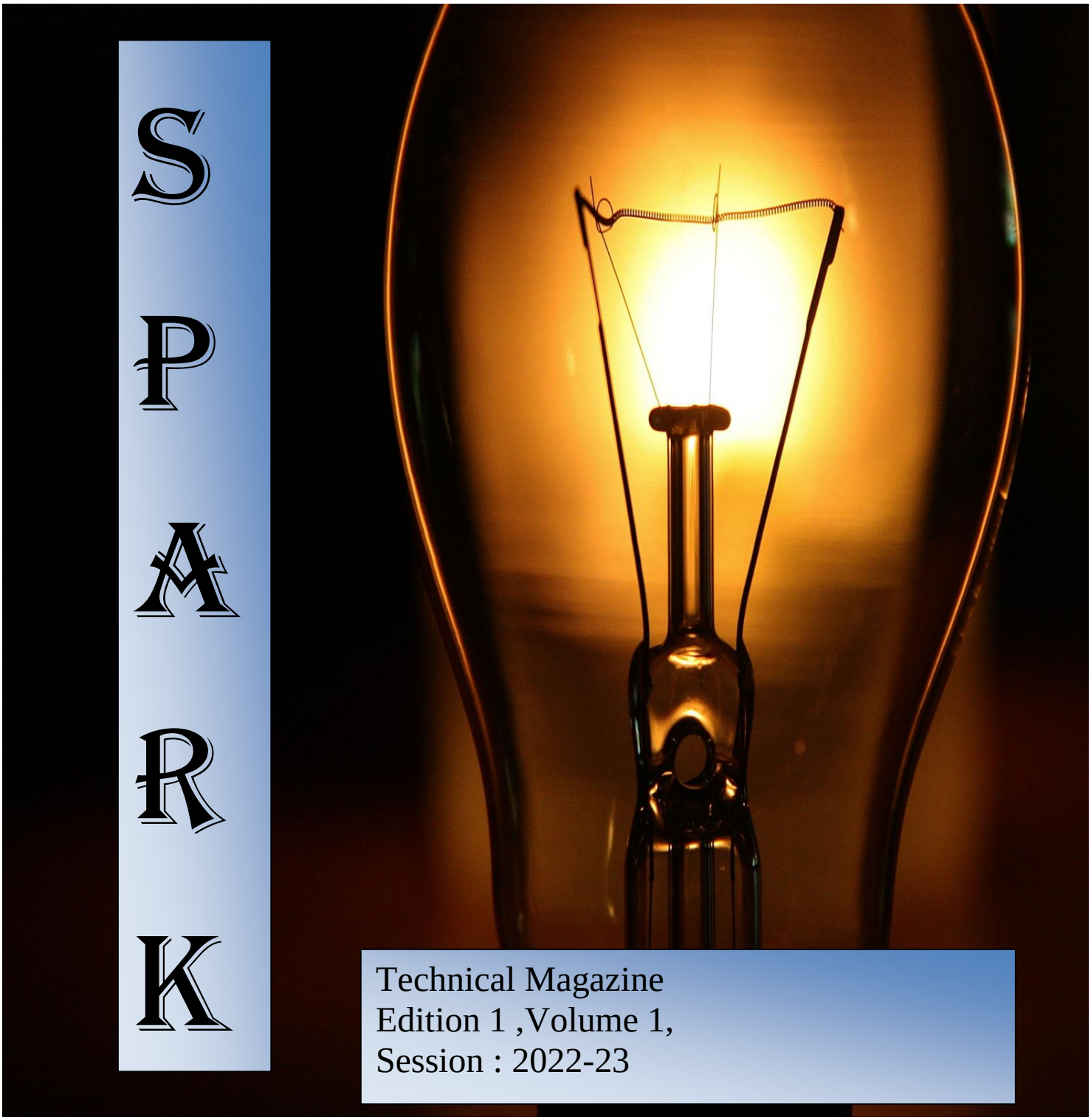
TULSIRAMJI GAIKWAD-PATIL COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL ENGINEERING

S P A R K



Technical Magazine
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FROM THE HEAD OF DEPARTMENT DESK

I am very much happy that our department have taken steps to publish the Yearly Technical magazine “SPARK”. I hope it will create enthuse among students and staffs in future.

