters and transmit the data to the blockchain through a secure and automated process. Based on the sensor readings, the system is programmed to autonomously control the water supply. For instance, the water level is constantly monitored, and the system will automatically turn the water pump ON or OFF to maintain optimal levels and prevent overflow or depletion. Furthermore, the system includes automated safety protocols for water quality. If the pH value deviates from the acceptable range or if the turbidity level increases beyond a safe threshold, indicating potential contamination, the water supply is immediately turned OFF to prevent the distribution of unsafe water. It reduces the need for manual intervention, enhances operational efficiency, and builds trust among users by ensuring that all data is accurate, transparent, and securely stored.

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ANGUCHETTYPALAYAM, PANRUTI – 607 106.

EC3401 NETWORKS AND SECURITY L T P C 3 0 2 4

COURSE OBJECTIVES:

- To learn the Network Models and datalink layer functions.
- To understand routing in the Network Layer.
- To explore methods of communication and congestion control by the Transport Layer.
- To study the Network Security Mechanisms.
- To learn various hardware security attacks and their countermeasures.

UNIT I NETWORK MODELS AND DATALINK LAYER 9

Overview of Networks and its Attributes – Network Models – OSI, TCP/IP, Addressing – Introduction to Datalink Layer – Error Detection and Correction – Ethernet (802.3)- Wireless LAN – IEEE 802.11, Bluetooth – Flow and Error Control Protocols – HDLC – PPP.

UNIT II NETWORK LAYER PROTOCOLS 9

Network Layer – IPv4 Addressing – Network Layer Protocols(IP,ICMP and Mobile IP) Unicast and Multicast Routing – Intradomain and Interdomain Routing Protocols – IPv6 Addresses – IPv6 – Datagram Format – Transition from IPv4 to IPv6.

UNIT III TRANSPORT AND APPLICATION LAYERS 9

Transport Layer Protocols – UDP and TCP Connection and State Transition Diagram - Congestion Control and Avoidance(DEC bit, RED)- QoS - Application Layer Paradigms – Client – Server Programming – Domain Name System – World Wide Web, HTTP, Electronic Mail.

UNIT IV NETWORK SECURITY 9

OSI Security Architecture – Attacks – Security Services and Mechanisms – Encryption –Advanced Encryption Standard – Public Key Cryptosystems – RSA Algorithm – Hash Functions – Secure Hash Algorithm – Digital Signature Algorithm.

UNIT V HARDWARE SECURITY 9

Introduction to hardware security, Hardware Trojans, Side – Channel Attacks – Physical Attacks and Countermeasures – Design for Security. Introduction to Blockchain Technology.

45 PERIODS

COURSE OUTCOMES:

Upon successful completion of the course the student will be able to

CO1: Explain the Network Models, layers and functions.
CO2: Categorize and classify the routing protocols.
CO3: List the functions of the transport and application layer.
CO4: Evaluate and choose the network security mechanisms.
CO5: Discuss the hardware security attacks and countermeasures.

TOTAL:75 PERIODS

TEXTBOOKS

1. Behrouz.A.Forouzan, Data Communication and Networking, Fifth Edition, TMH, 2017.(Unit – I,II,III)
2. William Stallings, Cryptography and Network Security, Seventh Edition, Pearson Education, 2017(Unit-IV)
3. Bhunia Swarup, Hardware Security –A Hands On Approach,Morgan Kaufmann, First edition, 2018.(Unit – V).

REFERENCES

1. James.F.Kurose and Keith.W.Ross, Computer Networking – A Top – Down Approach, Sixth Edition, Pearson, 2017.
2. Doughlas .E.Comer, Computer Networks and Internets with Internet Applications, Fourth Edition, Pearson Education, 2008.

IOT AND ML - BASED FIRE ACCIDENT PREVENTION SYSTEM FOR ELECTRIC VEHICLES USING SUPER CAPACITORS AND THERMO GEL COOLING

A PROJECT REPORT

Submitted by

ABI. E	422121106001
MOHANA. P	422121106021
SENTHAMIZH NILA. V	422121106032

in partial fulfillment for the award of the degree

of

BACHELOR OF ENGINEERING

In

ELECTRONICS AND COMMUNICATION ENGINEERING

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANNA UNIVERSITY :: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY : CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"IOT AND ML-BASED FIRE ACCIDENT PREVENTION SYSTEM FOR ELECTRIC VEHICLES USING SUPERCAPACITORS AND THERMO GEL COOLING"** is the bona fide work of **" ABI.E (422121106001), MOHANA. P (422121106021), SENTHAMIZH NILA. V (422121106032)"** who carried out the project work under my supervision.

28/5/25

SIGNATURE

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Ms. SAMADHANA PRIYA M.E.,

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EXTERNAL EXAMINER

ABSTRACT

This project illustrates a precarious industrial environment monitoring and control for this monitoring information concerning safety and security. The proposed system uses a combination sensor network node with a system architecture and concept implementation, which are described mainly for an industrial safety monitoring scenario. The information is gathered by the deployed sensor network with focus on four main conditions: gas leakage and oil. This Project also enables an easy to use user interface and the accessibility of data through standards-based web server technologies. It is the most effective and most economical means of equipment safety monitoring. The Raspberry Pi Pico W serves as the central control unit, running the software application responsible for collecting sensor data, processing it, and controlling the connected devices. It communicates with the Gas sensor (MQ135) to detect the presence of harmful gases in the environment. If the gas concentration exceeds a predefined threshold, indicating potential danger, the Buzzer is triggered to emit an audible alarm, alerting the residents.

CEC367 **INDUSTRIAL IOT AND INDUSTRY 4.0** **L T P C 2 0 2 3**

COURSE OBJECTIVES:

- IoT Nodes & Sensors
- IoT Gateways
- IoT Cloud Systems
- IoT Cloud Dashboards
- Challenges in Iot system Design – Hardware & Software

UNIT I UNDERSTANDING IOT CONCEPT AND DEVELOPMENT PLATFORM 6

IOT Definition, Importance of IoT, Applications of IOT, IoT architecture, Understanding working of Sensors, Actuators, Sensor calibration, Study of Different sensors and their characteristics

UNIT II ANALYZING & DECODING OF COMMUNICATION PROTOCOL USED IN IOT DEVELOPMENT PLATFORM 6

UART Communication Protocol, I2C Protocol device interfacing and decoding of signal, SPI Protocol device interfacing and decoding of signal, WIFI and Router interfacing, Ethernet Configuration, Bluetooth study and analysis of data flow, Zigbee Interfacing and study of signal flow

UNIT III IOT PHYSICAL DEVICES AND ENDPOINTS AND CONTROLLING 6

HARDWARE AND SENSORS IoT Physical Devices and Endpoints- Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), Programming – Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins. Controlling Hardware- Connecting LED, Buzzer, Switching High Power devices with transistors, Controlling AC Power devices with Relays, Controlling servo motor, speed control of DC Motor, unipolar and bipolar Stepper motors; Sensors- Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11, Motion Detection Sensors, Wireless Bluetooth Sensors,Level Sensors, USB Sensors, Embedded Sensors, Distance Measurement with ultrasound sensor.

UNIT IV CLOUD SERVICES USED IN IOT DEVELOPMENT PLATFORM 6

Configuration of the cloud platform, Sending data from the IOT nodes to the gateways using different communication options; Transferring data from gateway to the cloud; Exploring the web services like mail, Messaging (SMS) and Twitter etc.;Tracking of cloud data as per the requirement; Google Cloud service architect; AWS clod Services architect; Microsoft Azure cloud services Architect; OEN source Cloud Services; Initial State Iot Dashboard & Cloud Services

UNIT V CHALLENGES IN IOT SYSTEM DESIGN – HARDWARE & SOFTWARE 6

Antenna design and placement, Chip-package system development, Power electronics, electromagnetic interference/compatibility (EMI/EMC), Electronics reliability; Battery simulation. 30 PERIODS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

CO1: Understand the building blocks of IoT technology and explore the vast spectrum of IoT applications
CO2: Use processors & peripherals to design & build IoT hardware
CO3: Assess, select and customize technologies for IoT applications
CO4: Connect numerous IOT applications with the physical world of humans and real life problem solving.
CO5: Design and implement IOT applications that manage big data TOTAL:60 PERIODS

TEXT BOOKS

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

REFERENCES

1. Raspberry Pi Cookbook, Software and Hardware Problems and solutions, Simon Monk, O'Reilly (SPD), 2016, ISBN 7989352133895
2. N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014. 3. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015 3. Editors Ovidiu Vermesan

EXPERIMENTAL INVESTIGATION ON ELECTRICAL DISCHARGE MACHINING OF AA7075 ALUMINIUM ALLOY WITH CONVENTIONAL COPPER ELECTRODE USING RESPONSE SURFACE METHODOLOGY APPROACH

A PROJECT REPORT

Submitted by

DHIVAKAR .T (422121114008)

KAVIPRASATH .M (422121114012)

VISHNURAJ .T (422121114023)

Inpartial fulfillment for the award degree

of

BACHELOR OF ENGINEERING

In

MECHANICAL ENGINEERING

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

PANRUTI - 607106

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report "**EXPERIMENTAL INVESTIGATION ON ELECTRICAL DISCHARGE MACHINING OF AA7075 ALUMINIUM ALLOY WITH CONVENTIONAL COPPER ELECTRODE USING RESPONSE SURFACE METHODOLOGY APPROACH**" is the Bonafide work of"**DHIVAKAR.T(422121114008),KAVIPRASATH.M (422121114012), VISHNURAJ (422121114023)**" who carried out the project work under my supervision.

