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FOREWARD

IEEE CCET SB and Department of EEE, CCET in association with IEEE Kochi Subsection is organizing IEEE CCET Student paper contest 2023(IEEE CCET SPC 2023) on 28th April 2023 at Carmel College of Engineering and Technology, Alappuzha. The main objective of this event is to provide a platform for the undergraduate and post graduate students to expose their research idea and receive provisional feedback which shall further enhance their skills and knowledge.

The event includes paper presentation by students on various themes relevant to Electrical, Electronics and Computer Science Engineering. It was a fulfilling one-day program for candidates to share their knowledge, expertise and experience. Industrial experts and academician from reputed institution were chaired the presentations. Paper presentations oriented towards research and best practices were conducted in two venues. More than 54 papers from interested authors were submitted for the same. However only 45 papers were accepted for the presentation. This publication includes total of 45 full papers that address the topics suggested in the SPC themes.

Finally ,we thank all the presenters for their contribution for IEEE CCET SPC 2023 and Special thanks to Management of Carmel college of Engineering and Technology, IEEE Kochi Subsection for giving permission to conduct this event. Hope IEEE CCET SPC 2023 have achieved its goals of providing a forum for knowledge exchange, sharing experience in the field of Engineering, maintaining professionalism, fostering strategic networks, and promoting cooperation. We express our gratitude to all committee members, faculty members of our institution who have contributed greatly to make this event a great success.

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DESIGN AND SIZING OF SOLAR-POWERED ELECTRIC VEHICLE CHARGING STATION

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Abstract—Considering an eco-friendly atmosphere, global warming, and depletion of fossil fuel issues, the transportation system has been switched on to EV technology. As we know, the EV charging stations are powered by a grid connection. Most of the generating stations in India are Fossil fuel-based and hence the EV is not as eco-friendly as it tells and the Vehicle to home strategy from grid interconnection increases the electricity prices. So, an alternative for these issues is EV charging stations using renewable energy technology. The most economic type of renewable source is solar power, and hence solar-powered EV charging station is preferred. Here we are dealing with the study of solar-based EV charging stations, design and sizing of solar panels, design of converter topology, charge controller, the selection of battery are incorporated. The designed model is developed and simulated in MATLAB SIMULINK. The performance under all the practical conditions are done for an EV charging that can be established for a two wheeler parking area at Saintgits College of Engineering, Kottayam, Kerala.

Direct Torque Control Technique for Torque Ripple Minimization in Neutral Point Clamped Three level Inverter Fed Induction Motor

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Abstract—Induction Motors (IM) find many applications in industries and their control techniques have received a lot of interest. The Direct Torque Control (DTC) technique has become an industry standard for speed and torque control due to its simplicity, superior torque dynamic performance and robustness to machine parameters. Recently multilevel inverters have gained much importance due to their improved harmonics performance, lower device voltage ratings for higher output voltage and improved efficiency. In this paper, the feasibility of a DTC technique for torque ripple reduction employing Neutral Point Clamped Three Level Inverter (NPC-TLI) is investigated. The efficacy of the method is established by comparing its torque ripple and Total Harmonic Distortion (THD) with the corresponding characteristics of the DTC methods using two- level and three-level inverters. The performance analysis is done on MATLAB/SIMULINK platform.

A COMPARISON OF BUCK MODE OPERATION OF CONVERTERS SUITABLE FOR PHOTO VOLTAIC (PV) APPLICATIONS

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Abstract— As the demand for energy continues to increase, non- renewable energy sources are struggling to meet the needs, hence renewable energy sources like solar power has gained popularity as a promising alternative. The solar power requires a DC DC converter to regulate and control the variable energy output. The DC DC converter can operate in both buck and boost mode. The two switch based buck boost converter exhibit high output current compared with other converters in buck mode, which is suitable for applications like battery charging, telecom power supplies, lightning applications etc. In this paper initially various converters are compared with two switch based buck boost converter. For comparison duty ratio, input voltage, switching frequency and resistive load are kept the same. The corresponding output voltage, output current and gain has been evaluated. The performance of two switch based buck boost converter for PV (photo voltaic) application for battery charging is evaluated.

Gesture Recognition using Artificial Intelligence and Machine Learning

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Abstract—The identification of hand gestures has emerged as a significant domain of investigation within the realm of computer vision and human-computer interaction. This technology enables the creation of natural and intuitive interfaces for various applications, such as virtual reality, gaming, and robotics. Furthermore, it will offer substantial assistance to individuals with hearing disabilities and other impairments.

Skin Cancer Prediction System using Machine learning and Raspberry-Pi -A Review

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Abstract—The uncontrolled growth of abnormal epidermal cells causes cancer. Today, technology is creeping in to recognize and diagnose cancer. Most dangerous cancer is caused by unrepaired deoxyribonucleic acid (DNA). One of the primary divisions of cancer and skin cells that causes genetic flaws or mutations in the skin is skin cancer. If it is not treated regularly, it will spread to most parts of the skin and is life-limiting. Early detection of skin cancer is a slow process, by improving the machine-assisted approach to the detection of cancer is more efficient. Machine learning(ML) emulates the working of the human brain in organizing data and designing patterns for decision-making. Machine learning (ML) is becoming more broadly accessible to the general public as a result of the ongoing dissemination, use, and development of technologies. Specialists can accurately diagnose cancer, in only fewer numbers, by developing an automated system that can help to detect the disease to reduce the risk and also save the lives of people. In this paper, we give an overall review of ML-based skin cancer prediction system using Raspberry Pi with Densenet 121 algorithm to enormously help to solve health-related issues by assisting physicians to predict disease at an early stage and cure it.