Dr. Prashant Thakre
Head of Department
Electrical Engineering

EDITORIAL MESSAGE

It is an occasion of immense pleasure for the Department of Electrical Engineering to publish the first volume of Technical magazine "SPARK" from the year 2022. The Editorial board of department of Electrical Engineering 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 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 and we hope that this kind of support will be provided from all of the involved persons, for the next issue in 2022.

Prof. Ashvini Admane
Assistance Professor
Electrical Engineering

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Ms. Pratiksha Mute
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Sizing of Wind Turbine for Repowering of Old Wind Farm: A Case Study Based Approach

Prof. Radharam Shaha
Assistant Professor
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Abstract:

Large scale deployment of the Wind Power since early 1990's in India has hardly left any potential virgin windy land sites for the generation of power from wind energy. The sites wind high CUF are installed with the low rated power capacity wind turbines like 225 kW, 500 kW. The rapid increase in the technology in this sector has now forced to change these potential sites with the turbines having high capacity. The paper presents the overview of the wind power installation in India and the statistics of number of turbines in Maharashtra State. Also, it states the benefits of repowering in one the site in the state, by selecting the optimum size of turbine. In the repowering of wind farms the selection of appropriate size of the turbines is an important aspect to maximize the capacity utilization factor from the site. This paper explains the process of selecting the proper turbine size for repowering with the help of a flowchart and the mathematical modeling with the wind resource parameters.

Link: https://ieeexplore.ieee.org/document/10010971

Real-Time Implementation of an Automated Irrigation System for Effective Water Application to Improve Productivities of the Crop in India

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Introduction

In India, 18% of national total national output (GDP) is contributed by the rural segment and it draws in 49% of the workforce. According to the report, 20–22% [1] of power is expended in the horticultural part. Every year 0.2–0.5 million siphons is added to the rural area. In light of the inefficient siphoning set, uncontrolled water heads, unscheduled water framework, nonattendance of care for water and imperativeness safeguarding, prompts inefficient water framework structures like wastage of water and essentialness shows the proficiency of different yields in India. The productivities of the harvests are less in India contrasted with the normal yield profitability of the world. This is because of the diminishing in the accessibility of water for water system due to the expansion of different misfortunes, a lot of water misfortunes happening in the water system framework; water system effectiveness is decreased. Water misfortunes because of various sources and water system effectiveness of an alternate framework are analyzed. The recurrence of dry season happening is expanding step by step, because of which crop efficiency is getting antagonistically influenced. Along these lines, in many cases happening drought is of high need apprehen- sion. Advancing water system productivity and vitality use is a considerable test in the current water system situation. It is extremely basic to insightfully control the water sources used to accomplish most extreme harvest yield in upgraded power utilization. It is exceptionally hard to keep up water system productivity in solidarity. Water system productivity is the proportion of the water used by the dirt to the water given to the dirt through water system. Water system productivity ought to be solidarity that is water used by the dirt and water contribution to the dirt through water system ought to be equivalent. On the off chance that water system proficiency is more prominent than solidarity, at that point the water system framework can’t satisfy the water request of the dirt. In the event that the water system proficiency is not as much as solidarity, at that point abundance water is provided by a water system framework,which prompts the wastage of the water.

Link:https://doi.org/10.1007/s40030-020-00451-7

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Australian Government
IP Australia

CERTIFICATE OF GRANT

INNOVATION PATENT

Patent number: 2021107049

The Commissioner of Patents has granted the above patent on 24 November 2021, and certifies that the below particulars have been registered in the Register of Patents.

Name and address of patentee(s):

Pratik Ghutke of Assistant Professor, Department Electrical Engineering, Tulsiramji Gaikwad- Patil College of Engineering & Technology Nagpur Maharashtra India

Rahul Agrawal of Associate Professor, Department of Electrical Engineering, Sandip University Nasik Maharashtra India

Pravin Sonwane of Professor and Dy. Head (Academics) at Poornima College of Engineering Jaipur Rajashthan India

Title of invention:

A SOLAR POWER ENABLED AUTOMATED IRRIGATION SYSTEM AND METHOD

Name of inventor(s):

Ghutke, Pratik and Sonwane, Pravin

Term of Patent:

Eight years from 24 August 2021

Voltage Quality Based Electricity Nodal Pricing in Deregulated Power System

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Abstract

In regulated electricity markets, an effective transmission pricing method is required to transmission issues and to generate economical generation cost. It is require creating an effective pricing scheme that to provide the useful information to generation, transmission section and customers. These transmission pricing depends on generator, load levels and transmission line constraints. Transmission line constraints result is variations in energy prices throughout the network. The proposed approach is based on AC optimal power flow model with. Location Marginal Pricing methodology is used to determine the energy price for transacted power. Variation of LMP values with transmission constraint conditions also studied. Simulation is carried out on IEEE 30 bus system.

Modeling of Maximum Power Point Tracking Based Photovoltaic Open Loop Flyback Inverter Using Sinusoidal Pulse Width Modulation Technique for Performance Improvement

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Abstract

Nowadays, flyback inverter has gained popularity because of its advantages like simplicity, low cost, and high efficiency. Therefore; it is necessary to improve the performance of the flyback inverter by applying innovative techniques. The proposed research work presents the implementation of Perturb and Observe method of maximum power point tracking algorithm to flyback inverter for improving the output parameter by lowering the total harmonic distortion value. The sinusoidal pulse width modulation technique generates firing pulses for MOSFETS of the inverter. The output ac voltage and current of the flyback inverter are sinusoidal. The observed total harmonic distortion value is 2.76 which is less than 3 and acceptable as per IEEE 519 standard. The obtained value is lesser than the systems which do not use sinusoidal pulse width modulation and maximum power point tracking algorithms. The complete model has been built and tested in Simulink/MATLAB.

Link:https://ieeexplore.ieee.org/document/9807918

PLC & SCADA Based Automation of Industrial Reverse Osmosis Desalination Plants

Shubhangi adhagale(UG Student)
Sangita kundalwar(UG Student)
Nitesh talande(UG Student)

Abstract

The world is suffering from an eminent water crisis. Safe and pure drinking water is the necessity and right of everyone. The use of reverse osmosis-based water treatment plants has become a common method for providing clean water in many areas as the global demand for water increases. A system is needed to prevent difficulties when one needs to control and monitor important parameters such as Total Dissolved Solids (TDS), Water Level, and Flow rate manually. Manually operated RO plants have failed due to lack of proper monitoring and maintenance. Reverse osmosis (RO) is proved to be the most reliable, cost effective, and energy efficient in producing fresh water compared to other desalination technologies. Today's Reverse Osmosis plants are a widely used application of water treatment engineering all over the world, applied for water conservancy projects, emerged by the technology of automation control system is to ensure safe, continues, high quality water supply to municipal and for multipurpose usage in Industries. This paper represents a locally developed customized monitoring and controlling system for a typical generalised Reverse Osmosis Desalination plant which mostly used in industries. This work illustrates an integrated automation system which can facilitate monitoring and controlling of entire Reverse Osmosis plant from one PC. This paper describes how automation of Industrial Reverse Osmosis plant is done using PLC & SCADA. Keywords: Reverse Osmosis, customized monitoring.

Design A Working Model of IOT Based Smart Samai

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Jagganath Banik (UG Student)
Azad Mandawakar (UG Student)
Dewanand Petkar(UG Student)

Abstract:

Electric Samai to use in the temple, houses, colleges & schools, etc., places for application of inaugurations, prayer & decoration, etc., however, old samai use a lot of oil to light up the samai and it is also harmful if it accidentally touches the other things as it has fire and liberates smokes while burning. Here we are studying and designing a working model of IoT based electric samai which does not use any kind of oil so it is nature friendly and has other additional features in it like speakers to play prayer, remote control for LED lights.

The microcontroller connects the speaker and lights with the remote control which controls to switch ON or OFF the lights & speaker with the infrared sensor. This electrical system will be fitted inside the smart samai to operate it. After installing the electrical smart samai, it has performed smoothly and given proper results. The smart samai saves oil and hence is environment friendly it also leads to saving the cost of oil, simple to use, and is easy to install.