SIGNATURE

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Submitted for the ANNA UNIVERSITY examination held on 28.5.2025

Internal Examiner

External Examiner

ABSTRACT

The increasing demand for lightweight, high-strength materials in aerospace and automotive sectors necessitates precision machining techniques like Electrical Discharge Machining (EDM), which offers superior accuracy and surface integrity without inducing mechanical stress. EDM plays a crucial role in machining hard, conductive materials with intricate geometries, especially in aerospace, biomedical, and die-making industries where conventional methods fail to achieve desired precision and finish. Despite precision advantages of EDM, machining AA7075 aluminium alloy presents problems such as excessive tool wear, poor surface integrity, and microcrack formation due to its high thermal conductivity, low melting point, and reactive nature. These issues can be mitigated by optimizing EDM parameters through multi-response optimization techniques such as Response Surface Methodology (RSM), which enables precise tuning for improved MRR, surface quality, and defect reduction during AA7075 alloy machining. In this investigation, AA7075 aluminum alloy was machined using die-sinking EDM with a copper electrode and EDM oil as the dielectric fluid. Experiments were conducted based on Response Surface Methodology (RSM) to systematically evaluate the effects of process parameters. Parameters such as discharge current (Ip), pulse-on time (T_{on}), and pulse-off time (T_{off}) were controlled to achieve enhanced surface characteristics, including material removal rate (MRR) and surface roughness (SR). The effect of process parameters on MRR and SR was analyzed, and the most influential parameters were identified using Analysis of Variance (ANOVA). Mathematical models for MRR and SR were developed using RSM to predict and optimize EDM process performance.

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ANGUCHETTYPALAYAM, PANRUTI – 607 106.
DEPARTMENT OF MECHANICAL ENGINEERING

CME 387 NON-TRADITIONAL MACHINING PROCESSES

L T P C
3 0 0 3

COURSE OBJECTIVES

1. To classify non-traditional machining processes and describe mechanical energy based non traditional machining processes.
2. To differentiate chemical and electro chemical energy-based processes,
3. To describe thermo-electric energy-based processes
4. To explain nano finishing processes.
5. To introduce hybrid non-traditional machining processes and differentiate hybrid non-traditional machining processes

UNIT – I NTRODUCTION AND MECHANICAL ENERGY BASED PROCESSES 9

Introduction - Need for non-traditional machining processes - Classification of non-traditional machining processes - Applications, advantages and limitations of non-traditional machining processes - Abrasive jet machining, Abrasive water jet machining, Ultrasonic machining their principles, equipment, effect of process parameters, applications, advantages and limitations.

UNIT – II CHEMICAL AND ELECTRO CHEMICAL ENERGY BASED PROCESSES

Principles, equipments, effect of process parameters, applications, advantages and limitations of Chemical machining, Electro-chemical machining, Electro-chemical honing, Electro-chemical grinding, Electro chemical deburring.

UNIT –III THERMO-ELECTRIC ENERGY BASED PROCESSES NANO FINISHING PROCESSES 9

Principles, equipments, effect of process parameters, applications, advantages and limitations of Electric discharge machining, Wire electric discharge machining, Laser beam machining, Plasma arc machining, Electron beam machining, Ion beam machining.

UNIT – IV NANO FINISHING PROCESSES 9

Principles, equipments, effect of process parameters, applications, advantages and limitations of Abrasive flow machining – Chemo mechanical polishing, Magnetic abrasive finishing, Magnetorheological finishing, Magneto rheological abrasive flow finishing..

UNIT – V HYBRID NON-TRADITIONAL MACHINING PROCESSES 9

Introduction - Various hybrid non-traditional machining processes, their working principles, equipments, effect of process parameters, applications, advantages and limitations. Selection and comparison of different non traditional machining processes.

TOTAL: 45 PERIODS

OUTCOMES: At the end of the course the students would be able to

1. Formulate different types of non-traditional machining processes and evaluate mechanical energy based non-traditional machining processes.
2. Illustrate chemical and electro chemical energy based processes.
3. Evaluate thermo-electric energy based processes.
4. Interpret nano finishing processes.
5. Analyse hybrid non-traditional machining processes and differentiate non- traditional machining processes.

TEXT BOOKS:

1. Adithan. M., "Unconventional Machining Processes", Atlantic, New Delhi, India, 2009. ISBN 13: 9788126910458
2. Anand Pandey, "Modern Machining Processes", Ane Books Pvt. Ltd., New Delhi, India, 2019.

REFERENCES:

1 Benedict, G.F., "Non-traditional Manufacturing Processes", Marcel Dekker Inc., New York 1987. ISBN-13: 978-0824773526.

2. Carl Sommer, "Non-Traditional Machining Handbook", Advance Publishing., United States, 2000, ISBN-13: 978-1575373256.

3. Golam Kibria, Bhattacharyya B. and Paulo Davim J., "Non-traditional Micromachining Processes: Fundamentals and Applications", Springer International Publishing., Switzerland, 2017, ISBN:978-3 319-52008-7. 4. Jagadeesha T., "Non-Traditional Machining Processes", I.K. International Publishing House Pvt. Ltd., New Delhi, India, 2017, ISBN-13: 978-9385909122.

5. Kapil Gupta, Neelesh K. Jain and Laubscher R.F., "Hybrid Machining Processes: Perspectives on Machining and Finishing", 1st edition, Springer International Publishing., Switzerland, 2016, ISBN 13: 978-3319259208.

MACHINABILITY BEHAVIOR OF AA7075 ALUMINIUM ALLOY PROCESSED USING ELECTRICAL DISCHARGE MACHINING WITH PURE ALUMINUM ELECTRODE: A PARAMETRIC STUDY

A PROJECT REPORT

Submitted by

KARTHIKEYAN. T (422121114010)

NAGALINGAM.K (422121114014)

TONY FIDEL SYNTHIA .V (422121114020)

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BACHELOR OF ENGINEERING

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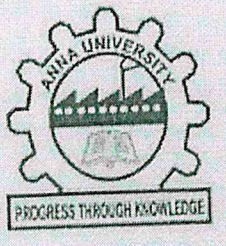

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICAT

Certified that this project report " **MICROSTRUCTURE AND MICRO HARDNESS ANALYSIS OF ALUMINIUM (AA7075) UNDER NEGATIVE POLARITY & BIO DIE ELECTRIC FLUID BY DIE SINKING ELECTRO DISCHARGE MACHINING (EDM)** " is the Bonafide work of **"KARTHIKEYAN .T (422121114010) NAGALINGAM.K (422121114014) TONY FIDE SYNTHIA .V(422121114020) VEERAPANDI (422121114021)"** who carried out the project work under my supervision.

for P. 28/5/25

SIGNATURE

Dr. K.SHANMUGAELANGO., M.Tech ., Ph.D.,

HEAD OF THE DEPARTMENT

Associate Professor

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SIGNATURE

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Assistant Professor

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Panruti – 607106

Submitted for the ANNA UNIVERSITY examination held on 28.02.25

Internal Examiner

External Examiner

ABSTRACT

The growing demand for lightweight, high-strength materials in industries such as aerospace and automotive has made precision machining techniques, like Electrical Discharge Machining (EDM), essential. EDM is particularly effective for machining hard, conductive materials with complex geometries, commonly used in aerospace, biomedical, and die-making sectors, where traditional methods often fall short in terms of precision and finish. However, machining AA7075 aluminum alloy via EDM presents challenges, including excessive tool wear, poor surface integrity, and micro crack formation, owing to the alloy's high thermal conductivity and low melting point. To address these issues, this study utilizes Response Surface Methodology (RSM) for multi-response optimization, aiming to improve material removal rate (MRR), surface quality, and minimize defects. This study investigates the machinability behavior of AA7075 aluminium alloy processed using EDM with a pure aluminium electrode. AA7075 is a high-strength aluminium alloy widely used in aerospace, automotive, and structural applications due to its excellent mechanical properties. However, machining this alloy poses challenges related to tool wear, surface integrity, and material removal efficiency. The primary objective of this research is to evaluate the influence of key EDM process parameters namely spark current (Is), pulse-on time (T_{on}), and pulse-off time (T_{off}) on the machinability characteristics, including material removal rate (MRR), electrode wear rate (EWR). The experiments are conducted using a pure aluminium electrode under varied parameter settings to understand their impact on machining performance. RSM is employed for the experimental design, and analysis of variance (ANOVA) is used to identify the most significant parameters affecting the machinability of AA7075. Composite desirability optimization was performed using response surface optimizer.

Keywords: Electrical Discharge Machining (EDM), AA7075 aluminum alloy, Response Surface Methodology (RSM), electrode wear rate (EWR)

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DEPARTMENT OF MECHANICAL ENGINEERING

CME 387 NON-TRADITIONAL MACHINING PROCESSES

L T P C
3 0 0 3

COURSE OBJECTIVES

1. To classify non-traditional machining processes and describe mechanical energy based non traditional machining processes.
2. To differentiate chemical and electro chemical energy-based processes.
3. To describe thermo-electric energy-based processes
4. To explain nano finishing processes.
5. To introduce hybrid non-traditional machining processes and differentiate hybrid non-traditional machining processes

UNIT – I NTRODUCTION AND MECHANICAL ENERGY BASED PROCESSES 9

Introduction - Need for non-traditional machining processes - Classification of non-traditional machining processes - Applications, advantages and limitations of non-traditional machining processes - Abrasive jet machining, Abrasive water jet machining, Ultrasonic machining their principles, equipment, effect of process parameters, applications, advantages and limitations.

UNIT – II CHEMICAL AND ELECTRO CHEMICAL ENERGY BASED PROCESSES

Principles, equipments, effect of process parameters, applications, advantages and limitations of Chemical machining, Electro-chemical machining, Electro-chemical honing, Electro-chemical grinding, Electro chemical deburring.

UNIT –III THERMO-ELECTRIC ENERGY BASED PROCESSES NANO FINISHING PROCESSES 9

Principles, equipments, effect of process parameters, applications, advantages and limitations of Electric discharge machining, Wire electric discharge machining, Laser beam machining, Plasma arc machining, Electron beam machining, Ion beam machining.

UNIT – IV NANO FINISHING PROCESSES 9

Principles, equipments, effect of process parameters, applications, advantages and limitations of Abrasive flow machining – Chemo mechanical polishing, Magnetic abrasive finishing, Magnetorheological finishing, Magneto rheological abrasive flow finishing.,

UNIT – V HYBRID NON-TRADITIONAL MACHINING PROCESSES 9

Introduction - Various hybrid non-traditional machining processes, their working principles, equipments, effect of process parameters, applications, advantages and limitations. Selection and comparison of different non traditional machining processes.

