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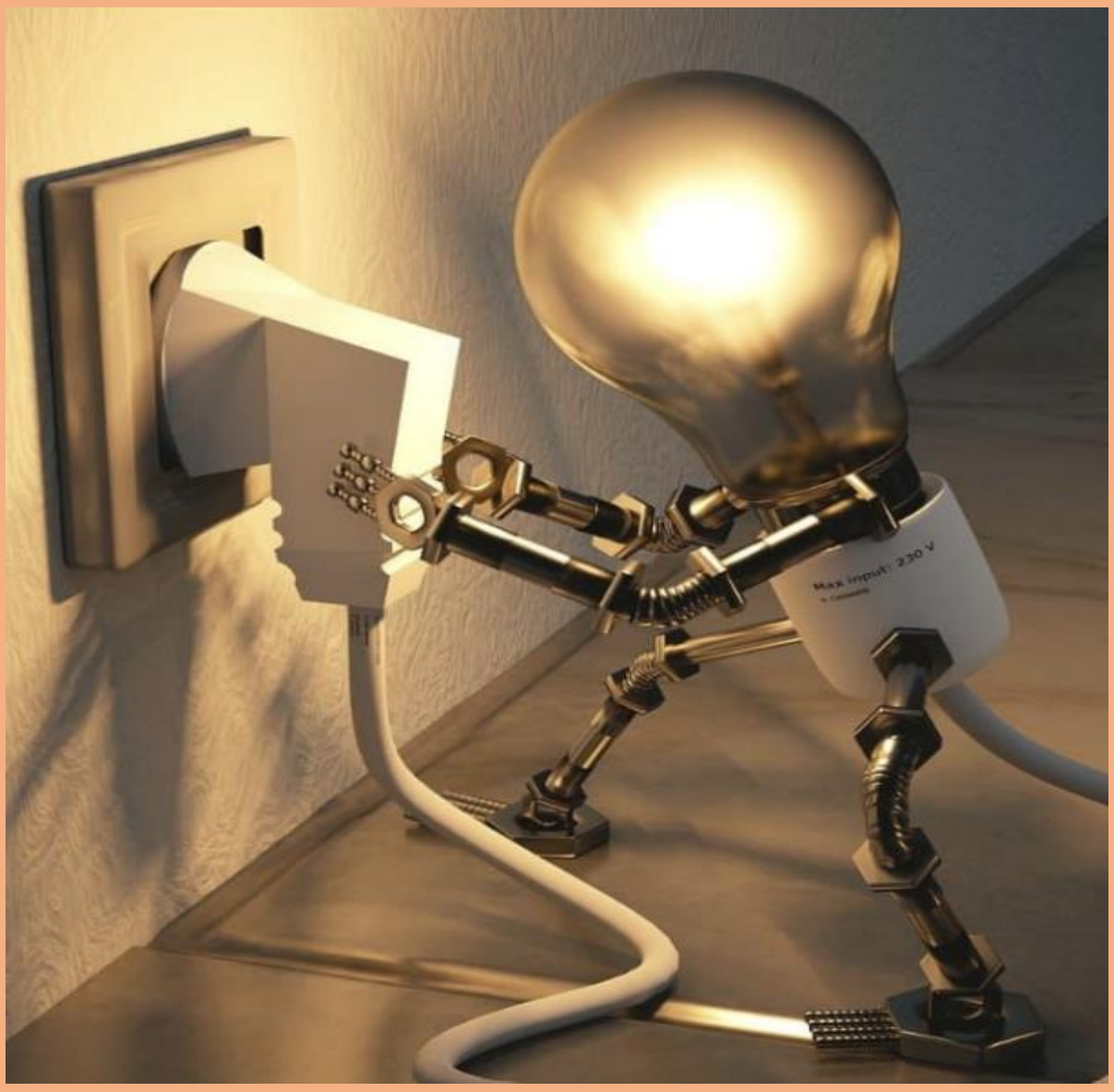


ANDHRA LOYOLA INSTITUTE OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

MESSAGE FROM THE HOD

I am gratified to know that the department of Electrical and Electronics Engineering is bringing the technical magazine of this academic year. This is a productive technical material and subsidiary skill developing tool for the students. I wish this Magaz“EEE”ne a very big success in all their ventures. I also applaud the coordination and efforts made by the editorial team.

Dr. G. Naveen Kumar, Professor

EDITORIAL MESSAGE

It is an occasion of immense pleasure for the Department of Electrical and Electronics Engineering to publish the first volume of magazine for the academic year 2020-21. The Editorial board of department of EEE wants to thanks all the faculty members and students who have made this issue a success by providing an article for the first volume.