Introduction:

Traditional samai it used cotton, synthetic oil, and matchsticks/candles. IoT-based smart samai is operated through a IR remote control. It is energy-saving and comes equipped with a built-in speaker for playing devotional music. The smart samai operates through a remote control with buttons for activating its different layers, devotional music, and other features. IoT is the internet of physical objects with sensors, computers, and connectivity for intelligent decision making

How does Smart Samai Work:

IoT-based smart samai operates seamlessly through remote control. With the press of dedicated buttons on the remote, you can activate different functionalities. Pressing the number 1 button illuminates the first layer while initiating the playback of devotional music. Similarly, pressing the numbers 2, 3, 4, and 5 buttons illuminates the respective layers. To turn off all five layers, simply press the power button. The remote also allows you to play, pause, and control the volume of the devotional music using the play/pause, vol+, and vol- buttons respectively. Additionally, you can change the devotional music using the next and previous buttons, and adjust the equalizer settings with the EQ button.

Working:

- ESP8266 setup the DF player module by checking if the memory card is present and use 9600 band width for communication with DF player module.
- When we press 1 number button of the remote the IR sensor receive the signal and send to ESP8266,
- Then ESP8266 sends a signal to the relay to trigger the relay to glow the first layer and send a signal to the DF player to start playing devotional music.
- Pressing the number 2 button on the remote activates the second layer, causing it to glow.
- When the number 3 button on the remote is pressed, the third layer illuminates.
- Pressing the number 4 button on the remote activates the fourth layer, causing it to glow.
- The fifth layer can be activated by pressing the number 5 button on the remote
- Once the devotional music completes, it automatically stops playing.
- To deactivate all the glowing layers, simply press the power button on the remote.
- The play/pause button on the remote controls the playback of the devotional music.
- Adjusting the volume is possible by pressing the vol+ and vol- buttons.
- Switching to different devotional music tracks can be done using the next and previous buttons.

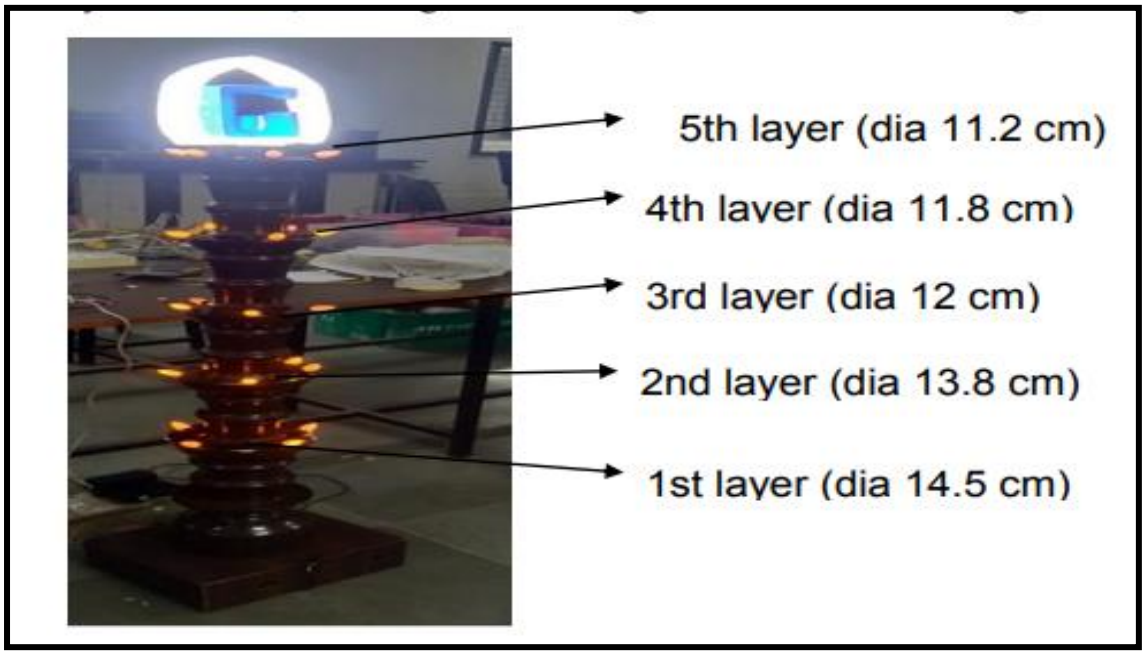
- The EQ button on the remote allows for changing the equalizer settings.

