International Journal of Research in Engineering, Science and Management
Volume 4, Issue 3, March 2021
https://www.ijresm.com | ISSN (Online): 2581-5792

IoT Based Charging Station for E-Vehicle Using Solar and PIC Microcontroller

A. Asha[1], Kakuluru Venkata Sundeep[2*], S. Mukul Govind[3], Nagareddy Pratheep Reddy[4], Bhargav Sunkara[5]

[1,2,3,4,5]*Department of Electronics and Communication Engineering, Rajalakshmi Engineering College, Chennai, India*

***Abstract*: This project is concerning charging E-vehicle modules exploitation the solar battery, accessibility of most power is viewed by IOT device and therefore the most power generated by the sun is being tracked exploitation the utmost outlet pursuit controller. The whole setup is connected to the PIC microcontroller, the battery level, generated and distributed associate in the quantity of the battery is viewed exploitation associate in liquid crystal display. GSM electronic equipment is employed to get Associate in alert messages for any reduction of power occurring within the system. A web page is employed to see the provision standing of charge, the number of power transferred to the charging module and therefore the obtainable location for the charging station can be displayed. The best plan of this project is to cut back on greenhouse emissions and fuel.**

***Keywords*: PIC-Microcontroller, LDR, Boost converter, GSM module.**

1. Introduction

The demand for conventional energy like coal, natural gas, and oil is raised, so that the researchers are forced towards the development of renewable resources or non-conventional energy resources. The upcoming year will come more and more solar electric vehicle due to these reasons: (1) Reduction of emission of fossil fuel for extracting power from renewable resources (2) intelligent compliance to electronic requirements that facilitate the monitoring the availability of used power using IoT, and (3) tracking of sun's radiation throughout a time. Electric vehicle confines the outlook of passengers on a vehicle that draws current from the rechargeable battery. There are three types of electric vehicles: hybrid electric vehicle (HEV), plug-in hybrid (PHEV), battery electric vehicle (BEV), an extended-range electric vehicle (EREV). The main objective of the paper is to provide power from solar PV cells to the charging station in which the vehicle can be charged through the rechargeable battery and also with the help of IoT, the availability status of the charging station can be monitored.

2. Literature Review and Research

[1] "Grid-connected Solar Wind Hybrid Power Based IoT system" by Shweta Dhage, Mohini Pranjale, Sachin Jambhulkar, Nisha Warambhe, Volume 5, Issue 2, Feb. 2018. As electricity demand is increasing, victimization of renewable energy sources to get additional energy within the industries and residential appliances is additionally increasing. The star and wind hybrid generation system square measure economical, freely out there within the atmosphere. The two main reasons to style star and wind hybrid generation systems victimization the renewable energy supply square measure power responsibleness in variable climatic conditions and price. within the projected system, we tend to square measure introducing the responsibility to deliver the continuous load and watching it with IoT interfacing. The system consists of a turbine, PV solar, charge controller, battery, inverter, grid, and IOT system for watching electrical parameters of the system. The advantage of the IoT system is that the operator will apprehend the updated electrical parameters from anyplace and anytime.

[2] "Solar and Wind energy-based charging station for electric vehicle" by C. Chellasamy, V. Nagaraju, R. Muthammal, Volume 7, Issue 1, Jan. 2018. This paper describes the star and wind energy-based mostly charging mechanism (SWCM) to come up with the ability for charging the battery packs of electrical vehicles (EVs). The renewable charging station consists of each star electrical phenomenon (PV) module and a windmill. The SWCM vastly reduces the need for fossil fuels to come up with electricity which ends in greatly reduced dioxide and CO-connected emissions. The renewable sources like wind Associate in the Nursing star are modeled employing a single diode model and analytical modeling has been in deep trouble wind energy generation. The simulation model has been developed in MATLAB Simulink for the projected SWCM. The I-V and PV characteristics of the electrical device are studied below varied irradiance levels and completely different parameters of wind turbines are studied below 2 different loadings (1 kW and three kW) conditions. There is unit 2 unidirectional electricity (DC) to DC converters connected to the PV modules and therefore the turbine and 6 bifacial DC-DC converters area unit connected to 10 charging points which offer to charge to the electrical vehicle. To balance the load demand, the projected system is connected to the grid through a 3-part bifacial DC-AC (alternating current) electrical