This magazine focuses on the recent trends evolved in the field of Electrical and Electronics engineering & wants to provide advanced knowledge and awareness among the students about the same. The Editorial board also wants to thanks the Management of the Institute and Head of the department for inspiring us to go forward in publishing this magazine.

Editors:

Dr. G. Naveen Kumar, Professor

Mrs. V. Anantha Lakshmi

Mr M. Rama Krishna

Student Coordinator:

Mr. S Subhani

Ms. A. Rakshitha

Department Vision:

To prepare competent and knowledgeable Electrical and Electronics Engineers by ensuring quality education with skills and character to serve the society.

Department Mission:

M1- To provide quality teaching and services that render students a supportive environment.

M2- Making the effort to mould the students to be the problem-solvers, to be able to apply engineering principles to electrical systems.

INDEX

Controlling and Monitoring of Substation

K Nandini

In this article I would like to give some important observations regarding the controlling and monitoring of substation like synchronization, interlocking operations, and the substation control system.

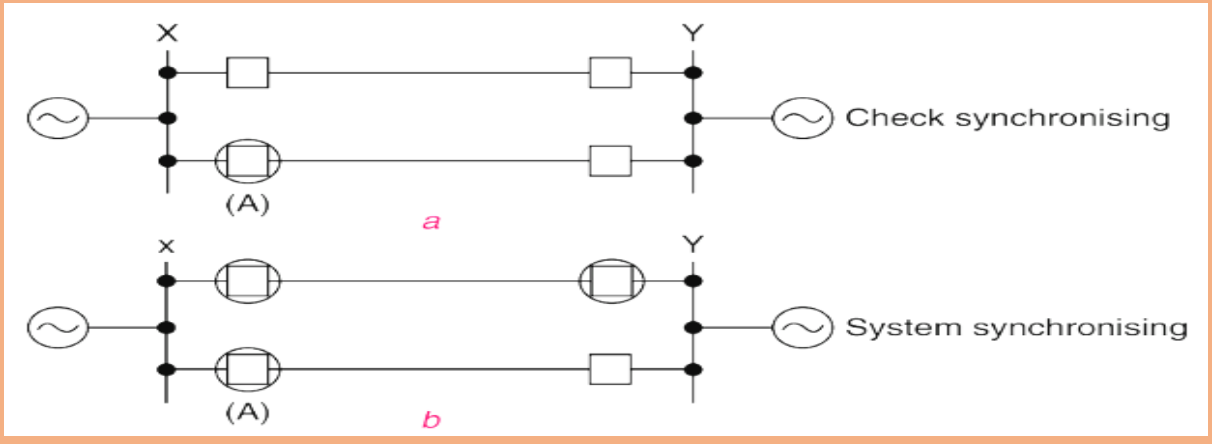
Substation Control System:

The control and Monitoring systems are needed by the substation to run efficiently. These control and monitoring systems in the substation should display the current status of all plant equipment, including alarms and secondary system indicators. They provide digital outputs to open and close switchgear, raise and lower taps on transformers, and show analogue values for key parameters like voltage, current, megawatts.

There are some standard indicators and controls in the substation but additional functions like synchronizing, reactive and voltage control, operational and safety-related interlocking, load control are necessary to prevent frequency collapse.

Synchronization:

It is necessary to perform synchronization on transmission networks in order to guarantee the maintenance of system stability, reduce the amount of damage accomplished to plant. When circuit breakers are closed, if the systems on either side are not in synchronism, a shock load can be imposed on generators, and a significant amount of synchronizing power will flow on the network.



When it comes to the transmission network, the two forms of synchronizing that are typically utilized are check synchronizing (when the circuit breaker that is being losed is located within a system) and system synchronizing (when the circuit breaker that is being closed is connecting two systems).

The following requirements must be met for synchronization:

1. Both sides of the CB have the same frequency i.e., slip is zero.
2. There is no phase angle variation between voltages on both sides of the CB.
3. Both Sides of the CB will have same magnitude of voltage which is equivalent to the nominal value.

Note: In order to verify the synchronization, use light-lamp, dark-lamp methods, so these instruments were occasionally supplemented with lamps.

Interlocking Systems:

This system will give guarantee the proper sequence of operation for disconnectors, fixed earthing switches and circuit breakers. This ensures that operators do not compromise the integrity of the transmission system by mistakenly or unintentionally operating equipment. when the switching sequences solely include operated switchgear, it is common practice to use electrical techniques to accomplish the interlocking.