Glimpse of construction of smart samai

Conclusion:

The IoT-based smart samai serves as a highly efficient and environmentally-friendly substitute for the conventional oil-based samai. It finds application in embellishing and facilitating prayer rituals in a variety of settings such as temples, residences, educational institutions, and more. The electric samai boasts user-friendly features including integrated speakers for playing devotional music and remote control functionality for managing the LED lights and speaker. By means of an infrared.

sensor, the microcontroller system establishes a connection between the lights, speaker, and remote control, enabling effortless operation. Furthermore, this electric samai obviates the need for oil, thereby reducing costs and minimizing environmental impact. The positive outcomes observed with the implementation of this smart samai underscore the potential for further advancements in eco-friendly alternatives and the integration of the internet of things. 1. It's efficient as compared to oil samai 2. Save the synthetic oil 3. Life span is more 4. Less expensive than old samai.



Design And Fabrication of Highway Wind Turbine and Its Applications

Mr.Gunwanta Waghmare, Mr. Rahul Tijare , Mr.Yash Sonkuwar, Mr.Girish Jiddewar , Mr.Vikki Dighore, Mr.Shubham Shende

INTRODUCTION

As the world continues to prioritize renewable energy sources, wind turbines have emerged as a promising option to generate electricity. Traditional wind turbines typically consist of large horizontal blades that rotate around a central hub, but a newer design called vertical axis wind turbines (VAWTs) has been gaining popularity due to their unique benefits. Specifically, VAWTs are compact, efficient, and capable of operating in a variety of wind conditions. In this project, we propose to install VAWTs on highways to generate electricity from the constant flow of wind created by passing vehicles. By utilizing this untapped energy source, we can reduce our reliance on non-renewable energy sources and promote sustainable transportation infrastructure. In addition to this, everyone is concerned about global climate change. This whole scenario is pushing the world to find the alternative source of energy

DESIGN OF EXPERIMENTAL SET-UP

Selection of Material for Rotor Blade

Aluminum sheets are commonly used as a material for blades of Savonius wind turbines due to their high strength-to-weight ratio, excellent corrosion resistance, and easy availability. Here's some information about the selection of aluminum sheets for Savonius wind turbine blades:

1. Strength: Aluminium sheets are strong enough to withstand the forces exerted by the wind, which allows them to be used as a material for wind turbine blades. The high strength-to-weight

ratio of aluminum makes it an ideal choice for use in the construction of Savonius wind turbine blades.

2. Corrosion resistance:

Aluminium is highly resistant to corrosion and rust, making it ideal for use in outdoor applications such as wind turbines. This resistance to corrosion ensures that the blades will not deteriorate over time due to exposure to the elements.

3. Availability:

Aluminum sheets are widely available and easily accessible, making it easy to find and purchase the necessary materials for constructing Savonius wind turbine blades.

4. Lightweight:

Aluminum is a lightweight material, which is important for wind turbine blades because it reduces the load on the rotor and makes it easier for the turbine to start turning in low wind speeds.

5. Cost-effective:

Aluminum sheets are generally cost-effective, which makes them an attractive material for wind turbine blades, particularly for DIY projects or small-scale wind turbines. Overall, the selection of aluminum sheets as a material for Savonius wind turbine blades is a good choice due to their strength, corrosion resistance, availability, lightweight, and cost-effectiveness. However, it's important to note that the thickness and design of the blades must be carefully considered to ensure that they are optimized for the specific wind turbine application

Fabricated Model

ANALYSIS OF RESULT

Calculation for wind energy Theoretically, The output of any wind turbine is calculated by using following equation,

$$Pa = ½ PAV^3 \text{ in watts}$$

P- Air density at particular height and location,(normally 1.225 kg/m3)

A- Swept area by blades

B- V- Wind velocity in m/

Co-Working Of Solar Panel And Wind Energy For Electrical Vehicle

Mr. Abhishek Deotale , Mr. Aditya Chaudhary , Ms.Sunandita Fule , Ms.Vaishnavi Band Ms. Priyanka Bhoyar ,Ms.Shreya Arekar

