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ANGUCHETTYPALAYAM, PANRUTI – 607 106.

ACADEMIC YEAR 2019-20

S.NO	NAME OF THE FACULTY	TITLE OF THE PAPER	NAME OF THE CONFERENCE
1.	Dr. Sr. S. Anita	Diagnosis of early Parkinson's disease using Bilateral Filter	International Virtual Conference on Distributed Computing Intelligence and its application ISSN: 9 789390 082247
2.	Dr. Sr. S. Anita	Early Diagnosis of Parkinson's disease using Machine learning Algorithm	International Web Conference on Smart Engineering Technologies ISBN: 978-93-5407-648- 0
3.	Sr. A. Annai Theresa	31 level Cascaded H-Bridge inverter with reduced switches and harmonics	International web conference smart Engineering Technologies,2020 ISBN: 978-93-5407-648- 0

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Proceedings of International Virtual Conference

on

Distributed Computing, Intelligence & it's Applications

IVCDCIA - 2020

20th June, 2020

Organized by

**Department of Computer Science and
Engineering &
Department of Information Technology**

**School of Computing
Kalasalingam Academy of Research and
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International Virtual Conference on Distributed Computing Intelligence & It's Applications - IVCDCIA 2020



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DIAGNOSIS OF EARLY PARKINSON'S DISEASE USING BILATERAL FILTER

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Abstract

Parkinson's Disease (PD) is a neurodegenerative disease next to Alzheimer. It is caused due to the reduction of dopamine in the region of the striatum (Caudate and Putamen). Identification of early stage PD is very tough. The paper proposes a technique which highly supports in the early diagnostic process. The volume rendering image slices are selected from the Single Photon Emission Computed Tomography (SPECT) images as they are intimately related to PD. The image processing techniques called bilateral filter, segmentation, feature extraction and machine learning techniques such as Support Vector Machine (SVM) classifier are implemented. The SVM performs well as it gives Accuracy, Sensitivity, Specificity and Area Under Curve (AUC). The results offer better understanding of the early stage of the disease which could aid the clinicians.

Keywords: Parkinson's disease, SPECT, SVM classifier, Accuracy

1. Introduction

PD is a movement disorder which disturbs neurons, which produce less amount or fail to produce dopamine (chemical mediator) content in the human brain, leads to PD in the human brain [1-3]. The PD is clinically described by the symptoms of impairment of movement with tremor, gait problem, slowness, stiffness or balance problems and impairment of posture in an advanced stage. The diagnosis of it is easy when the disease is in the advanced stage. But an accurate diagnosis is very tough at an early stage [4]. Hence, novel technique must be sort out to diagnose the disease in the early stage [5, 6].

In the early days of diagnosis, PD is diagnosed by the appearance of the striatum based on the visual inspection. This led to inter and intra variability of the experts which resulted either misdiagnosis or delayed diagnosis. Next, the related features are extracted from the 2D image slices [8] and averaged image slice [9] is used to diagnose the PD in the early stage. Advancing 2D slice, 3D analysis [10] were implemented to analyse the changes of striatum in the premature stage. This resulted system complexity and found not beneficial to the clinical practices. Hence, a technique that would be simple but offer more accurate result, is imperatively needed to diagnose the PD in the early stage.

SPECT image slices offer better understanding of the dopamine content, even when the disease is in the early stage. It serves to be a valuable biomarker to discriminate early PD from HC [7]. The SPECT images are taken from the International Parkinson's Progression Markers Initiative (PPMI) database.

The image processing technique like preprocessing, segmentation and feature extraction plays a major role in the medical field to diagnose the disease. The machine

*International Web Conference
On Smart Engineering
Technologies-2020
26th & 27th June*

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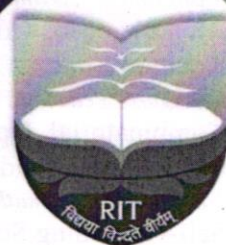
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**EARLY DIAGNOSIS OF PARKINSON'S DISEASE USING MACHINE LEARNING
TECHNIQUES***Dr.S.Anita¹, S.Jothi**¹Assitant Professor, ²Assitant Professor**¹Department of Electrical and Electronics Engineering,**²Department of Computer Science Engineering,**¹St. Anne's College of Engineering and technology, Cuddalore, Tamilnadu, India.**²Jayaraj Annapackiam College for Women Periyakulam, Tamilnadu, India.**sranitaa@gmail.com*

The Scans Without Evidence of Dopaminergic Deficit (SWEDD) is a non-degenerative variant, however it is clinically diagnosed as Parkinson's disease (PD). The effective diagnosis of PD from SWEDD helps for patient management in neural disorders. The Single Photon Emission Computed Tomography (SPECT) images provide valuable information about the content of dopamine in the striatum, which improves the diagnosis of early stage PD. The present work proposes an effective system for Volume rendering SPECT image slices using alpha stable distribution based intensity normalization techniques for discriminating early PD from Healthy Control (HC) and SWEDD. The input images are chosen from Parkinson's Progression Markers Initiative (PPMI) database and the slices which has high specific uptake region are alone selected for further analysis. Statistical features are extracted, and classified using different machine learning techniques, namely Naïve bayes, J48, Bayes net, Decision tree, K nearest neighbor. The highest accuracy is obtained by Decision tree classifier than other classifiers. These techniques are practiced to develop a promising diagnostic model for early diagnosis of PD.