The different situations encompassed by interlocking schemes are:

1. Between disconnectors & circuit breakers (prevent the interruption of load currents)
2. Between disconnectors & earth switches guarantees that earth switches cannot be closed onto circuits that are locally energized.

The different ways to achieve interlocking schemes are:

1. Mechanically by using key access.
2. Electrically by using a solenoid.

Keywords:
voltage, current, megawatts, Substation, Switch Gear, transformers, Synchronization, Interlocking system

Above article was published in Department of EEE under Loyola Electrical Engineers Student Chapter

Article by
K Nandini

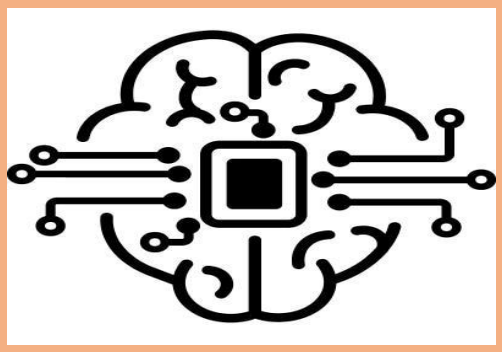
ARTIFICIAL INTELLIGENCE AND ROLE OF AI IN ELECTRICAL VEHICLES.

P Rohith kumar

AI plays an important role in the present generation. AI works by making computers think and act like humans, which requires computational systems, data and data management, and advanced AI algorithms. The AI algorithms use deep learning and natural language processing to learn from experience, adjust to new inputs, and perform human-like tasks.

Artificial intelligence (AI) can help drive growth by automating complex physical tasks, and by augmenting labor and capital. AI can also improve accuracy and decision-making by providing rich analytics and pattern prediction capabilities.

Importance of artificial intelligence:



AI automates repetitive learning and discovery through data. AI performs frequent, high-volume, computerized tasks reliably and without fatigue instead of automating manual tasks. Humans are still essential to set up the system and ask the right questions.

AI adds intelligence to existing products and also improve the production. Automation, conversational platforms, bots and smart machines can be combined with large amounts of data to improve many technologies. AI adapts progressive learning algorithms to let the data do the programming and also finds structure and regularities in data so that algorithms can acquire skills.

AI analyses more and deeper data using neural networks that have many hidden layers. Building a fraud detection system with five hidden layers used to be impossible. You need lots of data to train deep learning models because they learn directly from the data.

AI achieves incredible accuracy through deep neural networks. For example, your interactions with Alexa and Google are all based on deep learning. And these products keep getting more accurate the more you use them. In the medical field, AI techniques from deep

learning and object recognition can now be used to pinpoint cancer on medical images with improved accuracy.

Artificial intelligence (AI) is used in electric vehicles (EVs) in many ways, including:

- **Driver assistance:** AI powers advanced driver-assistance systems (ADAS) that make EVs safer and more autonomous.
- **Safety:** AI allows EVs to detect and respond to potential hazards more quickly than human drivers.
- **Efficiency:** AI can help optimize the use of electric vehicles by analyzing data on energy use, driving patterns, and charging infrastructure.
- **Maintenance:** AI enables predictive maintenance, fault detection, and energy management, leading to increased performance, reliability, and reduced emissions.
- **Communication:** AI can enable vehicle-to-grid communication, allowing EVs to serve as energy storage and participate in energy balancing.

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Article by

P Rohith kumar

Implementation of E-voting Machine using Python and Arduino

G Karthik, Dr G Naveen Kumar

This work can be implemented using Python and Arduino. The user is no longer required to check his register in search of records, after the voting procedure gets over, the admin will be able to calculate the total number of votes in just one click since the entire work is done using computers. The user just needs to enter his/her unique voter ID. In today's world, no one likes to manually analyze the result after the voting procedure gets over because the process is time-consuming and of which results get usually delayed. Everyone wants his/her work to be done by computer automatically and displaying the result for further manipulations.

How does it work?

1. The user has to enter his/her ID in the system.
2. After verifying the user ID, the system will show a message that whether a user is eligible to vote or not after checking his/her details stored in the system.
3. A message will be displayed accordingly. The user will then have to press the button against which the name of the candidate is written and whom he/she wants to vote.
4. The votes hence are stored in the database and the results will be announced accordingly.

Keywords:
Arduino, E-voting, Python.