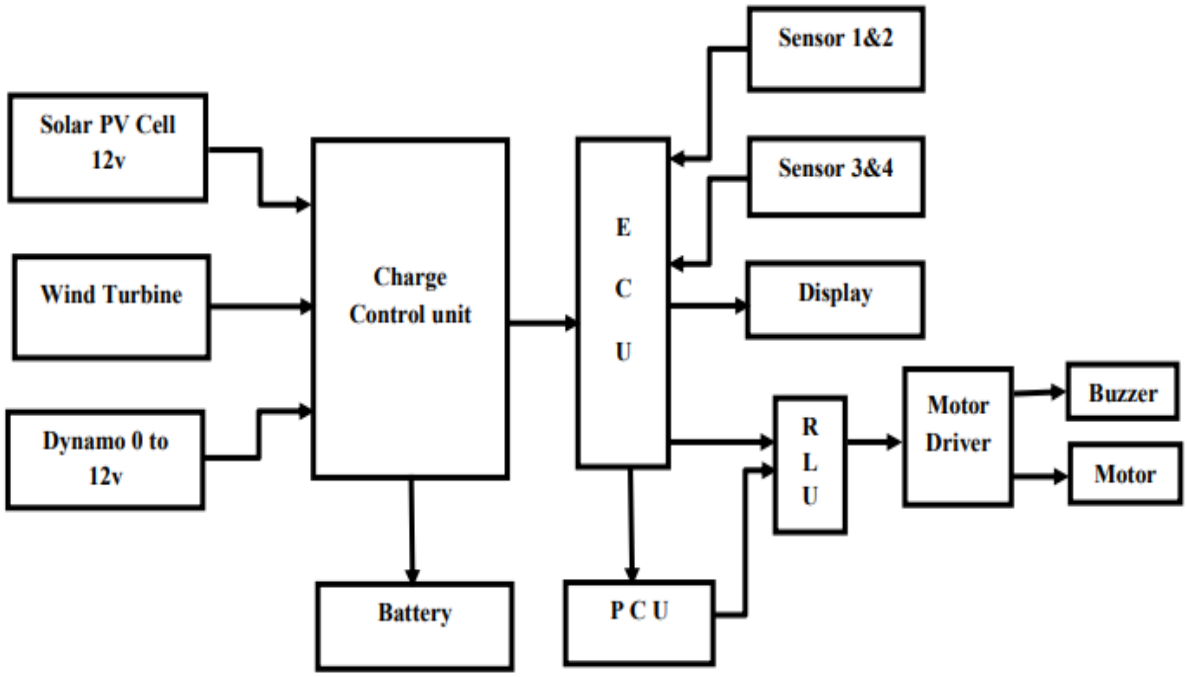
Introduction

We are going to introduce here a new concept in our electric vehicle as “coworking of solar panel and wind energy for electrical vehicle” It will work on the principal of producing electricity from renewable sources. This project gives a clear idea that vehicle-powered with the help of solar energy and wind energy is more effective than fuel vehicle. By combining the two intermittent sources of the wind and solar energy to charge battery of electric vehicle. Due to depleting fossil fuel and its detrimental effect on the environmental alternative energy source is a mandate. The wind and solar energy resources are prospective option. As conventional source is insufficient in meeting the load demands, the other forms of energy source can compensate for the difference. The air quality of cities is mainly affected by vehicle emissions. Among the renewable energy source harnessing wind energy with wind turbines appears to be the most promising source of renewable energy.

Objective

The objective of co-working solar, wind, and dynamo energy generated for electrical vehicles is to create a sustainable and reliable source of power that reduces reliance on non-renewable energy sources and helps mitigate the impact of climate change. By integrating solar, wind, and dynamo energy, the electrical vehicle can operate on a combination of renewable energy sources, reducing its dependence on traditional sources of electricity. Solar energy is a clean and renewable source of energy that can be harnessed by solar panels installed on the roof of the vehicle. The energy generated from solar panels can be used to charge the batteries of the electric

vehicle, allowing it to travel further without needing to be plugged into an electrical outlet. Wind energy can be harnessed through the use of wind turbines mounted on the electric vehicle or on the surrounding infrastructure. The energy generated from the wind turbines can be stored in the vehicle's battery or used to power other components of the vehicle, such as the air conditioning or heating system. Dynamo energy is generated through the movement of the vehicle, such as the rotation of the wheels or the movement of the suspension system. This energy can be harnessed through the use of regenerative braking, which converts the kinetic energy of the vehicle into electrical energy that can be stored in the battery.