TOTAL: 45 PERIODS

OUTCOMES: At the end of the course the students would be able to

1. Formulate different types of non-traditional machining processes and evaluate mechanical energy based non-traditional machining processes.
2. Illustrate chemical and electro chemical energy based processes.
3. Evaluate thermo-electric energy based processes.
4. Interpret nano finishing processes.
5. Analyse hybrid non-traditional machining processes and differentiate non- traditional machining processes.

TEXT BOOKS:

1. Adithan. M., "Unconventional Machining Processes", Atlantic, New Delhi, India, 2009. ISBN 13: 9788126910458
2. Anand Pandey, "Modern Machining Processes", Ane Books Pvt. Ltd., New Delhi, India, 2019.

REFERENCES:

1 Benedict, G.F., "Non-traditional Manufacturing Processes", Marcel Dekker Inc., New York 1987. ISBN-13: 978-0824773526.
2. Carl Sommer, "Non-Traditional Machining Handbook", Advance Publishing., United States, 2000, ISBN-13: 978-1575373256.
3. Golam Kibria, Bhattacharyya B. and Paulo Davim J., "Non-traditional Micromachining Processes: Fundamentals and Applications", Springer International Publishing., Switzerland, 2017, ISBN:978-3 319-52008-7. 4. Jagadeesha T., "Non-Traditional Machining Processes", I.K. International Publishing House Pvt. Ltd., New Delhi, India, 2017, ISBN-13: 978-9385909122.
5. Kapil Gupta, Neelesh K. Jain and Laubscher R.F., "Hybrid Machining Processes: Perspectives on Machining and Finishing", 1st edition, Springer International Publishing., Switzerland, 2016, ISBN 13: 978-3319259208.

ME3392 ENGINEERING MATERIALS AND METALLURGY

COURSE OBJECTIVES:

1 To learn the constructing the phase diagram and using of iron-iron carbide phase diagram for microstructure formation.
2 To learn selecting and applying various heat treatment processes and its microstructure formation.
3 To illustrate the different types of ferrous and non-ferrous alloys and their uses in engineering field.
4 To illustrate the different polymer, ceramics and composites and their uses in engineering field.
5 To learn the various testing procedures and failure mechanism in engineering field.

UNIT I CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS 9

Constitution of alloys — Solid solutions, substitutional and interstitial — phase diagrams, Isomorphous, eutectic, eutectoid, peritectic, and peritectoid reactions, Iron — Iron carbide equilibrium diagram. Classification of steel and cast-Iron microstructure, properties and application.

UNIT II HEAT TREATMENT 9

Definition – Full annealing, stress relief, recrystallisation and spheroidising –normalizing, hardening and tempering of steel. Isothermal transformation diagrams – cooling curves superimposed on I.T. diagram – continuous cooling Transformation (CCT) diagram – Austempering, Martempering – Hardenability, Jominy end quench test -case hardening, carburizing, Nitriding, cyaniding, carbonitriding – Flame and Induction hardening – Vacuum and Plasma hardening – Thermo-mechanical treatments- elementary ideas on sintering.

UNIT III FERROUS AND NON-FERROUS METALS 9

Effect of alloying additions on steel (Mn, Si, Cr, Mo, Ni, V,Ti& W) – stainless and tool steels – HSLA - Maraging steels – Grey, white, malleable, spheroidal – alloy cast irons, Copper and its alloys – Brass, Bronze and Cupronickel – Aluminium and its alloys; Al-Cu – precipitation strengthening treatment – Titanium alloys, Mg-alloys, Ni-based super alloys – shape memory alloys- Properties and Applications- overview of materials standard

UNIT IV NON-METALLIC MATERIALS 9

Polymers – types of polymers, commodity and engineering polymers – Properties and applications of PE, PP, PS, PVC, PMMA, PET, PC, PA, ABS, PAI, PPO, PPS, PEEK, PTFE, Thermoset polymers –Urea and Phenol formaldehydes –Nylon, Engineering Ceramics – Properties and applications of Al2O3, SiC, Si3N4, PSZ and SIALON — intermetallics- Composites- Matrix and reinforcement Materials- applications of Composites - Nano composites.

UNIT V MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS 9

Mechanisms of plastic deformation, slip and twinning – Types of fracture – fracture mechanics- Griffith's theory- Testing of materials under tension, compression and shear loads — Hardness tests (Brinell, Vickers and Rockwell), Micro and nano-hardness tests, Impact test Izod and charpy, fatigue and creep failure mechanisms.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the students would be able to

1. Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.
2. Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.
3. Clarify the effect of alloying elements on ferrous and non-ferrous metals.
4. Summarize the properties and applications of non-metallic materials.
5. Explain the testing of mechanical properties.

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1. Kenneth G.Budinski and Michael K. Budinski, "Engineering Materials", Prentice Hall of India Private Limited, 9th edition ,2018.
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REFERENCES:

1. A. Alavudeen, N. Venkateshwaran, and J. T.WinowlinJappes, A Textbook of Engineering Materials and Metallurgy, Laxmi Publications, 2006.
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5. Williams D Callister, "Material Science and Engineering" Wiley India Pvt Ltd, 2nd edition Re print 2019.

DESIGN AND IMPLEMENTATION OF SOLAR AND WIND POWERED HYBRID VEHICLES

A PROJECT REPORT

Submitted by

AGAZHIYAN.M (422121114002)

AHAMED ASHIF.S (422121114003)

PREM KUMAR.G (422121114016)

In partial fulfillment for the award of the degree

Of

BACHELOR OF ENGINEERING

In

MECHANICAL ENGINEERING

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"DESIGN AND IMPLEMENTATION OF SOLAR AND WIND POWERED HYBRID VEHICLE"** is the Bonafide work of **"AGAZHIYAN.M (422121114002) AHAMED ASHIF.S (422121114003) PREMKUMAR.G (422121114016)"** who carried out the project work under my supervision.

SIGNATURE

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HEAD OF THE DEPARTMENT

Assistant Professor

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Submitted for the ANNA UNIVERSITY examination held on 28.05.2025

Internal Examiner

External Examiner

ABSTRACT

The increasing demand for sustainable energy solutions has led to the development of hybrid vehicles powered by renewable energy sources. This project focuses on designing and implementing a solar and wind-powered hybrid vehicle that utilizes both solar panels and wind turbines to generate electricity. The system efficiently stores the harvested energy in batteries, ensuring continuous power supply for the vehicle. By combining solar and wind energy, the vehicle can operate in different environmental conditions, making it a reliable and eco-friendly transportation option. This hybrid approach reduces dependency on fossil fuels, lowers carbon emissions, and promotes green energy usage. The proposed system aims to enhance energy efficiency and contribute to the development of sustainable mobility solutions.

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY
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DEPARTMENT OF MECHANICAL ENGINEERING

CME 380 AUTOMOBILE ENGINEERING

L T P C
3 0 0 3

COURSE OBJECTIVES

1 To study the construction and working principle of various parts of an automobile.
2 To study the practice for assembling and dismantling of engine parts and transmission system
3 To study various transmission systems of automobile.
4 To study about steering, brakes and suspension systems
5 To study alternative energy sources

UNIT – I VEHICLE STRUCTURE AND ENGINES 9

Types of automobiles vehicle construction and different layouts, chassis, frame and body, Vehicle aerodynamics (various resistances and moments involved), IC engines – components-functions and materials, variable valve timing (VVT).

UNIT – II ENGINE AUXILIARY SYSTEMS 9

Electronically controlled gasoline injection system for SI engines, Electronically controlled diesel injection system (Unit injector system, Rotary distributor type and common rail direct injection system), Electronic ignition system (Transistorized coil ignition system, capacitive discharge ignition system), Turbo chargers (WGT, VGT), Engine emission control by three way catalytic converter system, Emission norms (Euro and BS).

UNIT – III TRANSMISSION SYSTEMS 9

Clutch-types and construction, gear boxes- manual and automatic, gear shift mechanisms, Overdrive, transfer box, fluid flywheel, torque converter, propeller shaft, slip joints, universal joints, Differential and rear axle, Hotchkiss Drive and Torque Tube Drive.

UNIT – IV STEERING, BRAKES AND SUSPENSION SYSTEMS 9

Steering geometry and types of steering gear box-Power Steering, Types of Front Axle, Types of Suspension Systems, Pneumatic and Hydraulic Braking Systems, Antilock Braking System (ABS),electronic brake force distribution (EBD) and Traction Control.

UNIT – V ALTERNATIVE ENERGY SOURCES 9

Use of Natural Gas, Liquefied Petroleum Gas, Bio-diesel, Bio-ethanol, Gasohol and Hydrogen in Automobiles- Engine modifications required –Performance, Combustion and Emission Characteristics of SI and CI engines with these alternate fuels - Electric and Hybrid Vehicles, Fuel Cell Note: Practical Training in dismantling and assembling of Engine parts and Transmission Systems should be given to the students.

TOTAL: 45 PERIODS

OUTCOMES: At the end of the course the students would be able to

1. Recognize the various parts of the automobile and their functions and materials.
2. Discuss the engine auxiliary systems and engine emission control.
3. Distinguish the working of different types of transmission systems.
4. Explain the Steering, Brakes and Suspension Systems.
5. Predict possible alternate sources of energy for IC Engines.

TEXT BOOKS:

1. Jain K.K. and Asthana .R.B, "Automobile Engineering" Tata McGraw Hill Publishers, New Delhi, 2002.
2. Kirpal Singh, "Automobile Engineering", Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 13th Edition 2014.

REFERENCES:

1. Ganesan V. "Internal Combustion Engines", Third Edition, Tata McGraw-Hill, 2012.
2. Heinz Heisler, "Advanced Engine Technology," SAE International Publications USA, 1998.
3. Joseph Heitner, "Automotive Mechanics," Second Edition, East-West Press, 1999.
4. Martin W, Stockel and Martin T Stockle , "Automotive Mechanics Fundamentals," The Good heart - Will Cox Company Inc, USA ,1978.
5. Newton, Steeds and Garet, "Motor Vehicles", Butterworth Publishers,1989.