Comparison between PI based and fuzzy based control for Cuk-derived PFC converter for EV

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Abstract—Power factor correction (PFC) is an important feature in on-board Electric Vehicle (EV) chargers. The purpose of PFC is to improve the efficiency of the charger and reduce the harmonic distortion in the AC power system. In a typical front-end converter, a bridge rectifier is used to convert the AC voltage from the power grid to a DC voltage that can be used to charge the battery of an electric vehicle. However, a bridgeless topology eliminates the need for a bridge rectifier by using a different circuit configuration. This article introduces a bridgeless topology which is derived from conventional cuk converter. The converter control involves a single-sensor based voltage control loop. The performance of the converter is evaluated using both proportional-integral (PI) and fuzzy logic (FL) controller and the simulation was carried out using Matlab simulink. The proposed front-end converter can be used in low-voltage battery chargers ranging between 1.0 and 3.3 kW.

A Review Of Face Detection Algorithms and Embedded Hardware

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Abstract_ Face detection, also known as facial detection, is a computer invention based on artificial intelligence (AI) that is used to locate and identify human countenances in advanced picture/video arrangements. Because manual processes are difficult and time demanding, there is an obvious need for intelligent systems to autonomously comprehend and scrutinize information, given the phenomenal development of video and picture databases. In this article, we look at various algorithms for face detection and how they can be used in the area of embedded systems. Various algorithms are discussed, but the Haar-cascade classifier is one of the most amazing methods for facial recognition, producing entirely accurate results. One of the present problems is the security of data and physical property. Face recognition has become important in security and data access. That is all there is to it. It can be used to improve the competence of the video observation system. Recognizing faces gradually is used for surveillance and tracking of individuals or things.

Compact modeling of Resistor using Verilog A in Xyce Circuit Simulator

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Abstract— In this paper, we implemented the Automatic Device model synthesizer(ADMS)-compiled and Xyce-linked Verilog code for a resistor. This resistor is used to create a MOSFET inverter. The DC analysis of an inverter is investigated for variable resistivity. In Xyce circuit simulator, the entire analysis is completed. Our paper also describes how to build Xyce and Trillinos, as well as how to add a device to Xyce. In the discrete RLC series, RLC module, and NMOS resistive load inverter, the Verilog A resistor is implemented.

A Review on Object Detection Algorithms Used By Various Robots

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Abstract-Researchers have recently paid a lot of attention to object detection because of how closely it is related to video analysis and image processing. Traditional Systems for object detection are constructed using high- quality parts and various trainable architectures. By building complex groupings with numerous low-level picture features and significant level setting from object indicators and scene classifiers, their appearance successfully corrupts. As a result of the rapid development of deep learning, more practical tools that can learn semantic, substantial level, and other components are familiar with resolving problems in conventional models. In terms of network design, preparation system, and advancement capability, these models behave differently. We provide an overview of deep learning-based object identification systems for robots in this study. The principal use of object detection in robotics is for navigation, pick and place operation etc. The first step in a moving robot is object detection. Here KSSnet is used as the better algorithm for object detection due to its accuracy.

Enhancement of Breakdown Voltage in Drain and Source Engineered Partially Depleted Silicon on Insulator

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Abstract— Enhancement in Breakdown voltage is revealed In this study, for a P+ Partly Depleted Silicon On Insulator(P+PDSOI). One crucial factor that affects the efficiency of high-power devices is breakdown voltage. A comparison between PDSOIs with and without P+ was conducted. To comprehend the electrostatics in the device, an electric field analysis is also conducted. P+ Partly Depleted Silicon On Insulator(P+PDSOI) displays a 27 % rise in breakdown voltage when compared to Partly Depleted Silicon On Insulator(PDSOI). The Atlas TCAD 2D simulator is used for all simulations.

Wi-Fi Controlled Robotic Arm With Image Processing

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Abstract— This paper's major goal is to deal with a variety of tasks that will directly reduce human effort. In an effort to find alternatives to carry out commands and to function in a difficult environment, mankind has always sought to imbue its artefacts with lifelike features. The most common image of a mechanical arm is one that resembles a human arm in both appearance and operation. This paper displays the controller's design for teleoperation. Through a Wi-Fi connection, we are able to control a robotic arm. System uses a number of interconnected processing modules to provide a wide range of functionalities along with image processing and uses Wi-Fi as its wireless communication channel because it is already widely used. This robotic arm takes pictures through camera mounted on it and transmits them to the control station through which image processing takes place.The robot in this paper is built to work both automatically and manually.

Existing Algorithms for Facial Emotion Recognition: A Review

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Abstract-Facial expression recognition is a vital part in artificial intelligence and roboticsThere are many deep learning and machine learning methodologies by which facial expressions can be recognized and classified.Many systems which are helpful for elder people and mentally depressed people have been build by recognizing facial emotions.In this paper a review of various algorithms have been briefed.

