

# Charging Station for E-Vehicle Using Solar with IoT

B. Yashaswinibai<sup>1\*</sup>, S. Rohan<sup>2</sup>, K. T. Yogesh<sup>3</sup>, S. Kavana<sup>4</sup>, P. Srinivas Babu<sup>5</sup>

<sup>1,2,3,4</sup>Student, Department of Electronics and Communication Engineering, East West Institute of Technology, Bangalore, India

<sup>5</sup>Professor, Department of Electronics and Communication Engineering, East West Institute of Technology, Bangalore, India

**Abstract:** 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. Fossil fills are nonrenewable asset which is one time utilize. To find an alternative energy resource which is renewable and easily available for daily use different types of vehicle engine development has been conducted, one such energy source is electrical energy. After successful development across years vehicles powered by electric energy are becoming the general trend worldwide because of its many advantages. As such charging stations for electric vehicles are in need. 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.

**Keywords:** Solar panel, Arduino Uno, GSM modem, Servo motor, Rechargeable battery, LDR, Rain sensor, LCD.

## 1. Introduction

Pretty much every establishment accompanies a sun-oriented force observing gadget, since stay educated about the thing the framework is delivering and how well it's performing. The request for traditional energy like hydrocarbon, methane gas, and crude oil is raised, so that the investigation pressured towards the growth of sustainable sources or eccentric energy funds. In the last couple of times, there has been a lot of dialogue around the fees of gas odd from the isolation of petrol and gasoline fumes prices. Moreover, these threats of disturbance of resources have brought the concentration on to different power teach technologies. In 1800s automobile had led on the road. The approaching year will come more and extra photo voltaic electric car due to these motives: Decline of discharge of fossil fuel for elicit energy from renewable resources. Cleves compliance to digital requirements that facilitate the watching the accessible of used strength the usage of IoT. Tracking of sun's radiation in the course of a time.

## 2. Literature Survey

### A. 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.

### B. 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.

## 3. Proposed Methodology

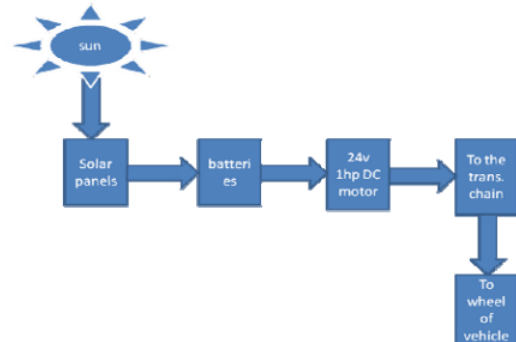


Fig. 1. Methodology

Fig. 1 shows a general diagram of e-vehicle having solar charging option. Current vehicles for the most part is subordinate on fossil fills such petrol, diesel, LPG etc. Fossil fills are nonrenewable asset which is one time utilize. For a sample case study, hazards gases. This increases the environmental pollution in the world. In recent years to reduce the pollution researchers have given the solution of EV's or hybrid vehicles and many countries adopted this as one of the best solutions to reduce pollution.

Exhibit the idea the usage of a nimble based on electric powered motors along convinced which the use of the vehicles in this method do balance the improved buy fees of electric vehicles. A extra edge supplied via cell electric vehicles is the moving of outpouring away the element of action , supplying increased air condition in crowded cities. In spite of the

\*Corresponding author: yashaswininaik27@gmail.com

income pull off, EV growth own so a way sinful quick based on prospect. The fundamental cause is associated to penetration of terrible effecting and vary alongside with value

#### 4. System Architecture

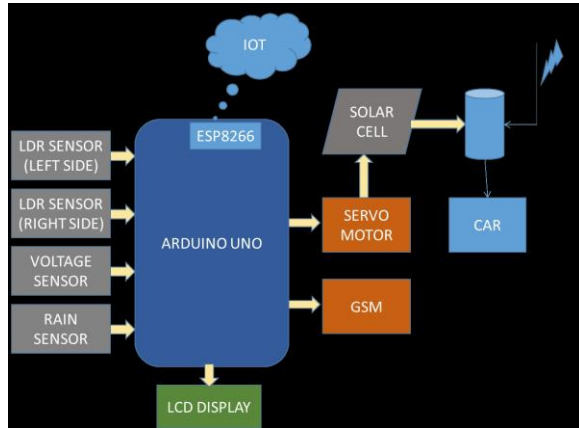


Fig. 2. System architecture of charging station e-vehicle

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.