*Corresponding author: venkatasundeep316@gmail.com

converter. The obtained results show that the projected renewable charging mechanism is appropriate for energy unit charging therefore making a pollution-free atmosphere

[3] H. Anandakumar and K. Umamaheswari, "A bio-inspired swarm intelligence technique for social aware cognitive radio handovers," Computers & Electrical Engineering, vol. 71, pp. 925–937, Oct. 2018. A novel dynamic spectrum sharing technique impressed by natural communities supported social language has been projected to beat prevailing spectrum underutilization and insufficiency. The Social psychological feature Radio Network (SCRN) combines social information and a mobile communication network by providing a spread of knowledge delivery services regarding the social relationship among mobile users. The analysis focuses on numerous SCRN applications and their relinquishing problems, a bio-intelligent supervised learning approach referred to as SpecPSO is devised for performing arts social-psychological feature relinquishing (SCH) to a) judge economical spectrum utilization and b) Increase rate for applications like Facebook, LinkedIn. Experimental results show that the projected SCH-SpecPSO outperforms seventy-fifth over state of art mobile social networks by optimizing numerous relinquishing problems.

[4] H. Anandakumar and K. Umamaheswari, "An Efficient Optimized Handover in Cognitive Radio Networks using Cooperative Spectrum Sensing," Intelligent Automation & Soft Computing, pp. 1– 8, Sep. 2017. Cognitive radio systems necessitate the incorporation of cooperative spectrum sensing among psychological feature users to extend the dependability of detection. We've found that cooperative spectrum sensing isn't solely advantageous, however is additionally essential to avoid interference with any primary users. Interference by accredited users becomes a chief concern and issue, that affects primarily moreover as secondary users resulting in restrictions in spectrum sensing in psychological feature radios. Once the number of psychological feature users will increase, the overheads of the systems, that square measure meant to report the sensing results to the common receiver, becomes large. Once the spectrum that is in use becomes unobtainable or once the accredited user takes the allotted band, these networks have the aptitude of adjusting they are in operation frequencies. Additionally, psychological feature radio networks square measure seen to possess the distinctive capability of sensing the spectrum and police work any spectrum that has been left underutilized. This capability of recognizing the spectrum very well supports the scale detected, permits for determination of the band, which can be used. The most objective of this paper is to investigate the psychological feature of radio's spectrum sensing ability and evolving a self-configured system with dynamic intelligence networks while not inflicting any interference to the first user. The paper additionally brings focus to the measuring of the 2 spectrum sensing techniques namely; Energy Detection and Band restricted dissonance Detection. The estimation technique for police work spectrum noise relies on the detection of chance and chance of false alarms at completely different ratio (SNR) levels victimization Additive White Gaussian Noise signal (AWGN). The potency of the projected Cooperative CUSUM spectrum sensing formula performs higher than existing optimum rules supporting one observation spectrum sensing technique below cooperative networks.

[5] H. Anandakumar and K. Umamaheswari, "Supervised machine learning techniques in cognitive radio networks during cooperative spectrum handovers," Cluster Computing, vol. 20, no. 2, pp. 1505– 1515, Mar. 2017. Cognitive communication models perform the investigation and police work of spectrum in psychological feature radio networks instigation in attentive primary users (PUs) and successively facilitate in the allocation of transmission house for secondary users (SUs). Ineffective performance of regulation of wireless channel relinquishment strategy in psychological feature computing systems, new computing models are desired in operative a group of tasks to method business models and act naturally with humans or machines rather than being programmed. Psychological feature wireless networks are trained via computing (AI) and machine learning (ML) algorithms for the dynamic process of spectrum handovers. They assist human consultants in creating increased selections by penetrating the quality of the handovers. This paper focuses on learning and reasoning options of psychological feature radio (CR) by analyzing primary user (PU) and secondary user (SU) digital communication exploitation home location register (HLR) and traveling location register (VLR) info severally. The SpecPSO is planned for optimizing relinquishment exploitation supervised machine learning techniques for playacting dynamic handover by adapting to the surroundings and creating good selections compared to the standard cooperative spectrum sensing (CSS) techniques.