An Intelligent Smart Cradle for Monitoring and Managing Babies

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Abstract— One of the biggest challenges today's parents' faces is keeping an eye on their babies. They all are busy with work and other activities. So, parents cannot take care of their babies properly. For this, we are presenting an intelligent smart cradle for monitoring and managing babies using Android App. By using this system, we can resolve a huge working load of the parents and they can be concentrated on their jobs. With the help of this system, parents can monitor their babies anywhere at any time using an Android application. This technology assists parents in recognizing the motion and sound of the babies and the system also help to detect the temperature, pressure rate, and facial expression of the baby. This system will also provide a warning message to the parents when the baby tries to cross the boundary of the cradle when the cradle bed gets wet, body temperature, etc. The system is low-powered, light weighted, scalable, and portable.

FACE RECOGNITION AND WEAPON DETECTION IN SECURITY CAMERAS

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Abstract— In the modern world with developing infrastructures and facilities, life has become easy. On the other hand, there is still a lot of concern about the security of our premises. In fact, now-a-days we are not even safe in our own house. According to the reports of National Crime Report Bureau (NCRB), there was a jump in the number of cases that took place in residential places by 10.53% in 2017. In order to overcome this problem, we have proposed a system "Face Recognition and Weapon Detection in Security Cameras". The system only permits known individuals without any kind of weapons to enter. It prioritizes the face detection after which the weapon detection starts. The person has to completely unarmed and known to the system to enter. The system is completely designed using python with the help of image processing. With this system, the security regarding the restricted areas, residential areas will be improved.

Air Quality Monitoring using IoT and Filtration- Review

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Abstract— Air quality inspection and protection has become one of the most important government responsibilities in many industrial and urban regions nowadays. The issue of indoor air quality must be addressed because it will have an impact on people's health. Many factors that affect air quality must be routinely monitored in order to preserve it. As technology and senses have advanced, IoT has emerged as a viable option for air quality monitoring system implementation and system maintenance. This project created an air quality monitoring system with an ESP32 controller and many sensors to gauge the quality of the air. We provide an analysis and comparative study of a system that can monitor air quality both with and without the usage of a filter, measuring the concentration of polluting gases such CO, CO2, CH4, PM2.5, and PM10 as well as dust particles.

Design and Implementation of a Soft Switching Interleaved Buck Boost Converter With Coupled Inductor For Motor Driver Application

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Abstract—This paper presents a novel and innovative motor driver technology, which employs an interleaved buck boost converter with coupled inductor to efficiently drive and regulate the speed of a PMDC motor. The proposed circuit configuration is designed to distribute the current stresses uniformly across the switches, while the coupled inductor facilitates soft switching by releasing the charge stored in the parasitic capacitance of the active switches. It is anticipated that this converter will achieve an impressive efficiency rate of 95%. In addition to outlining the technical specifications of this proposed technology, this paper also aims to explore the impact of the coupled inductor in the interleaved topology, by rigorously analyzing the simulation results obtained from the aforementioned circuit. By closely examining the simulation data and conducting an in-depth analysis, this investigation seeks to provide a comprehensive understanding of the system's performance, and its potential for enhancing the efficiency and reliability of PMDC motor drivers.

INTERLEAVED BUCK-BOOST UNIDIRECTIONAL CONVERTER WITH DUAL BRIDGE FOR EV CHARGING

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Abstract-In this paper design of a Resonant Dual Active Bridge (R-DAB) converter with interleaved circuit for charging a Electrical Vehicle(EV) Battery is discussed. Battery chosen is a Li-ion battery since it is extensively used in EV charging applications. Here both Pulse Width Modulation (PSM) and Pulse Frequency Modulation (PFM) is utilised for the dual control of R-DAB. Dual control method of the R-DAB emphasize the control strategy of R-DAB converter using two control variables i.e. PSM and PFM. Detailed design of parameters of the converter is discussed and simulated. Converter comprehend a resonant tank that minimises the switching losses by using soft switching principles and an interleaved circuit at primary side to extend Zero Voltage Switching (ZVS) operation range. The interleaved circuit also helps to drive the converter at high current. It can also reduce the rating of switches, capacitors and inductors and hence size of the components can be reduced. Interleaved circuit can provide voltage with high gain while operating in boost mode with a gain upto 4 times. The converter can work in both buck mode as well as in boost mode. Converter charges a Li-ion battery with a nominal voltage of 24V.Converter provides isolation between input and output which is essential for Battery Management Systems (BSS).The experimental results and waveforms are proposed in the paper.

An AI Based Smart Glass For Blind Using Raspberry-Pi - A Review

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Abstract— Vision disabilities are one of the prevailing problems that is rapidly increasing. Visually impaired have to use traditional methods like Guide Dog, walking stick, Brail Script etc. for their assistance .The main motive of the project is to develop a Smart glass by using Artificial Intelligence (AI), Image and Text Recognition, obstacle identification for Assisting Visually Impaired. Its functionality addresses the identification of objects and signboards. It consists of an ultrasonic sensor it which spreads ultrasonic waves in the direction the person is going by scanning most 40-150 centimeters of range. ,we implied a system utilizing Raspberry Pi-based where you only need to glance once AI calculation made using the coco dataset and the "YOLO" algorithm is applied for object detection and a voice output is synthesized using text to speech(TTs),This system proposes integration of technologies like image processing ,speech processing etc.to reduce challenges faced by visually impaired people.