#### 5. Requirements

##### A. Software Requirements

1. IoT
2. Arduino IDE/Embedded C

##### B. Hardware Requirements

1. Arduino Uno.
2. LDR Sensor
3. Rain Sensor
4. Servo Motor
5. LCD Display
6. GSM
7. Solar Cell
8. 12v Battery
9. Voltage Sensor

#### 6. 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 a congenator input. Initiative for tracking, pursue in and exhibiting the required electricity output grant can be stuffed on it as follows from the easy-to-use Arduino pc software.

##### B. Carving of Arduino UNO R3

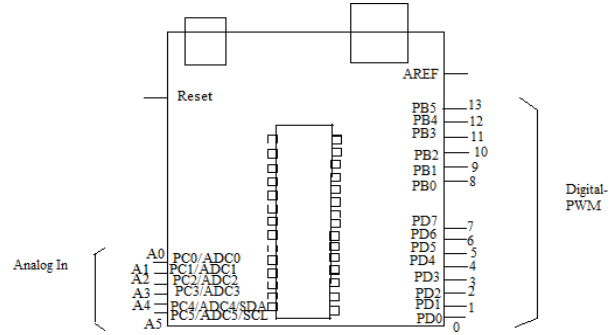


Fig. 3. Pin configuration of Arduino Uno R3

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 it from the easy-to-use Arduino PC program. Arduino Uno is an embedded controller board based totally on the ATmega328PC.

##### C. Carving of Motor Drives

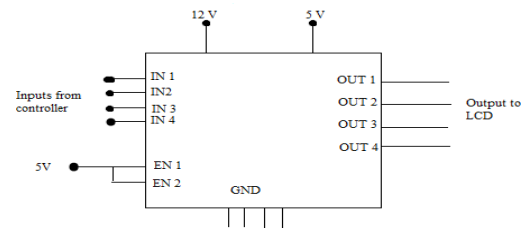


Fig. 4. Carving of piston drive

A piston power is a megaphone which guide the 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.

##### D. 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. On definite 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.

- Bulk Value = (Accuracy)
- Current = 1mA ~ 1500A(+or- 1%)
- Voltage = 6V ~ 18V(+or- 0.2%)
- Reversal = -400C ~ 1050C

Thus, in the LCD, the Sensed sign and the battery voltage is put on view.

**E. Modeling of LCD**

LCD stands for Liquid Crystal Display, works on the concepts of blocking light as an alternative than emitting. It is collected of multiple layers which involve two poles a part panel filters and electrodes and 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 aircraft is made of indium-tin-oxide which is kept on upper layer and a pole a part glass with a polarizing 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 decision or 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 grid sorts are line, bar, column, and step. Course consist of proportion, color, and docket.

**Open-Source API:**

The ThingSpeak API is reachable on GitHub and consists of the alter ThingSpeakAPI for processing HTTP petition, stow numeric and numeracy data, numeric information handling, region pursuing, 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 net services 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.

**Thingspeak:**

**Obtain Started**

- Join Up for New User Account – <https://www.thingspeak.com/account/new>
- Fabricate a new medium with the aid of deciding on Channels and then Create New Channel
- Go after a seminar for frequent units and appeal.

**Medium:**

Medium is the place your utility shops and recover any kind of data. Each channel has an individual View and a general View. The Private View is only handy via signing into your ThingSpeak.com person narrative. The Public View is what different audience will see when they go to your ThingSpeak Channel.