3. Methodology

As a solar PV array plays a vital role in a project, the model simply uses torches with an LDR sensor to track the position for generating power from the source which helps the continuous flow of energy. Since the tilting angle of the sun varies from 0 o to 180o, two sensors should be built for either direction i.e., one in the left and the other in the right. Then, the collected electric source from the PV cell is transferred to the converter together with the boost regulator which increases the power. The entire DC-DC converter setup maintains the reliability of output from the cell and it should unbiased output when it exceeds the expected result to avoid a hysteresis loss. Initially, the DC-DC converter accepts the DC input voltage and also provides output as DC voltage in the next level whether lower or higher depends on the requirement such that converter output voltage matches the power supply required to the module. The regulated constant voltage is delivered to an analog input of the pic microcontroller to avoid the complexity of the operation. The meter should help to monitor the constant voltage. Program for tracking, delivering, and displaying the required power output supply can be loaded on it as follows from the easy-to-use pic microcontroller computer program.

Advantages:

- Tracking the sun and getting more power.
- Intelligent system.

- Fast charging.
- Renewable energy source from sun

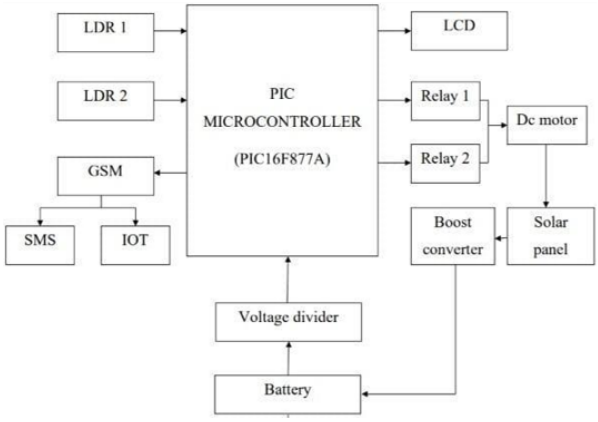

Fig. 1. Block diagram

A. Hardware Requirement

- Battery
- PIC16F877A
- Solar panel
- Boost regulator
- Voltage divider
- Relay board
- DC Motor
- GSM

B. Software Requirement

- MPLAB-IDE
- EMBEDDED C

4. Result

The two LDR sensors are connected to the PIC Microcontroller, one at the left side of a solar panel and the other at the right side of the solar panel. Based on the light intensity of the LDR, the solar panel rotates either left or right with the help of Relay which is connected to the Wiper motor. It absorbs the solar energy and converts the energy into double using Boost Converter and stores it into the Battery. The status of Voltage of battery displayed on LCD and sends a message to User using GSM module, also it gives an output of Status of voltage day-day in graphical design on a web page. The GSM Module is interfaced with PIC Microcontroller, so for every one minute the status of the battery is monitored on the webpage and battery status is sent to a specific user.

5. Conclusion and Future Scope

Internet of Things (IoT) based battery sensor monitors the real-time status of the battery as an energy storage management system. The IoT developed here uses a cloud platform for management purposes. The vehicle user can easily check to the destination to reach the charging station and can view the withdrawal of battery voltage from the system. The data stored in the microcontroller can withstand until the battery fails to charge. For future use, multiple users for the e-vehicle who settles the station are stored and upgraded in the database so that the distribution to the different users can be monitored.

- We can implement in large space with multiple solar panels and we get more output voltage to store in the battery.
- In future we can also include a solar panel cleaning mechanism to this project.

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