Article by
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Guided by
Dr G Naveen Kumar

Above article was published in Department of EEE under Loyola Electrical Engineers Student Chapter

An Intelligent Door Access Management System

P Ravi Teja, Dr G Naveen Kumar

When we are at work, we may have an important meeting and may not be in time to receive our guests and they may need to wait outside. The same may happen if we are on a vacation and to safeguard ourselves from Intruders. Today the world has been far more advanced in technology than in the last few decades and with that, there are advances in the technologies that help to keep our homes safe. With the help of IoT now we can track our house even when we are on vacation.

The significance and the purpose of a Door Access Management System is to make the user's home much safer by increasing security and giving the user full control of the system.

The first step was to make an interface between the Push button and the Camera using an Arduino microcontroller so that when the button is pressed the camera would take a picture. The next step is to connect the camera to a Cloud database to upload the images in the Storage and send the image's URL to the Database. Next using Android Studio, a Mobile application can be designed to retrieve the image from the Database. Using Node JS push messaging is also added along with the mobile app such that when someone is at the door a notification pops out. They can Open or Close the door using the buttons in the app. When pressed the data is sent to Database and retrieved by the Arduino which then operates the door.

Keywords:

Door Access, Intelligent.

Article by

P Ravi Teja

Guided by

Dr G Naveen Kumar

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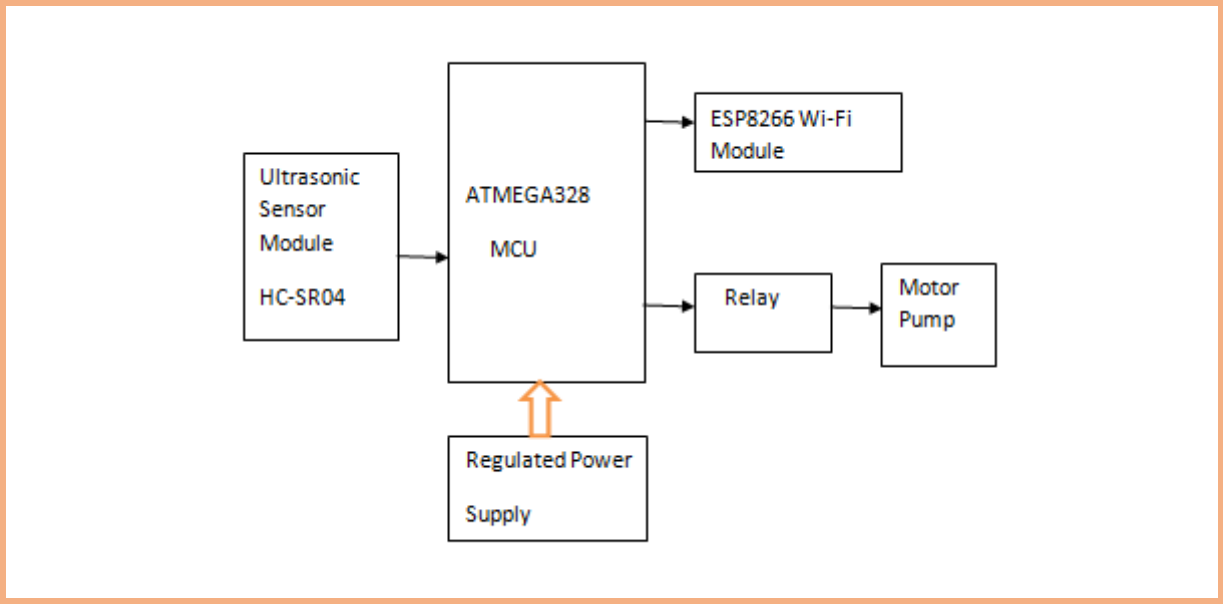
Wi-Fi Based Water Level Monitoring & Motor Pump Controller

K Indra Sena Reddy, Dr G Naveen Kumar

Wi-Fi Based Water Level Monitoring & Motor Pump Controller is used to overcome the pressure of physical process of water pump motor control. The purpose can be divided into sensing unit and control unit. The sensing unit is a contactless ultrasonic sensor which can evaluate an obstacle up to 4 meters. An obstacle for the sensor is water surface level. The ultrasonic digital sensor section is interfaced with the microcontroller. The control unit is the motor on/off the circuit.

Microcontroller that can be used in this work is ATMEGA328. The water level is monitored remotely using Wi-Fi communication with the android app. We can use ESP8266 module to transmit data to remote end. The water pump motor is connected through relay driver. The motor pump can be turned ON /OFF using android app.



Keywords:

ATMEGA328, water level, Sensor.