Fire Detection Technologies: An Evaluation on fire detection methods

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Abstract- Nowadays fire accidents are common and sometimes it is uncontrollable and may risk life. Thusly, fire security turns into a significant perspective to save human lives. Distinguishing fire at a beginning phase and smothering it can help with the counteraction of different mishaps. Existing technologies in the field of fire detection and extinguishing were studied and analyzed. One of the detection method was using artificial intelligence with YOLOv3 model was utilized to prepare the model for fire recognition to further develop precision. Another method was using sound waves. In this change of Collimator has made it conceivable to smother little as well as medium flames. In this paper "Firefighting System" aims at locating the fire and extinguish it with water after the pump is activated. For fire detection various sensors like temperature sensors, smoke sensors, and fire sensors are utilized. The entire framework is programmed using ESP8266 which is a low-cost and user-friendly Wi-Fi module. With line- following technology, the robot is intended to move automatically and follow the line. When presence of fire is detected, automatically water is ejected at the fire breakout place. To achieve this technology IR sensor is used for moving to the desired location with the feed path.

An IoT Based Smart Dog Cage

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Abstract— Pet ownership is a wonderful experience everyone should enjoy at least once in their lives. Pets are, without doubt, animals and are a companion and an emotional being. Pet monitoring may not be efficient in the busy modern world. True caring for a pet and ensuring their health is a difficult responsibility, but with the appropriate measures, it may be easier. In this modern era, there is a lot of technological improvement in pet cage design. The world is moving towards automated or smart mechanisms. In this context a novel method is proposed here. IoT based smart dog cage consists of a feeding system, temperature controller, food dispenser and live monitoring units. The feeding system in this cage can dispense food accordingly based on the required quantity of food time to time by using Real Time Clock (RTC). A water level sensor is also added to feed water to the pet. Water will be automatically pumped into the feeder bottle when the water level falls below the required level. When the temperature increases beyond the set value, an exhaust fan automatically turns on for cooling. IoT systems are used to control & monitor dog's real-time behavior.

SMART RECEPTIONIST ROBOT

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Abstract—A receptionist is a person who works in an office, store or hotel, to help visitors with their needs by interacting with them. The aim of this project is to design and develop a smart receptionist robot that performs the work of a receptionist in an automatic manner. Precisely, the goal of this project is to investigate how robots used as direction-giving systems. This project is a welcome humanoid service robot which receives, provides refreshment and assists people by giving directions and helping them to find the places of interest through voice. The main components used in this project are Raspberry pi, ATmega328 microcontroller, Webcam, Servo motors, Speaker.

Mobile Navigated Sweeping Machine

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Abstract— Cleaning is a basic need for all human beings and a necessary part of our daily routine. In public places like bus stands, railway stations, and hospitals, conventional cleaning requires a lot of manpower. The aim is to design a sweeping machine which reduces human effort and increases the efficiency in the cleaning process with time reduction. The mobile sweeping machine we propose consists of a Bluetooth module, Arduino, ultrasonic sensor, sweeping brush, roller belt, and waste collector. The machine is controlled through a mobile app installed on a mobile phone. The waste swept by the sweeping brush is collected by a roller to the waste disposal bin. The waste disposal bin can be removed and reinstalled after cleaning. A sensor in the machine reduces collisions with objects around the cleaning area by using ultrasonics. This machine can be used in public places and yards.

AUTOMATIC HEAD-LAMP SYSTEM WITH SMART ROAD-ACCIDENT DETECTION AND COMMUNICATION

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Abstract—Due to the lack of illumination, accidents frequently occur at night. Many drivers who use high beam headlights often forget to switch to low beams due to the low light circumstances. Several nighttime accidents are caused by the improper usage of high beam lights. Drivers are not allowed to turn on their high beams when approaching other vehicles since the driver receiving the light may be blinded and may temporarily lose vision, which could lead to accidents. When passing on dark uphill or downhill highways, many drivers fail to switch the vehicle's beam headlight setting. We require a system that can automatically switch the headlight mode of the vehicle for that. Whether driving on uphill or downhill routes, Automatic Headlamp can adjust the mode of its reflector lights using an accelerometer sensor. When a vehicle passes another one or travels through well-lit areas, the headlight can automatically switch between modes. The rising number of fatal traffic accidents is another major cause for concern. Human lives are frequently lost in traffic accidents as a result of inadequate medical care. Thus, we are creating a smart road accident detection and communication system using micro controller technology, which will alert the family, nearby hospitals, and police as well as the location of the accident.

Auxilia: Assistive Learning Tool for Children with Down Syndrome

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Abstract— A third copy of chromosome 21 results in the incurable genetic disease called Down's syndrome. A medical term for having an extra copy of a chromosome is 'trisomy' and hence is also referred to as Trisomy 21. Children with Down syndrome often have IQs in the lower range and speak more slowly than other kids their age. The project aims to target children under the age of twelve who have issues in learning and getting introduced to new concepts (learning disabilities). The teacher determines the child's preferred technique of learning, and then the best teaching approach is used. The project consists of three sections: the application which is both teacher's and student's phone, an audio comparison module and provision for biotelemetry. The software application consists of activities ranging from LEVEL 1 to LEVEL 4 which helps the child to initially develop interest in the activity and then perform the activity. The audio comparison module compares the voice of the child and the audio it has. The biotelemetry module checks BP, pulse rate, oxygen level and temperature. Thus, AUXILIA will act as an overall assistance guide and a health monitoring device for Down's syndrome students.