SURFACE BEHAVIOUR OF AA7075 USING WS_2/Cu POWDER METALLURGICAL ELECTRODE BY ELECTRO DISCHARGE COATING

A PROJECT REPORT

Submitted by

BHARATH. P	422121114005
VELPANDIYAN.D	422121114022
VISHWA.R	422121114024

In partial fulfilment for the award of the degree

Of

BACHELOR OF ENGINEERING

In

MECHANICAL ENGINEERING

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

PANRUTI - 607106

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report "**SURFACE BEHAVIOUR OF AA7075 USING WS_2/Cu POWDER METALLURGICAL ELECTRODE BY ELECTRO DISCHARGE COATING**"is the Bonafide work of **"BHARATH.P (422121114005) VELPANDIYAN.D (422121114022) VISHWA.R (422121114024)"**who carried out the project work under my supervision.

SIGNATURE

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Panruti – 607106

Submitted to the Project Report Viva voce held on 28/05/2025

Internal Examiner

External Examiner

ABSTRACT

Nowadays, surface modification techniques are a big part of making metals and alloys better on the outside. Even though various metals and alloys are coated using surface modification techniques, improving the surface properties of the light alloys is difficult. To improve the surface properties of light alloys, electro-thermal techniques, namely electro discharge Coating (EDC), are suitable. Hence, in this investigation, a tungsten disulfide (WS2) copper (Cu) composite coating was developed on AA7075 using electro discharge deposition. The WS_2 Cu composite electrodes were manufactured by the powder metallurgy method. The effects of discharge current, pulse on time, and pulse off time on deposition rate (DR) and surface roughness (SR) have been studied. Tests were carried out according to the design matrix generated by central composite design in response surface methodology (RSM). An ANOVA was performed to determine the optimum parametric conditions for the responses. Pulse off time was the dominating parameter followed by discharge current and pulse on time for attaining the best response. Higher values of current, pulse on time, and pulse off time led to higher DR and SR values. Higher discharge current produced sufficient spark strength that melted both the tool electrode and the workpiece. The lower setting of parameters offered smooth roughness due to the even spark distribution. At a current of 4 A, bigger craters were observed due to the higher spark intensity that made the surface hard. The uneven mass was produced with a deeper shallow crater, resulting in a poor surface.

Keywords: Surface modification/ EDC/ DR/ EWR/ Powder metallurgy

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DEPARTMENT OF MECHANICAL ENGINEERING

CME 387 NON-TRADITIONAL MACHINING PROCESSES

L T P C
3 0 0 3

COURSE OBJECTIVES

1. To classify non-traditional machining processes and describe mechanical energy based non traditional machining processes.
2. To differentiate chemical and electro chemical energy-based processes.
3. To describe thermo-electric energy-based processes
4. To explain nano finishing processes.
5. To introduce hybrid non-traditional machining processes and differentiate hybrid non-traditional machining processes

UNIT – I NTRODUCTION AND MECHANICAL ENERGY BASED PROCESSES 9

Introduction - Need for non-traditional machining processes - Classification of non-traditional machining processes - Applications, advantages and limitations of non-traditional machining processes - Abrasive jet machining, Abrasive water jet machining, Ultrasonic machining their principles, equipment, effect of process parameters, applications, advantages and limitations.

UNIT – II CHEMICAL AND ELECTRO CHEMICAL ENERGY BASED PROCESSES

Principles, equipments, effect of process parameters, applications, advantages and limitations of Chemical machining, Electro-chemical machining, Electro-chemical honing, Electro-chemical grinding, Electro chemical deburring.

UNIT –III THERMO-ELECTRIC ENERGY BASED PROCESSES NANO FINISHING PROCESSES 9

Principles, equipments, effect of process parameters, applications, advantages and limitations of Electric discharge machining, Wire electric discharge machining, Laser beam machining, Plasma arc machining, Electron beam machining, Ion beam machining.

UNIT – IV NANO FINISHING PROCESSES 9

Principles, equipments, effect of process parameters, applications, advantages and limitations of Abrasive flow machining – Chemo mechanical polishing, Magnetic abrasive finishing, Magnetorheological finishing, Magneto rheological abrasive flow finishing..

UNIT – V HYBRID NON-TRADITIONAL MACHINING PROCESSES 9

Introduction - Various hybrid non-traditional machining processes, their working principles, equipments, effect of process parameters, applications, advantages and limitations. Selection and comparison of different non traditional machining processes.

TOTAL: 45 PERIODS

OUTCOMES: At the end of the course the students would be able to

1. Formulate different types of non-traditional machining processes and evaluate mechanical energy based non-traditional machining processes.
2. Illustrate chemical and electro chemical energy based processes.
3. Evaluate thermo-electric energy based processes.
4. Interpret nano finishing processes.
5. Analyse hybrid non-traditional machining processes and differentiate non- traditional machining processes.

TEXT BOOKS:

1. Adithan. M., "Unconventional Machining Processes", Atlantic, New Delhi, India, 2009. ISBN 13: 9788126910458
2. Anand Pandey, "Modern Machining Processes", Ane Books Pvt. Ltd., New Delhi, India, 2019.

REFERENCES:

1 Benedict, G.F., "Non-traditional Manufacturing Processes", Marcel Dekker Inc., New York 1987. ISBN-13: 978-0824773526.
2. Carl Sommer, "Non-Traditional Machining Handbook", Advance Publishing., United States, 2000, ISBN-13: 978-1575373256.
3. Golam Kibria, Bhattacharyya B. and Paulo Davim J., "Non-traditional Micromachining Processes: Fundamentals and Applications", Springer International Publishing., Switzerland, 2017, ISBN:978-3 319-52008-7. 4. Jagadeesha T., "Non-Traditional Machining Processes", I.K. International Publishing House Pvt. Ltd., New Delhi, India, 2017, ISBN-13: 978-9385909122.
5. Kapil Gupta, Neelesh K. Jain and Laubscher R.F., "Hybrid Machining Processes: Perspectives on Machining and Finishing", 1st edition, Springer International Publishing., Switzerland, 2016, ISBN 13: 978-3319259208.

ME3392 ENGINEERING MATERIALS AND METALLURGY

COURSE OBJECTIVES:

1 To learn the constructing the phase diagram and using of iron-iron carbide phase diagram for microstructure formation.
2 To learn selecting and applying various heat treatment processes and its microstructure formation.
3 To illustrate the different types of ferrous and non-ferrous alloys and their uses in engineering field.
4 To illustrate the different polymer, ceramics and composites and their uses in engineering field.
5 To learn the various testing procedures and failure mechanism in engineering field.

UNIT I CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS 9

Constitution of alloys — Solid solutions, substitutional and interstitial — phase diagrams, Isomorphous, eutectic, eutectoid, peritectic, and peritectoid reactions, Iron — Iron carbide equilibrium diagram. Classification of steel and cast-Iron microstructure, properties and application.

UNIT II HEAT TREATMENT 9

Definition – Full annealing, stress relief, recrystallisation and spheroidising –normalizing, hardening and tempering of steel. Isothermal transformation diagrams – cooling curves superimposed on I.T. diagram – continuous cooling Transformation (CCT) diagram – Austempering, Martempering – Hardenability, Jominy end quench test -case hardening, carburizing, Nitriding, cyaniding, carbonitriding – Flame and Induction hardening – Vacuum and Plasma hardening – Thermo-mechanical treatments- elementary ideas on sintering.

UNIT III FERROUS AND NON-FERROUS METALS 9

Effect of alloying additions on steel (Mn, Si, Cr, Mo, Ni, V,Ti& W) – stainless and tool steels – HSLA - Maraging steels – Grey, white, malleable, spheroidal – alloy cast irons, Copper and its alloys – Brass, Bronze and Cupronickel – Aluminium and its alloys; Al-Cu – precipitation strengthening treatment – Titanium alloys, Mg-alloys, Ni-based super alloys – shape memory alloys- Properties and Applications- overview of materials standard

UNIT IV NON-METALLIC MATERIALS 9

Polymers – types of polymers, commodity and engineering polymers – Properties and applications of PE, PP, PS, PVC, PMMA, PET, PC, PA, ABS, PAI, PPO, PPS, PEEK, PTFE, Thermoset polymers –Urea and Phenol formaldehydes –Nylon, Engineering Ceramics – Properties and applications of Al2O3, SiC, Si3N4, PSZ and SIALON — intermetallics- Composites- Matrix and reinforcement Materials- applications of Composites - Nano composites.

UNIT V MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS 9

Mechanisms of plastic deformation, slip and twinning – Types of fracture – fracture mechanics- Griffith's theory- Testing of materials under tension, compression and shear loads — Hardness tests (Brinell, Vickers and Rockwell), Micro and nano-hardness tests, Impact test Izod and charpy, fatigue and creep failure mechanisms.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the students would be able to

1. Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.
2. Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.
3. Clarify the effect of alloying elements on ferrous and non-ferrous metals.
4. Summarize the properties and applications of non-metallic materials.
5. Explain the testing of mechanical properties.

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NTMP-31
A-E - 2
MT - 2
EMM-2
PPE-1

EXAMINE THE MECHANICAL PROPERTIES AND IMMERSION CORROSION BEHAVIOR OF ALUMINUM 8011 HYBRID NANOCOMPOSITE

A PROJECT REPORT

Submitted by

DESIGAN.R (422121114006)

IGNO CROSSLY.M (422121114009)

KATHIRAVAN.M (422121114302)

In partial fulfillment for the award degree

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BACHELOR OF ENGINEERING

In

MECHANICAL ENGINEERING

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"EXAMINE THE MECHANICAL PROPERTIES AND IMMERSION CORROSION BEHAVIOR OF ALUMINUM 8011 HYBRID NANOCOMPOSITE"** is the Bonafide work of **"DESIGAN.R (422121114006) IGNO CROSSLY.M (422121114009) KATHIRAVAN.M (422121114302)"** who carried out the project work under my supervision.