Keyword: Reliability, Inverter, IGBT, Diode, Electrical Vehicle, Switching, Temperature.

IWCSET-20-ECE-005

ARDUINO BASED AUTOMATIC PLANT WATERING/IRRIGATION SYSTEM*Shreya Srivastava¹, Neha Singh², Sana Mukhtar³, Rahul Mani Upadhyay⁴**¹UG Student, ²UG Student, ³UG Student, ⁴UG Student**Department of Electronics and Communication Engineering,**AKTU, Buddha institute of Technology, Gorakhpur, India.**shreyasrivastava534@gmail.com*

Irrigation In the present days, the farmers are suffering from severe drought like condition throughout the year. The main objective of this paper is to provide a system leads to automatic irrigation thereby saving time, money & power of the farmers, gardeners in greenhouses etc. An adequate water supply is important for plant growth. When rainfall is not sufficient, the plants need additional water. We know that people do not pour the water on to the plants in their gardens when they go to vacation or often forget to water plants. As a result, there is a chance to get the plants damaged. This paper presents a technique for Arduino based Automatic Irrigation System. With this automated technology of irrigation, human intervention can be minimized.

Keyword: Reliability, Inverter, IGBT, Diode, Electrical Vehicle, Switching, Temperature.

IWCSET-20-EEE-002

**BRUSHLESS DIRECT CURRENT MOTOR DRIVE ENGINEERING FOR ELECTRIC
VEHICLE APPLICATIONS**¹B.Gunapriya, ²M.Karthik¹New Horizon College of Engineering, ²Sri Ramakrishna Engineering College
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The constantly increasing prices of petroleum products and severe environmental pollution problems have augmented the development of non-polluting electric and hybrid vehicles. The ideal characteristics of an electric motor drive for traction application in an electric and hybrid electric vehicle are high torque at low speed region for fast acceleration, hill climbing and obstacle negotiation, and low torque at high speed for normal driving. Electric vehicles offer one way to reduce the level of emissions. However there are some common issues related to electric vehicle technology. These include selection of batteries, selection of electric motors for specific capacity vehicles, design of controllers, design of battery chargers with specific applications to electric vehicles, development of testing facility for testing of electric motors, controllers and battery chargers. The reducing prices of the permanent magnet materials and the trend of increasing efficiency in the permanent magnet and brushless DC motors make them more and more attractive for the EV applications. A Brushless Direct Current (BLDC) motor drive is belonging to higher efficiency, lesser maintenance, and increased cost and it is used in the areas of automobiles, consumer electronics, and medical industrial applications. Therefore, it is necessary to have a cheap but effective BLDC motor controller. The widely-used control method is Digital Pulse width modulation (PWM) control. It is the most powerful technique which provide a simple method for controlling of system with digital processor output. PWM frequency depends on Field Programmable Gate Array (FPGA) device speed and duty cycle resolution requirement. In this paper, a brief review is done on the speed control of BLDC motor using PWM and it is implemented in FPGA.

Keywords: Electric vehicles, Electric Machines and Drives, Permanent magnet motors, Brushless DC motors, Field Programmable Gate Array, Pulse Width Modulation.

IWCSET-20-EEE-003

**31 LEVEL CASCADED H BRIDGE INVERTER WITH REDUCED SWITCHES AND
HARMONICS**¹A.Annai Theresa ²K.Kalpana, ³M.NirmalaDepartment of Electrical and Electronics Engineering
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Multilevel converter is the state-of-the-art technology for high power medium voltage applications. Inverters are power electronic devices that convert DC quantity to AC quantity. But these devices produces non-sinusoidal signal which contains harmonics. So as to overcome this problem a multilevel especially in our case 31-level cascaded multilevel inverter (CMLI) topology has been developed. The proposed inverter topology has been designed with the minimum number of switches and lower total harmonic distortion [THD]

Keywords: Multilevel converter, harmonics, CMLI, THD.



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ISBN: 978-93-5407-648-0

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This is to certify that A. ANNAI THERESA, ST. ANNE'S COLLEGE OF ENGINEERING AND TECHNOLOGY has presented a paper entitled "31 LEVEL CASCADED H- BRIDGE INVERTER WITH REDUCED SWITCHES AND HARMONICS" in the International Web Conference on Smart Engineering Technologies 2020 (IWCSET - 2020) during 26 - 27 June 2020.

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