MACHINE LEARNING BASED SOC ESTIMATION OF LI-ION BATTERY FOR ELECTRIC VEHICLE APPLICATIONS

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Abstract—Battery Management System (BMS) plays a vital role in hybrid and electric applications, since the implementation of BMS has a significant impact on the energy efficiency and the battery's life. State of Charge (SoC) estimation forms the crux of any BMS system. Estimation of SoC is a cumbersome task due to the complex internal electrochemical reactions that depend on the temperature and vary with cell aging and many more internal and environmental factors. Hence, SoC is estimated and not determined. The development of data-driven algorithms such as machine learning methods in recent years have shed light on efficient ways to improve the accuracy of SoC measurements with enhanced performance, learning capabilities for high accuracy and convergence. Artificial Neural Network (ANN) approach has exceptional potential to construct a non-linear map between input and output parameters which illustrates the non-linear model complexity. This paper presents SoC estimation using an ANN model so that prediction accuracy improves greatly. The error analysis shows that ANN based SoC estimation is promising in the area of accurate SoC estimation. This method when implemented in electric vehicles would enhance the user experience as it will lead to more clarity on the available charge in a battery and allow the user to plan charge times accordingly.

Energy Generation From Speed Breaker

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Abstract—A large amount of energy is wasted by vehicles on the speed breaker during breaking every time it passes over it. The typical speed breakers are replaced with a simple system that generates electricity as the vehicle passes over the speed breaker, the roller shaft rotates and it is coupled with the motor through a one way clutch and hence we can generate electricity. Advantages of our model is that it includes a roller mechanism which ensures that the generator rotates in a single direction and eliminates negative voltage. We also include a controller to convert the output voltage to the required value for storage or connecting to the load.

EMOTION ANALYSIS AND DEPRESSION DETECTION FROM SPEECH USING DEEP NEURAL NETWORK -A REVIEW

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Abstract— Feeling acknowledgement can uncover the mentality of people through blended sentiments. Detection humans emotion can be a breakthrough in healthcare sector and is essential for state of mind. we are proposing a method of detecting human emotion using speech signals. we have to implement a real time audio detecting system. First we have to detect the audio. Then we have to normalize the audio signal ie, removing all the unwanted signals from it. We have to create cepstral coefficient of the audio clip. From that we obtain the MFCC(Mel-frequency Cepstral Coefficient).Then the classifier classifies the audio signal and obtain the emotion from them. We have reviewed six research papers and compared the accuracy obtained using different deep learning techniques. CNN+LSTM model has the highest accuracy among them.

Powertrain Design for High Voltage Electric Vehicles with Reconfigurable Integrated On-Board Charger

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Abstract— This paper proposes a reconfigurable on-board charger (R-OC) for High voltage electric vehicles (EVs) that integrates battery charging functionality into the drive unit. The R-OC uses a 3-phase, 6 switch voltage source inverter (VSI) that can be reconfigured as a bridgeless boost front-end converter enables optimal constant current-constant voltage (CC-CV) charging of the battery during charging mode. During propulsion mode, the same R-OC is reconfigured to drive the electric motor of High voltage EVs, thus reducing the switch count by eliminating the need for an additional inverter unit. The proposed topology enables the integration of battery charging functionality into the drive unit of High voltage EVs, reducing the weight, volume, and cost of the powertrain. Additionally, the paper proposes Speed control during propulsion mode and regenerative charging. The proposed design presents an efficient and cost-effective powertrain solution for high voltage EVs.

Double differential line-to-line voltage based sensorless control of a Submersible BLDC with PV connected Bore-well system

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Abstract—Brushless direct current (BLDC) motors with photovoltaic panels are getting popular these days due to their higher efficiency and reliability etc. compared with other kinds of motors. Deep bore-well submersible motors are used for extracting potable water from the water table. The motor and controller are submerged in the water table, and have more temperature rise due to the poor ambience. Thus, control of a PM BLDC motor with hall effect based position sensor is unreliable in these environments due to the temperature sensitivity of the hall-effect sensors. In this paper, a double differential line-line voltage based sensorless control of a Submersible BLDC motor with PV connected Bore-well system is presented. A position sensorless control scheme is implemented to eliminate the use of hall-sensors, thus improving reliability of the overall system.

Microstrip diplexer based on circular open loop resonators for S-band Applications

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Abstract— Diplexer is a three-terminal device that takes two or more frequencies into one input port and separates them into two output ports. Diplexers are used to minimize the number of antennas in high-speed wireless systems and other communication systems. These diplexers employ filters for uplink and downlink and are connected by matching networks. In this paper design, simulation and design of S-band diplexers are presented. Microstrip diplexer using circular open-loop resonators are designed and simulated for 2.0 GHz and 2.25 GHz on Rogers RT Duroid 6010 substrate. The proposed diplexer is made of two compact-size bandpass filters using circular open-loop resonators. The proposed diplexer is having isolation better than 30dB. Insertion loss in the pass band is 2dB. The proposed diplexers can be used as a part of telemetry systems for launch vehicle applications, reducing the number of antennae used. Once the performance of diplexers is verified by the simulation software, hardware fabrication can be planned.