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Submitted for the ANNA UNIVERSITY examination held on 28.05.2025

Internal Examiner

External Examiner

ABSTRACT

Aluminium based Metal Matrix Composites (MMCs) are newer materials having many favorable mechanical properties and a wide range of applications from automotive to aerospace, gradually replacing the conventional engineering materials. Aluminium based MMCs are gaining increasing importance because of their attractive properties of better specific strength, specific stiffness, wear resistance, excellent corrosion resistance, high elastic modulus and light weight. In the present work, Al8011 aluminium alloy-Scandium-Zinc Oxide, metal matrix composites are developed by Ultrasonic Stir casting technique. The reinforcing hard ceramic particles of Scandium, Zinc Oxide play a vital role on the material properties. Hence, the Al8011 aluminium alloy based metal matrix composites are fabricated with different percentage weight of Scandium, Zinc Oxide particles. Thepresent work also deals with mechanical property, corrosion studies, of the newly developedAl8011 aluminium alloy based metal matrix composites.The hardness of the aluminium alloy based MMCs are determined by using a Brinell hardness testing machine. The hardness increases with the amount of particle reinforcement. finally electrochemical and immersion corrosion studies are performed.

ME3392 ENGINEERING MATERIALS AND METALLURGY

COURSE OBJECTIVES:

1 To learn the constructing the phase diagram and using of iron-iron carbide phase diagram for microstructure formation.
2 To learn selecting and applying various heat treatment processes and its microstructure formation.
3 To illustrate the different types of ferrous and non-ferrous alloys and their uses in engineering field.
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UNIT IV NON-METALLIC MATERIALS 9

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TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course the students would be able to

1. Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.
2. Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.
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4. Raghavan.V, "Materials Science and Engineering", Prentice Hall of India Pvt.Ltd. 6th edition, 2019.
5. Williams D Callister, "Material Science and Engineering" Wiley India Pvt Ltd, 2nd edition Re print 2019.

AUTOMATED EFFECTIVE SOLAR TRACKING SYSTEM WITH MIRROR

A PROJECT REPORT

Submitted by

ADHAVAN. R	(422121114001)
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RAJESH .A	(422121114018)

In partial fulfillment for the award of the degree

Of

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In

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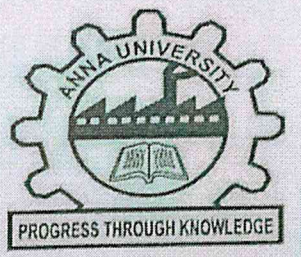

ANNA UNIVERSITY: CHENNAI 600 025

MAY 2025

ANNA UNIVERSITY: CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report **"AUTOMATED EFFECTIVE SOLAR TRACKING SYSTEM WITH MIRROR"** is the Bonafide work of **"ADHAVAN.R (422121114001) KAVIARASAN.K (422121114011) PANJAMOORTHI.S (422121114015) RAJESH.A (422121114018)"** who carried out the project work under my supervision.

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Submitted to the Project Report Viva voce held on 28.5.2025

Internal Examiner

External Examiner

ABSTRACT

Now a day's solar power is very helpful in our everyday life. This power is used in many ways such as homemade electrical appliances, vehicles, satellites and industries etc. The title of this project is "Automated Effective Solar Tracking System with Mirror". In simple terms this project's objective is to have a solar panel outputting its maximum possible power all day long, this occurs when the panel tracks the sun and rotates the accordingly, to receive sunlight to the fullest extent always during the day time. This movement is achieved by installing a couple of servo motors with the solar panel that changes its direction according to the positioning of the sun. There are basically three major parts of this project, sensor, Arduino and two servo motors. ATmega328 Arduino have been used for this purpose. It receives sensor output signal and controls servo motors according to the assigned program. One servo motor is used horizontally to move the panel upward and downward. The other is used vertically from left to right direction. As the solar panel is connected in servo motor so the position of solar panel is same to the servo motor. Since the maximum solar ray is fallen down on the solar panel module so that the maximum power output can be achieved.

CME384	POWER PLANT ENGINEERING	L	T	P	C
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COURSE OBJECTIVES

1 To study the coal based thermal power plants.
2 To study the diesel, gas turbine and combined cycle power plants.
3 To learn the basic of nuclear engineering and power plants.
4 To learn the power from renewable energy
5 To study energy, economic and environmental issues of power plants

UNIT – I COAL BASED THERMAL POWER PLANTS 9

Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers, FBC Boilers,Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants – Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogeneration systems.

UNIT – II D I E S E L , GAS TURBINE AND COMBINED CYCLE POWER PLANTS 9

Otto, Diesel, Dual & Brayton Cycle - Analysis & Optimisation. Components of Diesel and Gas Turbine power plants. Combined Cycle Power Plants. Integrated Gasifier based Combined Cycle systems.

UNIT – III NUCLEAR POWER PLANTS 9

Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors: Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANada Deuterium-Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.

UNIT – IV POWER FROM RENEWABLE ENERGY 9

Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, Solar P h o t o Voltaic (SPV), Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems.

UNIT – V ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS 9

Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.

TOTAL:45 PERIODS.

TEXT BOOKS:

1. Nag. P.K., "Power Plant Engineering", Third Edition, Tata McGraw – Hill Publishing Company Ltd.,2008.
2. A Textbook of Power Plant Engineering by R.K. Rajput | 1 January 2016

REFERENCES:

1. El-Wakil. M.M., "Power Plant Technology", Tata McGraw – Hill Publishing Company Ltd., 2010.
2. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.
3. Thomas C. Elliott, Kao Chen and Robert C. Swanekamp, "Power Plant Engineering", SecondEdition, Standard Handbook of McGraw – Hill, 1998.
4. Power Plant Engineering by B. Vijaya Ramnath C. Elanchezhian, L. Saravanakumar | 1 November 2019
5. Power Plant Engineering, As per AICTE: Theory and Practice by Dipak Kumar Mandal, Somnath Chakrabarti, et al. | 1 January 2019

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY
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ANGUCHETTYPALAYAM, PANRUTI – 607 106.
DEPARTMENT OF MECHANICAL ENGINEERING

CME 380 AUTOMOBILE ENGINEERING

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COURSE OBJECTIVES

1 To study the construction and working principle of various parts of an automobile.
2 To study the practice for assembling and dismantling of engine parts and transmission system
3 To study various transmission systems of automobile.
4 To study about steering, brakes and suspension systems
5 To study alternative energy sources

UNIT – I VEHICLE STRUCTURE AND ENGINES 9

Types of automobiles vehicle construction and different layouts, chassis, frame and body, Vehicle aerodynamics (various resistances and moments involved), IC engines – components-functions and materials, variable valve timing (VVT).

UNIT – II ENGINE AUXILIARY SYSTEMS 9

Electronically controlled gasoline injection system for SI engines, Electronically controlled diesel injection system (Unit injector system, Rotary distributor type and common rail direct injection system), Electronic ignition system (Transistorized coil ignition system, capacitive discharge ignition system), Turbo chargers (WGT, VGT), Engine emission control by three way catalytic converter system, Emission norms (Euro and BS).

UNIT – III TRANSMISSION SYSTEMS 9

Clutch-types and construction, gear boxes- manual and automatic, gear shift mechanisms, Overdrive, transfer box, fluid flywheel, torque converter, propeller shaft, slip joints, universal joints, Differential and rear axle, Hotchkiss Drive and Torque Tube Drive.

UNIT – IV STEERING, BRAKES AND SUSPENSION SYSTEMS 9

Steering geometry and types of steering gear box-Power Steering, Types of Front Axle, Types of Suspension Systems, Pneumatic and Hydraulic Braking Systems, Antilock Braking System (ABS),electronic brake force distribution (EBD) and Traction Control.

UNIT – V ALTERNATIVE ENERGY SOURCES 9

Use of Natural Gas, Liquefied Petroleum Gas, Bio-diesel, Bio-ethanol, Gasohol and Hydrogen in Automobiles- Engine modifications required –Performance, Combustion and Emission Characteristics of SI and CI engines with these alternate fuels - Electric and Hybrid Vehicles, Fuel Cell Note: Practical Training in dismantling and assembling of Engine parts and Transmission Systems should be given to the students.

TOTAL: 45 PERIODS

OUTCOMES: At the end of the course the students would be able to

1. Recognize the various parts of the automobile and their functions and materials.
2. Discuss the engine auxiliary systems and engine emission control.
3. Distinguish the working of different types of transmission systems.
4. Explain the Steering, Brakes and Suspension Systems.
5. Predict possible alternate sources of energy for IC Engines.

TEXT BOOKS:

1. Jain K.K. and Asthana .R.B, "Automobile Engineering" Tata McGraw Hill Publishers, New Delhi, 2002.
2. Kirpal Singh, "Automobile Engineering", Vol 1 & 2, Seventh Edition, Standard Publishers, New Delhi, 13th Edition 2014.

REFERENCES:

1. Ganesan V. "Internal Combustion Engines", Third Edition, Tata McGraw-Hill, 2012.
2. Heinz Heisler, "Advanced Engine Technology," SAE International Publications USA, 1998.
3. Joseph Heitner, "Automotive Mechanics," Second Edition, East-West Press, 1999.
4. Martin W, Stockel and Martin T Stockle , "Automotive Mechanics Fundamentals," The Good heart - Will Cox Company Inc, USA ,1978.
5. Newton, Steeds and Garet, "Motor Vehicles", Butterworth Publishers,1989.

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Accredited by NAAC
ANGUCHETTYPALAYAM, PANRUTI – 607 106.