Article by

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Guided by

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Speed Control of DC Motor Using Pulse-Width Modulation

P Venkatesh, G Gantaiah Swami

Pulse-width modulation (PWM) or duty-cycle variation methods are commonly used in speed control of DC motors. The duty cycle is defined as the percentage of digital 'high' to digital 'low' plus digital 'high' pulse-width during a PWM period. Fig. 1 shows the 5V pulses with 0% through 50% duty cycle. Here N1 inverting Schmitt trigger is configured as an astable multivibrator with a constant period but variable duty cycle. Although the total in-circuit resistance of VR1 during a complete cycle is 100 kilo-ohms, the part used during positive and negative periods of each cycle can be varied by changing the position of its wiper contact to obtain variable pulse-width. Schmitt gate N2 simply acts as a buffer/driver to drive transistor T1 during positive incursions at its base. Thus the average amplitude of DC drive pulses or the speed of motor M is proportional to the setting of the wiper position of VR1 pot meter. Capacitor C2 serves as a storage capacitor to provide stable voltage to the circuit as shown in figure 2. Thus, by varying VR1 the duty cycle can be changed from 0% to 100% and the speed of the motor from 'stopped' condition to 'full speed' in an even and continuous way. The diodes effectively provide different timing resistor values during charging and discharging of timing capacitor C1. The pulse or rest period is approximately given by the following equation: Pulse or Rest period ≈ 0.4 x C1 (Farad) x VR1 (ohm) seconds. Here, use the in-circuit value of VR1 during pulse or rest period as applicable. The frequency will remain constant and is given by 2.466/(VR1*C1) = 250 Hz. The recommended value of in-circuit resistance should be greater than 50 kilo-ohms but less than 2 mega-ohms, while the capacitor value should be greater than 100 pF but less than 1 µF.

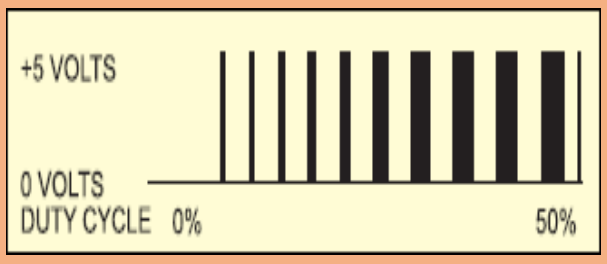

Fig 1: Pluses with 0% through 50% duty cycle

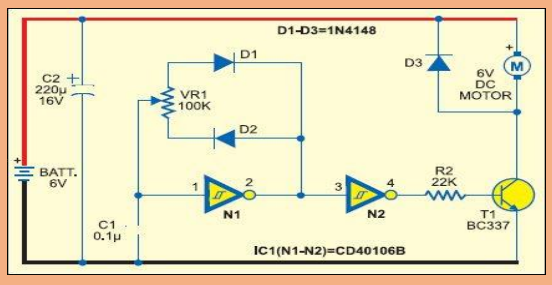

Fig 2: speed control using PWM method

Article by

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Hybrid Electric Vehicle

J Siva Sai, D Ravi Kiran

A hybrid electric vehicle (HEV) is a type of hybrid vehicle that combines a conventional internal combustion engine (ICE) system with an electric propulsion system (hybrid vehicle drive train). The presence of the electric power train is intended to achieve either better fuel economy than a conventional vehicle or better performance. There is a variety of HEV types and the degree to which each functions as an electric vehicle (EV) also varies. The most common form of HEV is the hybrid electric car, although hybrid electric trucks (pickups and tractors), buses, boats, and aircraft also exist.

Modern HEVs make use of efficiency-improving technologies such as regenerative brakes which convert the vehicle's kinetic energy to electric energy, which is stored in a battery or super capacitor. Some varieties of HEV use an internal combustion engine to turn an electrical generator, which either recharges the vehicle's batteries or directly powers its electric drive motors; this combination is known as a motor–generator. Many HEVs reduce idle emissions by shutting down the engine at idle and restarting it when needed; this is known as a start-stop system. A hybrid-electric produces lower tailpipe emissions than a comparably sized gasoline car since the hybrid's gasoline engine is usually smaller than that of a gasoline-powered vehicle. If the engine is not used to drive the car directly, it can be geared to run at maximum efficiency, further improving fuel economy.

Keywords:
Electric Vehicle, Hybrid.

