IOT Based Solar Charging Station For E-Vehicle

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Abstract—The project name is "Smart IOT Based Solar Charging Station For E-Vehicle". This project is about charging station for E-vehicle employ the Solar panel with IoT, which is used to view the maximum power generated by the module. As population increases there is also an increase in usage of automobile vehicles. Current vehicles for the most part are subordinate on fossil fills such petrol, diesel, LPG etc. To accommodate an easy access, we have designed a solar powered charging station. Solar energy is not only a renewable energy resource but also easy to obtain from Sun. Arduino controller for monitoring light intensity using LDR sensors and observe energy from sun by solar cell and store into the battery and store to cloud. This project is about charging E-vehicle module using the Solar panel, availability of maximum power is viewed by IOT device and the maximum power generated by the solar is being tracked. The main idea of this paper is to reduce greenhouse gas emission and fossil fuel.

Keywords: solar panel, ESP 32, Relay, BC547 Transistor, Regulator IC 7805, LCD.

INTRODUCTION

With the advancements in technology, 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. As more countries are moving towards pollution free traffic, E-vehicles are gaining more popularity across the globe. As the number of E-Vehicles increases-Vehicle charging infrastructure will be also a basic need. A system with IoT will definitely streamline the performance of E-Vehicle charging and looks the impacts. The working costs linked by means of these diesel generators might be incorrectly high due to economical fossil energy costs jointly by means of complexities in petroleum deliverance plus safeguarding of generators. Numerous hybrid systems have been installed across the world, and the expanding renewable energy industry has now developed reliable and cost competitive systems using a variety of technologies. With the growing popularity of electric vehicles, there is an increased demand for a dependable and sustainable charging infrastructure. According to Bloomberg New Energy Finance, the number of electric vehicles on the road is expected to rise from 2 million in 2016 to 30 million by 2025. This emphasizes the importance of a strong charging infrastructure to support this growth. The smart electric vehicle solar plus IoT wireless charging system is a novel solution that can assist in meeting this need. Using renewable energy sources such as solar power, this system aims to provide a sustainable and convenient charging solution for EVs.). The main objective of the paper is to provide power from solar PV cell 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 frequently at any moment.

LITERATURE SURVEY

- Survey Paper 1

Utilize of solar vivacity system for the electric-vehicle in 2021. It's have been proposed a whole new use for the current hooked up solar PV panels at the selected location, which will optimize the uses of the hooked-up machine.

- Survey Paper 2

Sketch and modeling of Romanian Solar Energy Charging Station for Electric Vehicles in 2020. It is examined the opportunity of the use of solar energy assets to grant electricity bear for an EV charging station, as a beginning tip to show the practicality of the science in attendance in versatile purposes.
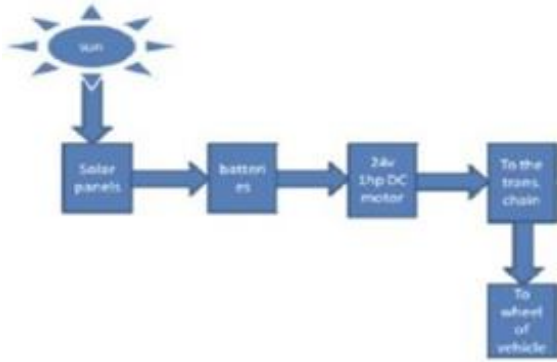
1. Proposed Methodology

Fig. 1. Methodology

Component used:
1. Solar Panel

solar panel is a device that converts sunlight into electricity by using photovoltaic (PV) cells. PV cells are made of materials that produce excited electrons when exposed to light. The electrons flow through a circuit and produce direct current (DC) electricity, which can be used to power various devices or be stored in batteries. Solar panels are also known as solar cell panels, solar electric panels, or PV modules. Solar panels are usually arranged in groups called arrays or systems. A photovoltaic system consists of one or more solar panels an inverter that converts DC electricity to alternating current (AC) electricity, and sometimes other components such as controllers, meters, and trackers.