INTERNSHIPS

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Prathish.K

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Saravana Velu.B

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Abinaya.S

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Bairavan.N

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Hariprasanth

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

4.0 READY
TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Jenifer Dency.I

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Sanjay.N

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Praveena.P

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

4.0 READY
TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Gokula Krishnan.R

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

R.Kiri

TRAINER
Kiwistron

DIRECTOR
Kiwistron

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Sudharshan.S

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
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DIRECTOR
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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Veeraragavan.D

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Pugazhenthi.M

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Antony Johnson.M

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Vasanthakrishnan.V

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Praveen raj.T

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
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CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Manikandan.R

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Harish.S

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
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DIRECTOR
Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Vignesh.E

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

4.0 READY
TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Shiban.K

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
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DIRECTOR
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Abinaya.P

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TRAINER
Kiwistron

DIRECTOR
Kiwistron

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Harikrishnan.K

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

R.K

TRAINER
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Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Abishek.R

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Umar Bin Hussain.M

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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TANSAM

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Abitha.A

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This internship program certificate is proudly awarded to

Anbu.A

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

RIM
TRAINER
Kiwistron

DIRECTOR
Kiwistron

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Manivasagan.M

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

R.K

TRAINER
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TANSAM

CERTIFICATE OF INTERNSHIP

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Praveen Kumar.R

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Mohamed Irfan.M.I

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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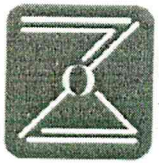

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CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Akash.A

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

RKJ

TRAINER
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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Balamurugan.S

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Denis.S

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Dishan.M

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Elumalai.G

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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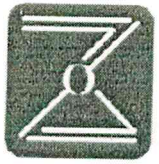
Kiwistron



4.0 READY
TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Gnanaraj.S

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Jaganathan.S

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CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Jegatheswari.A

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This internship program certificate is proudly awarded to

Praveen.N

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This internship program certificate is proudly awarded to

Prem Kumar.S

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CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Santhosh.P

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Seethapathi.M

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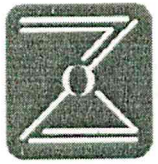

4.0 READY
TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Sivaraj.K

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Sridhar.B

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Sumanraj.T

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Udayalakshmi.T

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Agash.A

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Dhivakar.M

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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DIRECTOR
Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Megharjun.S

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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DIRECTOR
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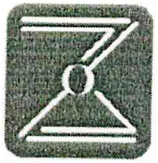

4.0 READY
TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Nijanth Kumar.D

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Vinoth.M

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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DIRECTOR
Kiwistron

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Asrif Ali.A

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

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Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Adhirai.V

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
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Kiwistron

4.0 READY
TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Chithiraiselvan.S

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
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DIRECTOR
Kiwistron

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Dhanush.D

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Elavarasan.E

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Ganesh.M

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
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TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Vishnuchandhiran.T

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

4.0 READY
TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Sureshkumar.S

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Subash.B

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

4.0 READY
TANSAM

CERTIFICATE OF INTERNSHIP

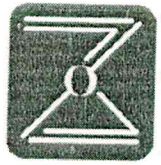
This internship program certificate is proudly awarded to

Sowmiya.S

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron



4.0 READY
TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Sivabalan.B.L

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Saranraj.S

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

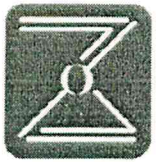
This internship program certificate is proudly awarded to

Sedhuraman.M

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron



4.0 READY
TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Prem.S

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

4.0 READY
TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Mohanraj.K

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Jana.M

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

4.0 READY
TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Hariharan.V

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

R.Hari
TRAINER
Kiwistron

DIRECTOR
Kiwistron

TANSAM

CERTIFICATE OF INTERNSHIP

This internship program certificate is proudly awarded to

Mohanraj.K

has successfully undertaken an internship training program at our organization in the field "INTERNET OF THINGS". The internship is spanned from 21st Jan 2025 to 21st Feb 2025.

TRAINER
Kiwistron

DIRECTOR
Kiwistron

SCODE SOFTWARE SOLUTIONS
CUDDALORE

CERTIFICATE OF APPRECIATION

This certificate is hereby bestowed upon
SURESH . U

for the GOOD performance that has led to the successful completion of WEB DEVELOPMENT internship between 24.01.2025 to 27.02.2025 (30 DAYS).

TYSON VIGNESH V
Founder and Managing Director
Scode Software Solutions

CATHERINE SANGEETHA A
Co-Founder and HR Manager
Scode Software Solutions

NO.47/17, First Floor, Sanjeevirayan Koil Street, Pudupalayam, Cuddalore-607001

SCODE SOFTWARE SOLUTIONS
CUDDALORE

CERTIFICATE OF APPRECIATION

This certificate is hereby bestowed upon
SNEKHA. S

for the GOOD performance that has led to the successful completion of WEB DEVELOPMENT internship between 24.01.2025 to 27.02.2025 (30 DAYS)

TYSON VIGNESH V
Founder and Managing Director
Scode Software Solutions

CATHERINE SANGEETHA A
Co-Founder and HR Manager
Scode Software Solutions

NO.47/17, First Floor, Sanjeevirayan Koil Street, Pudupalayam, Cuddalore-607001

SCODE SOFTWARE SOLUTIONS
CUDDALORE

CERTIFICATE OF APPRECIATION

This certificate is hereby bestowed upon

STEPHEN RAJ. G

for the GOOD performance that has led to the successful completion of WEB DEVELOPMENT internship between 24.01.2025 to 24.02.2025 (30 DAYS)

TYSON VIGNESH V
Founder and Managing Director
Scode Software Solutions

CATHERINE SANGEETHA A
Co-Founder and HR Manager
Scode Software Solutions

NO.47/17, First Floor, Sanjeevirayan Koil Street, Pudupalayam, Cuddalore-607001

SCODE SOFTWARE SOLUTIONS
CUDDALORE

CERTIFICATE OF APPRECIATION

This certificate is hereby bestowed upon
SNEKHA. S

for the GOOD performance that has led to the successful completion of WEB DEVELOPMENT internship between 24.01.2025 to 27.02.2025 (30 DAYS)

TYSON VIGNESH V
Founder and Managing Director
Scode Software Solutions

CATHERINE SANGEETHA A
Co-Founder and HR Manager
Scode Software Solutions

NO.47/17, First Floor, Sanjeevirayan Koil Street, Pudupalayam, Cuddalore-607001

Certificate of Completion

Skillible

AICTE

Abinaya M Abinaya M

has successfully completed the

Generative AI Virtual Internship Program

Abinaya is awarded this certificate for completing the following modules and projects in the July-August 2024, 6-week virtual internship program:

Introduction to Generative AI
Fundamentals of Generative AI
Terminologies and Concepts
Mastering Prompt Engineering
Generative Task
Limitation and Biases In Gen AI Models

Ankur Goel
FOUNDER, SKILLIBLE

Dr. Buddha Chandrashekhar
CCO, AICTE

Date
29 Aug 2024

Scan to verify AUTHENTICITY

Certificate ID
I20240830003641370Q

Scan Me

Certificate of Completion

Skillible

AICTE

Ishwarya M

has successfully completed the

Generative AI Virtual Internship Program

Ishwarya is awarded this certificate for completing the following modules and projects in the **July-August 2024, 6-week** virtual internship program:

Introduction to Generative AI
Fundamentals of Generative AI
Terminologies and Concepts
Mastering Prompt Engineering
Generative Task
Limitation and Biases In Gen AI Models

Ankur Goel
FOUNDER, SKILLIBLE

Dr. Buddha Chandrashekhar
CCO, AICTE

Date
28 Aug 2024

Scan to verify AUTHENTICITY

Certificate ID
G20240829061038472Z

Scan Me

Certificate of Completion

skillible

AICTE

Kaniha M

has successfully completed the

Generative AI Virtual Internship Program

Kaniha is awarded this certificate for completing the following modules and projects in the **July-August 2024, 6-week** virtual internship program:

Introduction to Generative AI
Fundamentals of Generative AI
Terminologies and Concepts
Mastering Prompt Engineering
Generative Task
Limitation and Biases In Gen AI Models

Ankur Goel
FOUNDER, SKILLIBLE

Dr. Buddha Chandrashekhar
CCO, AICTE

Date
02 Sep 2024

Scan to verify AUTHENTICITY

Certificate ID

I20240905072129758B

Scan Me

Certificate of Completion

Skillible

AICTE

Ashok Naveen Kumar A

has successfully completed the

Generative AI Virtual Internship Program

Ashok is awarded this certificate for completing the following modules and projects in the **July-August 2024, 6-week** virtual internship program:

Introduction to Generative AI
Fundamentals of Generative AI
Terminologies and Concepts
Mastering Prompt Engineering
Generative Task
Limitation and Biases In Gen AI Models

Ankur Goel
FOUNDER, SKILLIBLE

Dr. Buddha Chandrashekhar
CCO, AICTE

Date
02 Sep 2024

Scan to verify AUTHENTICITY

Certificate ID

X20240905072129915O

ScanMe

Certificate of Completion

Skillible

AICTE

Kaviya S

has successfully completed the

Generative AI Virtual Internship Program

Kaviya is awarded this certificate for completing the following modules and projects in the **July-August 2024, 6-week** virtual internship program:

Introduction to Generative AI
Fundamentals of Generative AI
Terminologies and Concepts
Mastering Prompt Engineering
Generative Task
Limitation and Biases In Gen AI Models

Ankur Goel
FOUNDER, SKILLIBLE

Dr. Buddha Chandrashekhar
CCO, AICTE

Date
29 Aug 2024

Scan to verify AUTHENTICITY

Certificate ID
V20240830003640874W

Scan Me

Certificate of Completion

Skillible

AICTE

Karthika A

has successfully completed the

Generative AI Virtual Internship Program

Karthika is awarded this certificate for completing the following modules and projects in the **July-August 2024, 6-week** virtual internship program:

Introduction to Generative AI
Fundamentals of Generative AI
Terminologies and Concepts
Mastering Prompt Engineering
Generative Task
Limitation and Biases In Gen AI Models

Ankur Goel
FOUNDER, SKILLIBLE

Dr. Buddha Chandrashekhar
CCO, AICTE

Date
26 Sep 2024

Scan to verify AUTHENTICITY

Certificate ID

V20240924040006946U

SeethVle

Certificate of Completion

Skillible

AICTE

Sowmiya Gnanavel

has successfully completed the

Generative AI Virtual Internship Program

Sowmiya is awarded this certificate for completing the following modules and projects in the **July-August 2024, 6-week** virtual internship program:

Introduction to Generative AI
Fundamentals of Generative AI
Terminologies and Concepts
Mastering Prompt Engineering
Generative Task
Limitation and Biases In Gen AI Models

Ankur Goel
FOUNDER, SKILLIBLE

Dr. Buddha Chandrashekhar
CCO, AICTE

Date
20 Sep 2024

Scan to verify AUTHENTICITY

Certificate ID

I20240920071342790L

Scan Me

Certificate of Completion

Skillible

AICTE

Vijayalakshmi S

has successfully completed the

Generative AI Virtual Internship Program

Vijayalakshmi is awarded this certificate for completing the following modules and projects in the **July-August 2024, 6-week** virtual internship program:

Introduction to Generative AI
Fundamentals of Generative AI
Terminologies and Concepts
Mastering Prompt Engineering
Generative Task
Limitation and Biases In Gen AI Models

Ankur Goel
FOUNDER, SKILLIBLE

Dr. Buddha Chandrashekhar
CCO, AICTE

Date
02 Sep 2024

Scan to verify AUTHENTICITY

Certificate ID
K20240905072129600A

Scan Me

R.S. No. 77, Thirubuvanai Main Road,
Thirubuvanai,
Puducherry - 605 107.
CIN : L65993TN2004PLC052856

Tel : +91 413 2640201
+91 413 2640202
URL : www.rane.co.in

Rane (Madras) Limited

Rane
Expanding Horizons

Date: 31.08.2024

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Mr. VELPANDIAN D (Reg. No: 422121114022) final year B.E (Mechanical Engineering) student of ST. Anne's College of Engineering & Technology has successfully completed his **internship** for a period of one month from 31.07.2024 to 31.08.2024.

During the tenure with us, his character and conduct was found to be good.

We wish him all the best for his future endeavor.

For Rane (Madras) Limited,

Karutha Pandi P
Assistant Manager – HR

R.S. No. 77, Thirubuvanai Main Road,
Thirubuvanai,
Puducherry - 605 107.
CIN : L65993TN2004PLC052856

Tel : +91 413 2640201
+91 413 2640202
URL : www.rane.co.in

Rane (Madras) Limited

Rane
Expanding Horizons

Date: 31.08.2024

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Mr. VEERAPANDI T (Reg. No: 422121114021) final year B.E (Mechanical Engineering) student of ST. Anne's College of Engineering & Technology has successfully completed his internship for a period of one month from 31.07.2024 to 31.08.2024.

During the tenure with us, his character and conduct was found to be good.

We wish him all the best for his future endeavor.

For Rane (Madras) Limited,

Karutha Pandi P
Assistant Manager – HR

R.S. No. 77, Thirubuvanai Main Road,
Thirubuvanai,
Puducherry - 605 107.
CIN : L65993TN2004PLC052856

Tel : +91 413 2640201
+91 413 2640202
URL : www.rane.co.in

Rane (Madras) Limited

Rane
Expanding Horizons

Date: 31.08.2024

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Mr. TONY FIDEL SYNTHIYA V (Reg. No: 422121114020) final year B.E (Mechanical Engineering) student of ST. Anne's College of Engineering & Technology has successfully completed his **internship** for a period of one month from 31.07.2024 to 31.08.2024.

During the tenure with us, his character and conduct was found to be good.

We wish him all the best for his future endeavor.

For Rane (Madras) Limited,

Karutha Pandi P
Assistant Manager – HR

R.S. No. 77, Thirubuvanai Main Road,
Thirubuvanai,
Puducherry - 605 107.
CIN : L65993TN2004PLC052856

Tel : +91 413 2640201
+91 413 2640202
URL : www.rane.co.in

Rane (Madras) Limited

Rane
Expanding Horizons

Date: 31.08.2024

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. RAJESH A (Reg. No: 422121114018)** final year B.E (Mechanical Engineering) student of ST. Anne's College of Engineering & Technology has successfully completed his **internship** for a period of one month from **31.07.2024** to **31.08.2024**.

During the tenure with us, his character and conduct was found to be good.

We wish him all the best for his future endeavor.

For Rane (Madras) Limited,

Karutha Pandi P
Assistant Manager – HR

R.S. No. 77, Thirubuvanai Main Road,
Thirubuvanai,
Puducherry - 605 107.
CIN : L65993TN2004PLC052856

Tel : +91 413 2640201
+91 413 2640202
URL : www.rane.co.in

Rane (Madras) Limited

Rane
Expanding Horizons

Date: 31.08.2024

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Mr. PREM KUMAR G (Reg. No: 422121114016) final year B.E (Mechanical Engineering) student of ST. Anne's College of Engineering & Technology has successfully completed his **internship** for a period of one month from 31.07.2024 to 31.08.2024.

During the tenure with us, his character and conduct was found to be good.

We wish him all the best for his future endeavor.

For Rane (Madras) Limited,

Karutha Pandi P
Assistant Manager – HR

R.S. No. 77, Thirubuvanai Main Road,
Thirubuvanai,
Puducherry - 605 107.
CIN : L65993TN2004PLC052856

Tel : +91 413 2640201
+91 413 2640202
URL : www.rane.co.in

Rane (Madras) Limited

Rane
Expanding Horizons

Date: 31.08.2024

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. KARTHIKEYAN T (Reg. No: 422121114010)** final year B.E (Mechanical Engineering) student of ST. Anne's College of Engineering & Technology has successfully completed his **internship** for a period of one month from **31.07.2024** to **31.08.2024**.

During the tenure with us, his character and conduct was found to be good.

We wish him all the best for his future endeavor.

For Rane (Madras) Limited,

Karutha Pandi P
Assistant Manager – HR

R.S. No. 77, Thirubuvanai Main Road,
Thirubuvanai,
Puducherry - 605 107.
CIN : L65993TN2004PLC052856

Tel : +91 413 2640201
+91 413 2640202
URL : www.rane.co.in

Rane (Madras) Limited

Rane
Expanding Horizons

Date: 31.08.2024

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Mr. DHIVAKAR T (Reg. No: 422121114008) final year B.E (Mechanical Engineering) student of ST. Anne's College of Engineering & Technology has successfully completed his **internship** for a period of one month from 31.07.2024 to 31.08.2024.

During the tenure with us, his character and conduct was found to be good.

We wish him all the best for his future endeavor.

For Rane (Madras) Limited,

Karutha Pandi P
Assistant Manager – HR

R.S. No. 77, Thirubuvanai Main Road,
Thirubuvanai,
Puducherry - 605 107.
CIN : L65993TN2004PLC052856

Tel : +91 413 2640201
+91 413 2640202
URL : www.rane.co.in

Rane (Madras) Limited

Rane
Expanding Horizons

Date: 31.08.2024

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Mr. DESIGAN R (Reg. No: 422121114006) final year B.E (Mechanical Engineering) student of ST. Anne's College of Engineering & Technology has successfully completed his internship for a period of one month from 31.07.2024 to 31.08.2024.

During the tenure with us, his character and conduct was found to be good.

We wish him all the best for his future endeavor.

For Rane (Madras) Limited,

Karutha Pandi P
Assistant Manager – HR

R.S. No. 77, Thirubuvanai Main Road,
Thirubuvanai,
Puducherry - 605 107.
CIN : L65993TN2004PLC052856

Tel : +91 413 2640201
+91 413 2640202
URL : www.rane.co.in

Rane (Madras) Limited

Rane
Expanding Horizons

Date: 31.08.2024

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. AHAMEDASHIF S (Reg. No: 422121114003)** final year B.E (Mechanical Engineering) student of ST. Anne's College of Engineering & Technology has successfully completed his **internship** for a period of one month from **31.07.2024** to 31.08.2024.

During the tenure with us, his character and conduct was found to be good.

We wish him all the best for his future endeavor.

For Rane (Madras) Limited,

Karutha Pandi P
Assistant Manager – HR

R.S. No. 77, Thirubuvanai Main Road,
Thirubuvanai,
Puducherry - 605 107.
CIN : L65993TN2004PLC052856

Tel : +91 413 2640201
+91 413 2640202
URL : www.rane.co.in

Rane (Madras) Limited

Rane
Expanding Horizons

Date: 31.08.2024

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. KATHIRAVAN M (Reg. No: 422121114302)** final year B.E (Mechanical Engineering) student of ST. Anne's College of Engineering & Technology has successfully completed his **internship** for a period of one month from **31.07.2024** to **31.08.2024**.

During the tenure with us, his character and conduct was found to be good.

We wish him all the best for his future endeavor.

For Rane (Madras) Limited,

Karutha Pandi P
Assistant Manager – HR

R.S. No. 77, Thirubuvanai Main Road,
Thirubuvanai,
Puducherry - 605 107.
CIN : L65993TN2004PLC052856

Tel : +91 413 2640201
+91 413 2640202
URL : www.rane.co.in

Rane (Madras) Limited

Rane
Expanding Horizons

Date: 31.08.2024

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. VISHWA R (Reg. No: 422121114024)** final year B.E (Mechanical Engineering) student of ST. Anne's College of Engineering & Technology has successfully completed his **internship** for a period of one month from **31.07.2024** to **31.08.2024**.

During the tenure with us, his character and conduct was found to be good.

We wish him all the best for his future endeavor.

For Rane (Madras) Limited,

Karutha Pandi P
Assistant Manager – HR

DANA INDIA PVT. LIMITED

31 August 2024

To whomsoever it may concern

This is to certify that the following students completed their internship in our organisation. Detail as below.

1. Kaviprasath M (422121114012)
2. Panjamoorthi S (422121114015)
3. Bharath P (422121114005)
4. Vishnuraj T (422121114023)

Internship Period from 01.08.2024 to 31.08.2024

Thanking you.