Software and Hardware Design of Perturb and Observe Algorithm in Maximum Power Point Tracking for South Indian States

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Abstract— Renewable energy resources have gained popularity over the years due to their numerous advantages- non-polluting, replenishable, reliable and resilient. Solar energy is definitely the most tapped resource globally because photovoltaic systems are relatively cheaper and implementation time is lesser when compared with other renewable energy technologies like wind power plants. Circuitry like Maximum Power Point Trackers, Boost Converters and Inverters are some of the components required in addition to solar panels. Tracking the maximum power point is critical in photovoltaic system design as solar irradiance and temperature keep varying throughout the day. Though many new algorithms are being developed, the traditional Perturb and Observe Algorithm is difficult to replace, owing to its simplicity. For South Indian States like Kerala, Karnataka, Tamil Nadu, Telangana and Andhra Pradesh, the annual irradiance levels are around 5kW/m2. This paper aims to detail the simulation of Perturb and Observe and the steps required in building the same as hardware. It also seeks to provide a comparison between the software and hardware results.

SMART GUARD ORIENTED ADVANCED VEHICLE CONTROL SYSTEM

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Abstract - A flourishing technology that has the potential to transform the world is cloud computing. All objects in the universe have the ability to link on the Internet of Things (IoT), giving people a comprehensive understanding of everything. To assist individuals in making their daily lives better, faster, and healthier, many initiatives use IoT. In this paper, we propose an internet-of-things (IoT) controlled emergency response system for medical and traffic emergency management teams, which might be highly helpful when a vehicle is involved in a serious accident. To enhance the overall recovery process and allow emergency responders to accurately identify the resources required, a timely and accurate evaluation of the incident's scope is essential. When an emergency condition is noticed, the proposed device instantly gets to work. The program would start a conversation with the appropriate authority and transmit important and pertinent information, including the location of the incident, tracked health conditions, and photos taken with the camera as the accident was happening. The device's application makes use of an Arduino (ATmega1608), an ESP32, and the necessary sensors.

Emotion-based Age separated customer feedback system

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Abstract—This conference paper presents a survey of existing literature on emotion analysis, aimed at identifying research gaps and potential directions for future studies. Additionally, the paper proposes a novel system for customer satisfaction analysis that incorporates emotion detection, age, and gender detection. Traditional methods for customer satisfaction analysis such as surveys and feedback forms can be time-consuming and yield biased results. The proposed system employs three different models to provide a more accurate analysis of customer satisfaction, which was tested on a real-world dataset. The results demonstrate that the proposed system outperforms existing methods by offering a more comprehensive and accurate analysis of customer satisfaction. The paper concludes that this system can aid businesses in enhancing their overall customer experience.

Low-Cost, Low-Profile Wearable Temperature Sensor for Continuous Body Temperature Measurement

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Abstract—In this paper, a small wearable sensor that can measure body temperature in humans is proposed. A compact wearable temperature sensor for human body temperature measurement must be created in order to address the shortcomings of temperature sensors for curved surfaces instead of commercial thermometers The sensor is built on a flexible material to for making it suitable for wearable applications. This article describes single-walled reduced graphene oxide (rGO)-printed flexible temperature sensors, their manufacturers, and their high-precision reading capabilities. The substrate material for the sensor is chosen as FR4 glass epoxy 100 microns thick. The electrodes made of copper are fabricated on top of the substrate using the photolithography process. The sensing material is then fabricated on top of the electrode using the drop and spin method. After the sensor is fabricated, it is tested using a Wheatstone bridge arrangement. The sensor was tested using the testing circuit created using an Arduino Uno board which is used to map the values and produce outputs accordingly.

Devices and Applications for Dementia Patients: A Comprehensive Review

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Abstract—The gradual deterioration of cognitive abilities is known as dementia, affecting memory, thinking, behavior, and the ability to perform everyday activities. We aim to create an application that can support individuals with dementia and their caregivers. By utilizing technology, we can reduce the effects of cognitive decline and provide a convenient solution for both individuals with dementia and their caregivers. In this paper, we present a review of the existing literature on this topic to identify areas where further research is needed and potential directions for future studies.

Optimal Power Control Of PMSG Based DC Microgrid Using Buck-Boost Converter

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Abstract— Wind energy conversion systems (WECS) are a popular and effective method of harnessing wind energy for power generation. One of the challenges in WECS is to maintain a stable output voltage and to maximize the power output. To address these challenges, a buck-boost converter and maximum power point tracking (MPPT) optimization using Artificial Neural Networks (ANNs) can be used. The proposed power system consists of Maximum Power Point Tracking (MPPT) algorithm to achieve optimal power extraction from the PMSG using Artificial Neural Networks , a subset of AI. The buck-boost converter is used to regulate the output voltage of the PMSG to match the required voltage of the DC microgrid. The proposed optimal power control strategy can be a promising solution for power management in DC microgrids powered by PMSGs.

Fuzzy Logic based Charging and Discharging of a Lithium ion battery in DC Microgrid

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Abstract—Microgrids generally resort to batteries as means of storing the excess energy generated by the renewable energy resources.So it is really important to understand the basics of a battery management system and how we can improve them. A battery management system includes determining and controlling the SoC of the battery, efficiently controlling the charging and discharging capabilities ,measurement and control of voltage current and temperature and fault detection.Normally the methods of control of a battery results in several problems related to over charging and over discharging of a battery and slower response time. Therefore in this paper we propose a fuzzy logic based controller to control the charging and discharging of a battery in a dc microgrid.We consider the SoC difference and the power demand as the two inputs to the fuzzy logic controller to control the battery charge and discharge. By analyzing each input combination, multiple rules are set and for each condition ,corresponding output is obtained.Thus one can accurately control when the battery should undergo charging or discharging without much mathematical complexities and other errors.