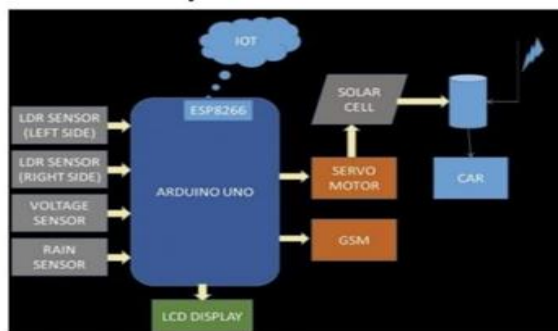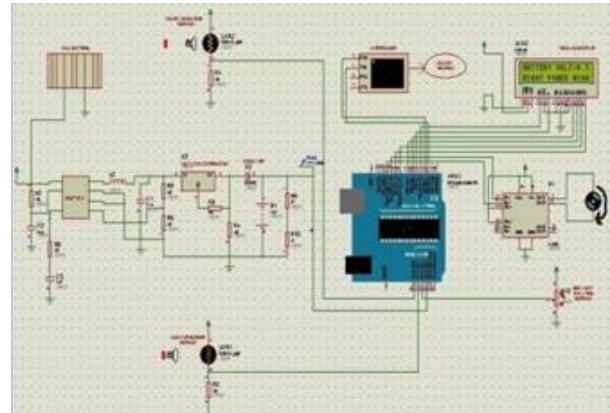Fig 1: Solar panel

Block Diagram :

Fig : System Architecture of solar charging station

As a solar PV array performs a critical function in a project, the mannequin actually uses torches with LDR sensor to music the position for producing power from the source which helps The continuous drift of energy. Since the tilting perspective of the sun varies from 0 o to 180o, two sensors should be constructed for either course i.e., one in the left and other in the right. At that point, the collected electric supply from the PV phone is exchanged to the converter alongside the buck Controller which stabilizes the control. The regulated steady voltage is delivered to an analog enter of Arduino to avoid the complexity of the operation. The meter help to screen the regular voltage. The features incorporated keep the condition of the set up good as the availability of solar insulation matters the most as per the geographical position of the vehicle.

Circuit Diagram:

Requirements :
A. Software Requirements
1. IoT
2. Arduino IDE/Embedded C

B. Hardware Requirements
1. Solar panel
2. Relay
3. ESP 32
4. Regulator IC 7805
5. BC 547 Transistor

Composition for Impose Version
A. Working of Module
The complete linear or switching regulators converter format keeps the safety of yield from the cellphone and it need to impartial output when it outdoes the accomplish result in order to keep away from a time

dependent loss. The meter assist to display the steady emf. Arduino UNO R3 is an embedded controller board with 20 computerized enter and six can be used as acongregator input. Initiative for tracking,pursue in and exhibiting the requiredelectricity output grant can be stuffed on it as follows from the easy-to-use Arduino pcsoftware.
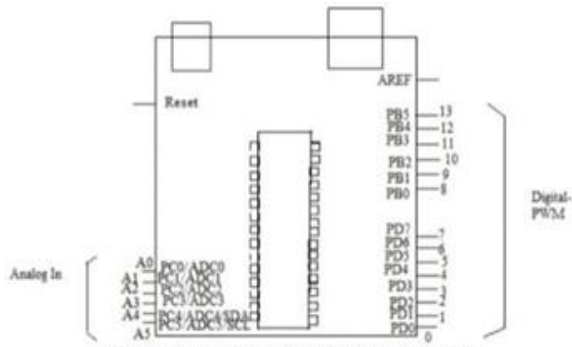
A.Carving of Arduino UNO R3

Fig. 3. Pin configuration of Arduino Uno R3

The Arduino Uno R3 is an embedded controller board principally primarily based on a removable, dual-inline- bundle (Plunge) ATmega328 AVR microcontroller. It has 20 computerized input/output activity can be stacked on to itfrom the easy-to-use Arduino PC program. Arduino Uno is an embedded controller board based totally on the ATmega328PC.

B. Carving of Motor Drives

A piston power is a megaphone which guidethe feature of the motor in either direction. The motor drives operation depends upon the tracking function of the photo voltaic panel in both left or proper direction.

C. Battery Voltage Sensor

The cell Voltage Sensor gives customers with extra precise battery charging giving you tranquility. Envisage the value knob is running as productivity as it should. Ondefinite appeal with long. rehearse, there can be a difference between the voltage. The voltage discern can be alterable with the aid of the fluctuating resistor linked to the motor which can regularly make bigger or minimize the output voltage inside the potential of the battery. The sensors are easily responding to the electrical or visual signals.