Article by
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Guided by
Mr D Ravi Kiran

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Automated Solar Grass Cutter

G Amulya, G Gantaiah Swami

Today the most promising source of energy where everyone focusing is the concept of Solar Power and its Utilization. Generally, we see people who had gardens use lawn mowers manually to cut the unwanted grass. Those lawn movers are powered from normal household's power through cables or using petrol/diesel. Using cables creates messing problem and if there is any power cut, we can't use that lawn mower. Similarly, if we use petrol/diesel powered machine, it requires money and they create pollution through the smoke. Through this project, you are going to build a unique Automatic Solar Grass Cutter (Lawn Mower) which is powered by solar energy and it will overcome all the above-mentioned problems.

We will need an Arduino Uno board for interfacing microcontroller with the DC motor and Ultrasonic sensor along with the solar panel. We can attach cutter blade to the DC Motor and placed it at the bottom. The Solar panel is used for getting power for the grass cutter. The ultrasonic sensor is used to detect the obstacles. We can program the microcontroller in such a way that when the robot had switched on, it will move based on the inputs given by the ultrasonic sensor. As soon as the bot starts, the cutter starts rotating and will chop the grass. The power for all these electronics will be taken from the Solar panel itself.

Keywords:

Automatic, Grass Cutter, Solar.

Article by

G Amulya

Guided by

Mr G Gantaiah Swami

Above article was published in Department of EEE under Loyola Electrical Engineers Student Chapter

Power Factor Correction Using Step-Up Chopper Fed to a DC Motor Drive

L.Karunakar, B Praveen

With the expanding interest for power from the ac line and more stringent cutoff points for power quality, power factor correction is extraordinary consideration as of late. An assortment of circuit topologies and control strategies has been created for the PFC application. While the discontinuous conduction mode (DCM) converters for example, boost and fly back converters are appropriate for low power applications. Continuous conduction mode (CCM) support converters with normal current mode, hysteresis control are absolute for some medium and high power applications. To eliminate these issues a few converter topologies utilizing proper semiconductor devices and control plans have been proposed. This examination is to find a minimal effort, small size, effective ac to dc converter to meet the UPS. In the proposed circuit, the power factor is enhanced by utilizing boost dc to dc converter. It eliminates the utilization of active switch and control circuit for PFC, which brings about higher efficiency. A Matlab/Simulink based model is iintroduced to get the results. At last a DC motor load is connected and simulation results are presented.

KEYWORDS: AC-DC Converter, Power Factor Correction, Step-up Chopper, etc.

Article by

B Praveen

Guided by

Mr L.Karunakar

Above article was published in Department of EEE under Loyola Electrical Engineers Student Chapter

Enhancement of Power Quality Using Electronic Load Controller from an Isolated Power Generation

J. Aneela1, L.Karunakar

This paper is about Enhancement of power Quality in predominant Electronic load controller by Synchronous generator. The Electronic load controller depends on a six pulse uncontrolled diode bridge rectifier with diodes and IGBT which creates harmonic current and intorsion in the current and terminal voltage of the synchronous generator. The Electronic load controller is also applied to 24-pulse bridge rectifier with diodes and IGBT.A Zig-Zag transformer is used in 24-pulse ac-dc converter to reduce harmonic current to reach the power quality requirements given by IEEE standard-519.Power Quality is improved from six pulse connected rectifier bridge based ELC to the 24-pulse connected rectifier bridge based ELC is done in MATLAB by Simulink and Power System block set tool boxes.

KEYWORDS: Synchronous Motor (3.125 MVA) Excitation Capacitors, Circuit breaker, PI controller, Electronic load controller, Zig-Zag transformer, IGBT.

Article by

J. Aneela

Guided by

Mr L.Karunakar

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Significance of Micro grids

Ms.Md. Abdul farhan Bano

In modern present power system scenario, renewable energy sources are becoming most paramount energy sources due to the increased awareness on environmental issues. Also, the power generation capacity of Distributed Energy Resources (DER) is low. This low generation ability has incentivized the need for integration of various types of DERs and loads in the form of a microgrid. This integration provides various benefits.The microgrid augmented with modern power electronics predicated technology can offer better quality of power supply, better efficiency of energy & higher dependability of service. Integration of various micro sources and new framework abolish the conventional control method of power flow. Research field based on microgrids have become very popular because it covers various aspects of power electronics field and power systems. The microgrid concept is proposed mainly because of two reasons.

(i) Make traditional grids more congruous for extensive deployment of distributed generators, and (ii) To control the impact of distributed generators.