Low Cost Reflow Oven

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Abstract: The reflow oven is one piece of machinery used in an SMT line that conducts the soldering procedures for the SMD components. Prior to mounting these components, solder paste was applied to the relevant copper pads on the printed circuit board (PCB). At the moment, there are just a few specific portable reflow ovens available, and those are rather costly. Some of the disadvantages of reflow ovens are listed below: If the temperature is too low or too high, problems with temperature management may prevent solder from reflowing properly. The reflow oven developed here is a low-cost, common grilling oven that has been transformed into a solder-reflow oven with a completely adjustable temperature profile and heating components to provide time-varying temperatures with a profile in line with the desired specification at each solder-reflow phase. With less expense and comparable outcomes, this product may be used by start-up firms. Automatic soldering, lower costs, mobility, and fewer time commitments are a few advantages. For large tasks that need to be finished rapidly, it works great. The product has issues with temperature measurement, temperature management, and temperature profiling. The temperature control system employs the PID control approach; the user may design the temperature profile using the GUI and can track and log changes in oven temperature in real-time. Without using this product, we cannot forecast what the future will bring.

INTEGRATION OF SOLAR- WIND HYBRID POWER SYSTEM

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Abstract—In today's technology driven world electricity is one of the foremost thing needed for our day to day life activities. As we all are aware of the fact that non - renewable sources of energy are depleting at a lightning rate and renewable sources do not have any detrimental effect on the environment. Wind energy is one of the best option which is available in affluence for power generation. By considering implementation in coastal areas, we selected vertical axis wind turbine which utilises wind energy in the most effective manner to get maximum electrical output.The foremost thing that have been done is the design of turbine with semi-circular blades coupled to a shaft. The power developed is stored in the battery and can be used for the selected load. In order to guarantee an uninterrupted power supply ,we can opt for solar-wind hybrid system which is basically the integration of solar plant and a wind energy plant. The main advantage of solar-wind hybrid system is that it obtains energy from both sources - solar energy with the help of PV panels and wind energy from wind turbines. This paper proposes a hybrid system, which combines photovoltaic and wind power as an alternative source for small scale electrical power generation where conventional production is not practical. The main attraction of this system is its simplicity, ease of control and basically focus to achieve maximum output with minimum cost.

ISLANDABLE MICROGRID USING PV SYSTEM FOR DOMESTIC APPLICATION

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Abstract—Due to the sheer global energy crisis, solar and wind energy, which are clean and renewable are gradually entering all the walks of lives even in or homes through distributed generators. And, a self-sufficient energy system that serves a discrete geographical footprint is one of the best ways of tackling the issue of energy crisis. This paper proposes a microgrid system that is a capable of operating in both on grid and off grid conditions. The system uses solar panels to produce energy during the day, while the batteries store excess energy for use later at night when there is no sunlight. This allows you to get the most energy possible out of your solar panels. By routing the energy generated through a hybrid inverter and into your own battery before kicking back the excess to the grid, you can feel confident that you are utilizing clean, renewable energy as much as possible.

Solar Photovoltaic array and Zeta converter based Water pumping system based on BLDC motor with torque ripple compensation

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Abstract— A solar pumping model is proposed in this paper using a Brushless DC (BLDC) motor. Zeta converter is used as a DC-DC link between the voltage source inverter and the PV array. Zeta converter enables soft starting of the BLDC motor and the speed control is achieved by simple variation of DC link voltage, thereby eliminating the need for complex switching circuitry. Zeta converter belongs to the class of buck-boost converter hence offers a wide range of operating voltage. The proposed model is simple and cost-effective so it can be practically implemented with minimum cost. The proposed model is tested for its suitability in the MATLAB/Simulink environment.

Energy monitoring and controlling system using IoT

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Abstract— Energy consumption has become a crucial issue due to its adverse effects on the environment and the economy. This has prompted the development of innovative solutions to manage energy consumption in a more efficient and sustainable way. In this dissertation, we propose an energy monitoring and controlling system using the ESP32 microcontroller. The main objective of this study is to develop a low-cost and easy-to- implement energy monitoring and controlling system that can help reduce energy consumption, increase energy efficiency, and improve sustainability. The system is designed to collect data on energy consumption, analyze the data, and control the devices based on pre-defined rules and algorithms. The ESP32 microcontroller is used as the central processing unit in the system due to its low cost, high processing power, and built-in Wi-Fi connectivity. The system also utilizes various sensors and devices such as the ACS712 current sensor, PZEM-004T AC voltage sensor, L298N motor driver, and 5V 10A 2-channel relay module shield to measure and control energy consumption. The proposed energy monitoring and controlling system has several advantages over traditional energy management systems. First, it is cost-effective and easy to implement. Second, it allows for real-time monitoring and control of energy consumption.

Charging Circuit Design & Chassis Design of an Light Weight EV

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Abstract— This paper details the development and design of an eco-friendly Electric Kart, called E-kart. The primary objective of this project was to create a kart powered by batteries and motors, without the harmful emissions of hazardous gases. The E-kart utilizes a BLDC motor with a 6000-watt power output and four rechargeable lithium-ion batteries with a 100-amp capacity each. The chassis is made of IS1161 Seamless tube material, weighs approximately 22 kg, and the whole kart weighs about 200 kg. The paper presents detailed calculations and designs of all components, including the batteries, motor, and brake. The maximum speed of the E-kart is 40 km/hr or 11.11 m/s, and it can travel up to 45 km with a 1.20 hp motor. The project adhered to international standards for all calculations.