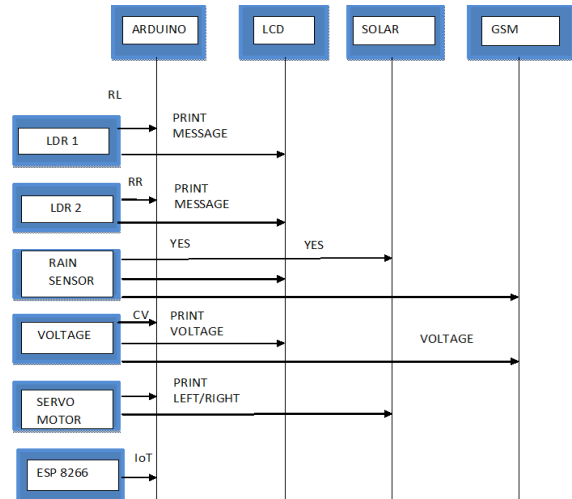


Fig. 5. Sequence diagram of the model

**7. Result and Discussion**

The dangerous have an effect on of EV charging station masses on the electrical energy distribution community cannot be neglected. The excessive charging hundreds of the speedy charging stations outcomes in extended top load demand, reduced reserve margins.

Solar cells: 18V, Battery: 12V 10Ah, Power plant: 220V, 50Hz AC.

Note: The solar cost controller steps down the voltage from 18V to 12V.  $P = \text{Power} = V \cdot I$   $P = 12 \cdot 10$   $P = \text{a hundred and twenty Watts}$  Therefore, the time required to cost from zero to 80% is 1 hour. (When 10A is stored)

Note: Input = 220V AC, the cost adapters have a simple output of 12V and 5A.  $P = V \cdot I$   $P = 12 \cdot 5$   $P = 60$  Watts Therefore, the time need to cost from 0 to 80% in instant of time (5A is supplied). The whole hypothetical time planned to cost from 0 to a hundred percent is about 1 hour and 15 mins for photo voltaic charging and 2 hours 30 mins for trendy charging.

As a photo voltaic PV array plays a critical function in a activity, the prototype truly makes use of light with LDR sensor to music the function for creating strength from the supply which assist the non-stop float of power. Since the slope position of the solar differ from 0° to 180°, two detectors ought to be assemble for both directions.

In IoT we will add the voltage information on thingspeak. And sending message using GSM module to mobile. Voltage sensor will check the how many voltages are coming. If it is more or much less it will send message to mobile. The IoT developed here uses a cloud pulpit for administration objective. The automobiles person can easily check to the goal to attain the charging station and can view the removal of battery voltage

from the mode. The data stored in the Arduino can hold up to till battery stops to charge. For the future utilize, a couple of consumers for the e-vehicle who settles the station are collected and enhances in the database so that the divide to the specific person can be observed.

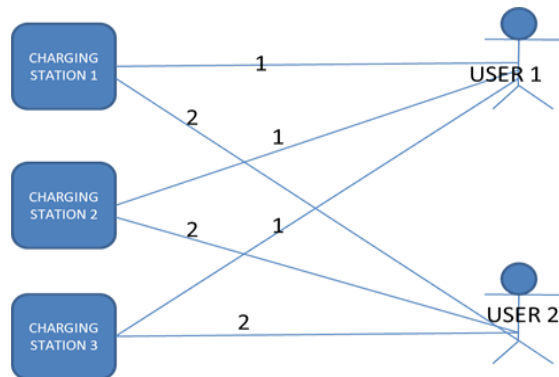


Fig. 6. Charging process diagram

### 8. Conclusion

In speedy maturing, IoT science pilot occasion for EV assemble to benefit their brownly 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 ultimaum. 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.

### References

- [1] H. Ananda Kumar and K. Uma Maheswari, "Supervised machine learning techniques incognitive radio networks during cooperative spectrum handovers, March 2019.
- [2] García-Olivares, Transportation in a 100% renewable energy system, 2018.
- [3] Roshini and Ananda Kumar, "Hierarchical cost-effective leach for heterogeneous wireless sensor networks," International Conference on Advanced Computing and Communication Systems, Jan. 2020.