Microgrids not only maintain service quality, but also help in providing uninterrupted service. Microgrid has various distributed energy resources and can operate at a low voltage distribution. It has the ability to operate in grid mode or off grid mode. Microgrid can simplify the accomplishment of various smart grid functions such as digital and two-way communication, distributed generation, self-monitoring, self-healing, adaptive and islanding mode and remote control. Microgrid is a congruous suppression for circumscribed fossil fuels and can effectively resolve various issues based on power generation. Some of the most paramount of these challenges are operation in normal and island modes, plug and play operation, protection, power quality, security, voltage and frequency control, system stability and energy management. Microgrid offers many technical challenges despite of umpteen benefits. Protection is one of them which requires more attention. Protection of microgrid system is essential for reliable and economic operation. The protection scheme must be proficient in handling any type of fault without disturbing the entire framework. It should execute in minimum possible time span. It must be capable of meeting the requirements of both the modes grid-tied as well as islanded mode. The process of protection scheme includes identification of fault, disconnection of faulty area from rest of the framework and clearing the fault in minimum time duration. So, protection system must be designed carefully.

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ARTICLE BY

Ms.Md. Abdul farhan Bano

Difference between petrol and hybrid vehicle

K Iswarya

Petrol-powered engine

A petrol-powered engine or an Internal Combustion Engine (ICE) primarily runs on petrol that is burnt in the combustion chamber of the engine, transferring power to the wheels via a driveshaft. The burnt petrol fumes exit the car via the exhaust pipe, and into the atmosphere.

The sole fuel used to propel the car is petrol, and some examples of petrol-powered cars are the Maruti Suzuki Alto, Hyundai Verna, Hyundai i20, Tata Nexon (petrol), and so on. Most vehicles in the Indian market are petrol-driven.

Hybrid-powered vehicles

A hybrid-powered vehicle has a regular internal combustion engine and an electric drivetrain that work together. The vehicle is primarily driven with the battery pack or by the ICE depending on the type of vehicle. Most hybrid vehicles sold in India are primarily driven by the petrol engine, however, at lower speeds, the electric drivetrain takes over.

At higher speeds, the petrol engine and the hybrid motor work together to deliver more performance, while using lower petrol. The electric motor drives until the battery are fully discharged before the ICE takes over, and usually, the pure EV range is minimal. When the battery pack is low on power, the petrol engine and regenerative braking charge the battery (hybrid), or it can be charged similar to electric cars on some models by an external charger, which is called a plug-in-hybrid.

Some examples of hybrid vehicles in India are the newly-launched Maruti Suzuki Grand Vitara Strong Hybrid, Toyota Urban Cruiser Hyryder Hybrid, Honda City Hybrid, and the Toyota Camry Hybrid.

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ARTICLE BY

K Iswarya

How does the block chain micro grid work?

Ms.V.Sri Lakshmi

A key development being witnessed in recent times is the block chain micro grid. As the market liberalizes and renewable energy grows, block chain offers an effective way to handle the increasingly complex and decentralized transactions between users, large and small-scale producers, retailers, traders and utilities.

Block chain technology is a distributed, digital ledger used to record and track transactions. It uses sophisticated algorithms to validate, encrypt, and instantaneously record transactions for virtually anything of value in a secure and decentralized manner.

Block chain micro grid is still an emerging approach, but it is being piloted in Brooklyn, New York and at certain university campuses in the UK. The technology is more like a peer-to-peer and peer-to-market wherein it not just facilitates a transaction between two individuals, but also creates neighbourhood-wide markets in which local energy can be traded within a specific virtual or physical micro grid.

The technology also allows households and businesses to trade energy directly, bypassing a utility or other central authority. There are more than 150 companies reportedly developing blockchain energy tools. Most participants in the nascent market are developing tools for peer-to-peer energy transactions.

Other types of transactions for block chain may include trading renewable energy credits or wholesale energy. There are now over 100 demonstration projects deployed or planned around the world in the electricity industry alone. Energy-focused block chain startups raised over $300 million between Q2 2017 and Q1 2018, both from venture capitalists and through initial coin offerings.

Most of the money raised is toward the transitive energy space, where companies are using block chain to verify and execute peer-to-peer transactions more rapidly.

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ARTICLE BY

Ms.V.Sri Lakshmi

Air Pollution Detector

K Sai, G Gantaiah Swami

Air pollution consists of chemicals or particles in the atmosphere that causes serious health and environmental health but what causes air pollution for our planet. Most of the air pollution comes from human activities very least is from natural activities like a volcano eruption. Most of the harmful gases formed are carbon dioxide, carbon monoxide, sulphates, nitrates, through Greenhouse gases, smog, toxic pollutants like lead and mercury now the question is do we have a solution? So, the answer is yes. We can accomplish it with the help of an embedded system. Here, we are going to make an air pollution detector by using an Arduino and some air quality sensors. We need one Arduino Uno to coordinate the activities of sensors and giving the details to be displayed on LCD display, and a 5 volts power supply. The sensors we required are described as below.