Design for Damping Electromechanical Oscillations in Power System Using AVR And PSS

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Abstract— AVR is a controller which stabilizes the output voltage of a generator. But the occurrence of oscillations disturbs the stability. The introduction of PSS along with AVR suppresses the oscillations and quality of power system is improved.

Fast charging converter and control algorithm for solar PV battery and electrical grid integrated electric vehicle charging station

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Abstract— Electric Vehicles (EV) offer eco-friendly transportation, but the growth of the electric vehicle market year over year is very minimal due to insufficient EV charging stations, slow charging time and grid instability during peak hours. This paper proposes a high gain, fast charging DC–DC converter and a control algorithm for grid integrated Solar PV based Electric Vehicle Charging Station (SPV-EVCS) with battery backup. The proposed converter and its control algorithm's performance are investigated in three different modes using MATLAB/Simulink tool and the simulated results are validated with Real- Time Digital Simulation (RTDS) in OPAL-RT. The observed results meet the Power Quality limits of an IEC61000-3-2 standard and met the level-4 dc charging standard IEC61851.

Design and Analysis of BLDC Controller with Thermal Regulation

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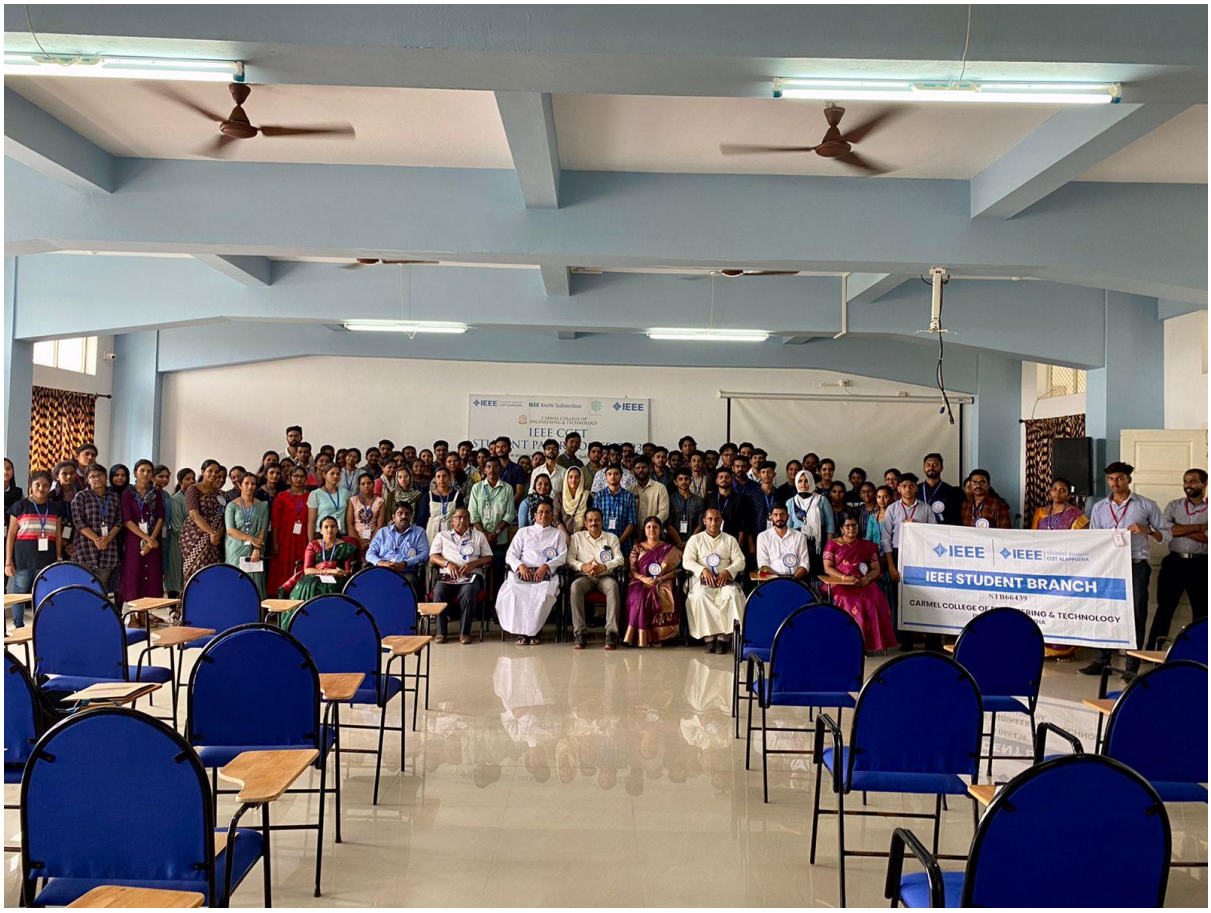
Abstract— BLDC (Brushless DC) motor and controller are part of a motor control system that works without brushes and commutators. The controller is responsible for controlling the motor's speed, torque, and direction of rotation by varying the voltage and the frequency applied to the stator windings. A simple extension has been done in the construction of BLDC motor to reduce heat is included in this paper. Excessive heat generated in the motor can cause its components to degrade, leading to a reduction in performance, and, in some cases, complete failure.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