D. Modeling of LCD

LCD stands for Liquid Crystal Display, works on the concepts of blockading mild as an alternative than emitting. It is collected of multiple layers which involve two poles a part panel filters and electrodesand light is transmitted from a lens on a layer of liquid crystal The LCD works on the concepts of obstruct light. While building the LCDs, a reflected mirror is organized at the back. An electrode aircraftis made of indium-tin-oxide which is kept on upper layer and a pole a part glass with apolarizing film is also brought on the clast of the device. Thus, in the Liquid crystal screen, the Sensed signal and the battery voltage is shown.

Channels API:

To learn and write to a ThingSpeak Channel, your appeal must make solicit to the ThingSpeak API the use of HTTP requests. Each ThingSpeak Channel permits for eight fields of facts (both numeric and alphanumeric forms), place knowledge and a repute modernize. Each entry is saved with a date and time stamp and is allocate a special Entry ID (entry_id). After the information is collected, you can take back the records by using time decisionor by using Entry ID. In expansion to collecting and recoup numeric and alphanumeric information, the ThingSpeak API permits for numeric records clarification such as time scaling, averaging, median, summing, and rounding. The channel feeds help JSON, XML, and CSV forms for integration into applications.

Charts API:

Use the Charts application program interface to existing digital facts keeping ThingSpeak Channels on grid. Hold up gridsorts are line, bar, column, and step. Course consist of proportion, color, and dockets. Open-Source API: The ThingSpeak API is reachable on GitHub and consists of thealter ThingSpeakAPI for processing HTTP petition, stow numeric and numeracy data, numeric information handling, region pursucing, and popularity updates.

The open-source model follows the same documentation as the ThingSpeak lay on service

Apps:

ThingSpeak Apps are apps that make it easier for devices to get right of entry to sources on the web such as social networks, net services, and APIs. Thing HTTP:

ThingHTTP is for connecting matters to netservices

with the aid of HTTP requests. ThingHTTP helps GET, POST, PUT, And DELETE methods, HTTP/ 1.0,HTTP/1.1, SSL, customized HTTP headers, and Basic Authentication.
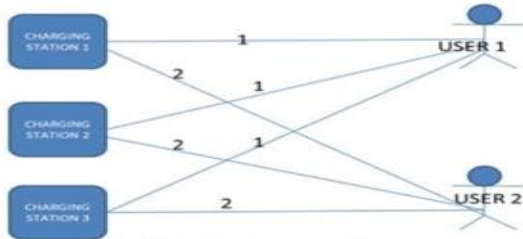
Circuit diagram:
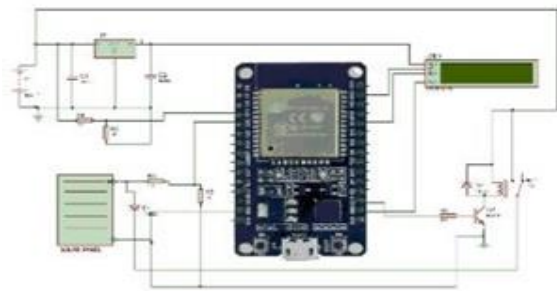

Fig. 6. Charging process diagram

Fig. Working of the circuit

CONCLUSION

In speedy maturing, IoT science pilotoccasion for EV assemble to benefit their browny presence in the market. Apart from that, IoT still lacks platform standards, community trendy treaty, isolation, synergy and faces virus uktimatum. IoT manufacturers have furnished blends and deliberation for the diagram and improvement of fantastically impervious certify. In speedy development, IoT technological know-how drives. A part from that, IoT nonetheless deficiency platform standards, community popular treaty, isolation, synergy and faces virus ltimatum. IoT producers have furnished solutions and consideration for the design and improvement of noticeably impenetrable dispersion. In fast growth, IoT technological know-how operate good time for EV fabricator to advantage both might appearance in the retail. Beyond, IoT nevertheless deficit policy level, community trendy code, esoteric, synergy also mug virus hazard. IoT smith have gave solving also rumination for the diagram and improvement of tremendously impervious.

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