Dust sensor: This Dust Sensor gives a good indication of the air quality in an environment by measuring the dust concentration. The Particulate Matter level (PM level) in the air is measured by counting the Low Pulse Occupancy time (LPO time) in given time unit. LPO time is proportional to PM concentration.

HCHO sensor: HCHO Sensor is a semiconductor VOC gas sensor. It uses the VOC sensor WSP2110 whose conductivity changes with the concentration of VOC gas in air. With a circuit, the conductivity can be converted to an output signal that corresponds to the gas concentration. This sensor has a very high sensitivity and stability; it can detect the gas whose concentration is up to 1ppm. It can be used to detect Toluene, Methanol, Benzene, Alcohol, Acetone etc. This product can be used to detect the presence of harmful gas in the home environment.

Keywords:
Air quality, Air Pollution, Arduino, Sensor.

Article by
K Sai
Guided by
Mr G Gantaiah Swami

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Technology News - 2021

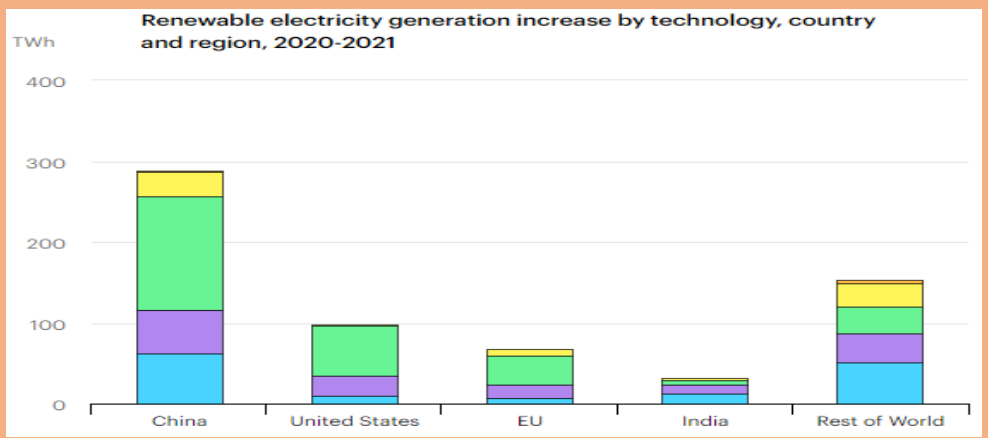
➢ New Efficiency Record Set by Novel Multi-Material Solar Cells

Researchers create highly efficient and stable tandem solar cell, one of the best-performing reported to date. Researchers from the University of Toronto Engineering and King Abdullah University of Science and Technology have overcome a key obstacle in combining the emerging solar-harvesting technology of "perovskites" with the commercial gold standard silicon solar cells. The result is a highly efficient and stable tandem solar cell, one of the best-performing reported to date. Today, silicon solar cells are more efficient and less costly than ever before, but there are limits to how efficient silicon can be on its own. Hence it was focused on overcoming these limits using a tandem (two-layer) approach. Like silicon, perovskite crystals can absorb solar energy to excite electrons that can be channeled into a circuit. But unlike silicon, perovskites can be mixed with liquid to create a 'solar ink' that can be printed on surfaces. The ink-based manufacturing approach known as solution processing is already well-established in the printing industry, and therefore has the potential to lower the cost of making solar cells.

News Credits: SciTech Daily, 2021

➢ Renewables are on track to set new records in 2021

Renewable electricity generation in 2021 is set to expand by more than 8% to reach 8 300 TWh, the fastest year-on-year growth since the 1970s. Solar PV and wind are set to contribute two-thirds of renewables growth. China alone should account for almost half of the global increase in renewable electricity in 2021, followed by the United States, the European Union and India.



News Credits: Global Energy Review, 2021

James Clerk Maxwell (1831-1879)

James Clerk Maxwell was a Scottish scientist who lived in the 19th century. He is known for his contributions to the study of electromagnetism. Maxwell developed a set of equations that describe the behaviour of electric and magnetic fields, now known as Maxwell's equations. These equations form the basis of modern electromagnetic theory and are used to design and analyze electrical and electronic devices.