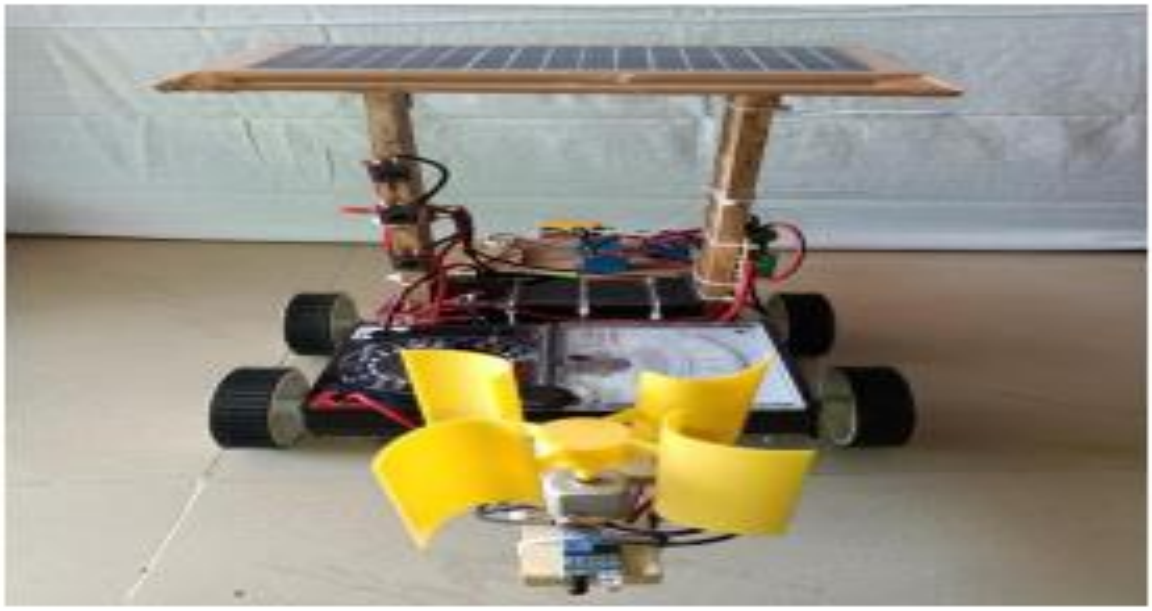


Block Diagram of Co-working of solar panel and wind energy for electric vehicle

Working

The block diagram as shown in fig this project is run a vehicle DC vehicle by solar, wind and dynamo power generations that is multiple power generation to run/perform this project in above mention block diagram solar panel convert solar energy to electrical energy, wind power turbine rotated according to flow of air and dynamo also rotated and generate electrical energy after taking electrical energy from this three sources the electrical charges are then send to charge control unit (CPU) and from here the charge control unit passes this electrical energy to battery and here the PCU is connected to battery and here it generates 5v and 12v charge with the 12v charge other circuits runs and with 5v is needed to run electronic control unit (ECU) and its function is to control the final control elements, such as motor, buzzer release, and its criteria issue will obtain feedback from sensors. After receiving the feedback from sensors, issue will provide conditional output to the final control element. However, there is one advantage to this problem: it lacks the necessary current in its output to power the FCU (Final Control Unit) (Electronic Control Unit). For breaking applications, sensors one and two are used, whereas sensors three and four are used for obstacle detection. The types of sensors 1 and 2 are proximity whereas positions 3 and 4 are infrared/micro switches.

Figure 6.1: Top View



HARDWARE

RESULT

The primary result of this system is to reducing the use of fossil fuels and minimizing the carbon footprint of transportation and also reduce the accidents, death, injuries and properly damage related to the car and other infrastructure failure. The result of this project concept is to design such type of electric vehicle where the energy generated by renewable energy sources so the vehicle doesn't need to stand by anywhere for charging. As we know that in today's life, we are facing a lot of problem due to increasing the pollution, so with the help of electric vehicle we reduce the pollution and save the environment, and save the vehicle from being accidental by implementation of this concept.