For**Dana India Private Ltd.,**

Padmaraj R
Head-Human Resource

DANA INDIA PVT. LTD. * ORAGADAM *

®

DANA INDIA PVT. LIMITED
Survey No. : 277/2A, 276/1D, 276/3A
Panruti Village, Wallajah Road, Oragadam,
Kancheepuram District, Chennai - 631604.
Phone No. : 044 - 6718 8208
Email : chennai.hr@dana.com

CORPORATE & REGISTERED OFFICE,
Survey No. 278, Raisoni Industrial Park,
Village Mann-Hinjewadi, Phase - II, Tal Mulshi,
Pune - 411 057.
TEL : 020 - 30436000
CIN No. : U74999PN2000PTC015131

DANA INDIA PVT. LIMITED

31 August 2024

To whomsoever it may concern

This is to certify that the following students completed their internship in our organisation. Detail as below.

1. Kaviprasath M (422121114012)
2. Panjamoorthi S (422121114015)
3. Bharath P (422121114005)
4. Vishnuraj T (422121114023)

Internship Period from 01.08.2024 to 31.08.2024

Thanking you.

For **Dana India Private Ltd.,**

Padmaraj R
Head-Human Resource

DANA INDIA PVT. LTD * ORAGADAM *

®

DANA INDIA PVT. LIMITED
Survey No. : 277/2A, 276/1D, 276/3A
Panruti Village, Wallajah Road, Oragadam,
Kancheepuram District, Chennai - 631604.
Phone No. : 044 - 6718 8208
Email : chennai.hr@dana.com

CORPORATE & REGISTERED OFFICE,
Survey No. 278, Raisoni Industrial Park,
Village Mann-Hinjewadi, Phase - Ii, Tal Mulshi,
Pune - 411 057.
TEL : 020 - 30436000
CIN No. : U74999PN2000PTC015131

ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY
Approved by AICTE, New Delhi. Affiliated to Anna University, Chennai
Accredited by NAAC
ANGUCHETTYPALAYAM, PANRUTI – 607 106.

FIELD WORK

UNITED PACKAGING SOLUTIONS
Plot. No. G7B, Sidco Industrial Estate,
Kakkalur, Thiruvallur - 602 003.
salesups@unitedgrps.com
Ph : +91 9444617407, +91 9551108420
PAN No. : AAGFU7228Q
GSTIN : 33AAGFU7228Q1ZK

CERTIFICATE OF IN-PLANT TRAINING

This is to certify that **Mr.KAVIARASAN K (422121114011)** Student of **4th Year Mechanical Engineering** at **St. Anne's College of Engineering and Technology,** Anguchettipalayam, Panruti has done his In-Plant Training at our Plant **UNITED PACKAGING SOLUTIONS** Kakkalur, Tiruvallur from Period of **01.08.2024 to 31.08.2024.**

We wish him all success for future endeavours.

UNITED PACKAGING SOLUTIONS
Thiruvallur
602 003

UNITED PACKAGING SOLUTIONS
Plot. No. G7B, Sidco Industrial Estate,
Kakkalur, Thiruvallur - 602 003.
salesups@unitedgrps.com
Ph : +91 9444617407, +91 9551108420
PAN No. : AAGFU7228Q
GSTIN : 33AAGFU7228Q1ZK

CERTIFICATE OF IN-PLANT TRAINING

This is to certify that **Mr .ADHAVAN .R (422121114001)** Student of **4th Year Mechanical Engineering** at **St. Anne's College of Engineering and Technology** , Anguchettipalayam , Panruti has done his In-Plant Training at our Plant **UNITED PACKAGING SOLUTIONS** Kakkalur, Tiruvallur from Period of **01.08.2024 to 31.08.2024.**

We wish him all success for future endeavours.

UNITED PACKAGING SOLUTIONS
Thiruvallur
602 003

UNITED PACKAGING SOLUTIONS
Plot. No. G7B, Sidco Industrial Estate,
Kakkalur, Thiruvallur - 602 003.
salesups@unitedgrps.com
Ph : +91 9444617407, +91 9551108420
PAN No. : AAGFU7228Q
GSTIN : 33AAGFU7228Q1ZK

CERTIFICATE OF IN-PLANT TRAINING

This is to certify that **Mr.AGAZHIYAN .M (422121114002)** Student of **4th Year Mechanical Engineering** at **St. Anne's College of Engineering and Technology** , Anguchettipalayam , Panruti has done his In-Plant Training at our Plant **UNITED PACKAGING SOLUTIONS** Kakkalur, Tiruvallur from Period of **01.08.2024 to 31.08.2024.**

We wish him all success for future endeavours.

UNITED PACKAGING SOLUTIONS
Thiruvallur
602 003

भारत सरकार
अंतरिक्ष विभाग
इसरो नोदन कॉम्प्लेक्स (आईपीआरसी)
महेंद्रगिरि पी.ओ., तिरुनेलवेली जिला- 627 133
तमिलनाडु, भारत
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04637 281547 (लेखा)

सत्यमेव जयते

Government of India
Department of Space
ISRO Propulsion Complex (IPRC)
Mahendragiri P. O., Tirunelveli District - 627 133
Tamil Nadu, India
Telephone : 04637 281900 (Operator)
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Date: 21.08.2024

MANAGEMENT SYSTEMS AREA
Programme Planning & Evaluation Division

Certificate

This is to certify that **Mr. Melwin R** studying third year B.E in Mechanical Engineering at St. Anne's College of Engineering and Technology, Anguchettypalayam has undergone In-Plant Training in the facilities at IPRC, Mahendragiri as per the details given below.

Areas in which Training was imparted	:	• Main Engine Test Facility for Testing Cryogenic Engine of GSLV and LVM3 • Assembly and Integration of Vikas Engine of PSLV, Cryo Engines of GSLV &LVM3 and Second Stage of PSLV, CUS of GSLV MkII and L110 & C25 stage of LVM3. • Test Facilities for Testing Vikas Engine, RCS Engine of PSLV, LAM & AOCS of Spacecrafts and testing Cryogenic engines at High Altitude Condition. • Air Separation Plant and Liquid Hydrogen Plant • Metrology and NDT • Welding Shop – Fabrication Facility • Safety Systems
Period of In-Plant Training	:	**07.08.2024 to 21.08.2024**
Name & Designation of the Mentors		1. Shri. Satay Pal Singh Arora, Engr. SF, VEI 2. Shri. Rajat Kumar Bhadani, Engr. 'SD', CSEAG 3. Shri. K. Velmurugan, DDH, SAIE 4. Shri. S. Aathithyayan, Engr. 'SE', SAIE 5. Shri. V. Maniraj, Sr. Tech. Asst. 'A', ESTG 6. Shri. D. Sam Martin, Engr.'SE', ILHP 7. Shri. R. Kanniah, Engr. 'SG', CETG 8. Shri. G. Kamesh Guru, Engr. SE, SRE 9. Shri. B. Kannan, DDH, WS-FF 10. Shri. V. Ravi Sankar, DDH, SFSG
Performance and interest shown by the student	:	Excellent
Conduct of the Student during the course of the training	:	Excellent

21.08.2024

(S. Krishna Diwakar)
DDH, PPED

भारत सरकार
अंतरिक्ष विभाग
इसरो नोदन कॉम्प्लेक्स (आईपीआरसी)
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Date: 21.08.2024

MANAGEMENT SYSTEMS AREA
Programme Planning & Evaluation Division

Certificate

This is to certify that **Mr. Igno Crossly M** studying third year B.E in Mechanical Engineering at St. Anne's College of Engineering and Technology, Anguchettypalayam has undergone In-Plant Training in the facilities at IPRC, Mahendragiri as per the details given below.

Areas in which Training was imparted	:	• Main Engine Test Facility for Testing Cryogenic Engine of GSLV and LVM3 • Assembly and Integration of Vikas Engine of PSLV, Cryo Engines of GSLV &LVM3 and Second Stage of PSLV, CUS of GSLV MkII and L110 & C25 stage of LVM3. • Test Facilities for Testing Vikas Engine, RCS Engine of PSLV, LAM & AOCS of Spacecrafts and testing Cryogenic engines at High Altitude Condition. • Air Separation Plant and Liquid Hydrogen Plant • Metrology and NDT • Welding Shop – Fabrication Facility • Safety Systems
Period of In-Plant Training	:	**07.08.2024 to 21.08.2024**
Name & Designation of the Mentors		1. Shri. Satay Pal Singh Arora, Engr. SF, VEI 2. Shri. Rajat Kumar Bhadani, Engr. 'SD', CSEAG 3. Shri. K. Velmurugan, DDH, SAIE 4. Shri. S. Aathithyayan, Engr. 'SE', SAIE 5. Shri. V. Maniraj, Sr. Tech. Asst. 'A', ESTG 6. Shri. D. Sam Martin, Engr.'SE', ILHP 7. Shri. R. Kanniah, Engr. 'SG', CETG 8. Shri. G. Kamesh Guru, Engr. SE, SRE 9. Shri. B. Kannan, DDH, WS-FF 10. Shri. V. Ravi Sankar, DDH, SFSG
Performance and interest shown by the student	:	Excellent
Conduct of the Student during the course of the training	:	Excellent

21.08.2024

(S. Krishna Diwakar)
DDH, PPED

चेन्नै पेट्रोलियम कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम और आईओसीएल की समूह कंपनी)
Chennai Petroleum Corporation Limited
(A Government of India Enterprise and Group Company of IOCL)

सी पी सी एल
CPCL

28/08/2024

CERTIFICATE

This is to certify that **Mr. NAGALINGAM K,** FINAL Year Student of **B.E (Mechanical Engineering)** from **ST. ANNE,S COLLEGE OF ENGINEERING & TECHNOLOGY, PANRUTI** has completed the Internship at **MAINTENANCE ONSITE - I DEPARTMENT "CHENNAI PETROLEUM CORPORATION LIMITED"** during the period from **16/08/2024 to 28/08/2024.**

28/8/24

JAYAKUMAR M
Senior Manager (HR – Trg & Dev)

एम. जयकुमार
M. JAYAKUMAR
वरिष्ठ प्रबंधक (मा.सं.-प्रशिक्षण और विकास)
Senior Manager (HR - Training & Dev.)
चेन्नै पेट्रोलियम कॉर्पोरेशन लिमिटेड
Chennai Petroleum Corporation Ltd.
मणली / Manali, चेन्नै / Chennai - 600 068.