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Design and Development of Intelligent EV Charging Station with Multiple Power Sources and Communication with IoT Gateway for Monitoring Parameters on IoT Platform

Vishal Kubde[1], Sanket Pund[2], Sambhaji Sawant[3], Prof. P.P.Gaikwad[4]

[1,2,3]*Final Year Student, Department Of Electronics And Telecommunication, Sinhgad College Of Engineering, Pune, Maharashtra, India*
[4]*Project Guide, Department Of Electronics And Telecommunication, Sinhgad College Of Engineering, Pune, Maharashtra, India*

A B S T R A C T

The transportation division of the world is within the change organize, moving from routine fossil fuel-powered vehicles to zero or ultra-low tailpipe emanation vehicles. To bolster this change, a legitimate charging station (CS) foundation in combination with data innovation, savvy disseminated vitality producing units, and favorable government approaches are required. The thought process of this Venture is to address the key viewpoints to be taken care of whereas arranging for the charging station foundation for electric vehicles. The Venture too gives major irateness and improvements in arranging and mechanical viewpoints that are going on for the improvement of the plan and proficient administration of charging station framework. The Extend addresses the show situation of India related to electric vehicle charging station improvements. The venture particularly gives a basic audit of charging station foundations inquire about and advancement, the challenges related with it, and efforts to standardize to assist analysts addresses the challenges.

Keywords: Electric Vehicle, Charging Station, EV Charger, Charging Infrastructure, etc.

1. INTRODUCTION

Within the shown situation, global warming and climate alter are the major concerns that can extremely influence the environment and life on soil. Nursery gasses (GHGs) are the prime variables that are dependable for climate alter Discuss contamination and GHG emanations from the fossil fuel-based transportation segment in later a long time have gotten the most noteworthy ever consideration, particularly in expansive, thick cities. All inclusive, in 2016, 7.87 billion tons of carbon dioxide-equivalents of GHG outflows were from the transportation segment and it expanded to 8.04 billion tons of carbon dioxide-equivalents of GHG outflow within the year 2017. Concurring to an appraise, 24 percent of the world's CO outflows are due to the Transportation division in which 3/4th of these outflows account for street transportation. In India, 291 Mt of CO equivalent outflow was from the transportation segment within the year 2017 and it accounts for 18% of add up to vitality utilization. The utilize of electric vehicles plays an critical part in moving forward the activity and makes a difference in keeping up a more advantageous living environment by zero or ultra-low tailpipe outflows and much lower clamor. In this way, the worldwide car industry is moving towards zero-emission vehicles in 2019, universally, nearly 4.8 million battery electric vehicles (BEV) were in utilize and around 1.5 million modern BEVs were included to the around the world armada The improvement of an electric vehicle charging station and its ideal area is exceptionally vital for simpler selection of electrically moved vehicles and the utilize of cheap and clean electrical vitality from lattice and renewable vitality assets. A legitimate charging station arrange will offer assistance in easing the extend uneasiness of proprietors of electric vehicles (EVs), guaranteeing the comparable execution of EVs compared to that of the inner combustion motor vehicles.

1.1 Introduction to Proposed System

In this Project, we are focusing on developing an Electric Vehicle Charging System which will take the power from AC Supply and will convert the charge to DC according to the Battery. In this system, we also focus on some points like monitoring the Voltage and current of the Battery charged by the system.

1.2 Objectives

- Design and development of an electrical charging station that includes both power electronic components and embedded circuits.
- The charger design has a variable power source that can be adjusted based on the vehicle and power requirements.
- In this project, we are trying to solve the real-time problem of charging electric vehicles in public places, which can be beneficial to both the user and the service provider.

2. SYSTEM DESIGN

In this segment, we'll incorporate all the details of the project counting block diagram, Proposed Framework, Details, selections etc.

2.1 Block Diagram of Proposed System

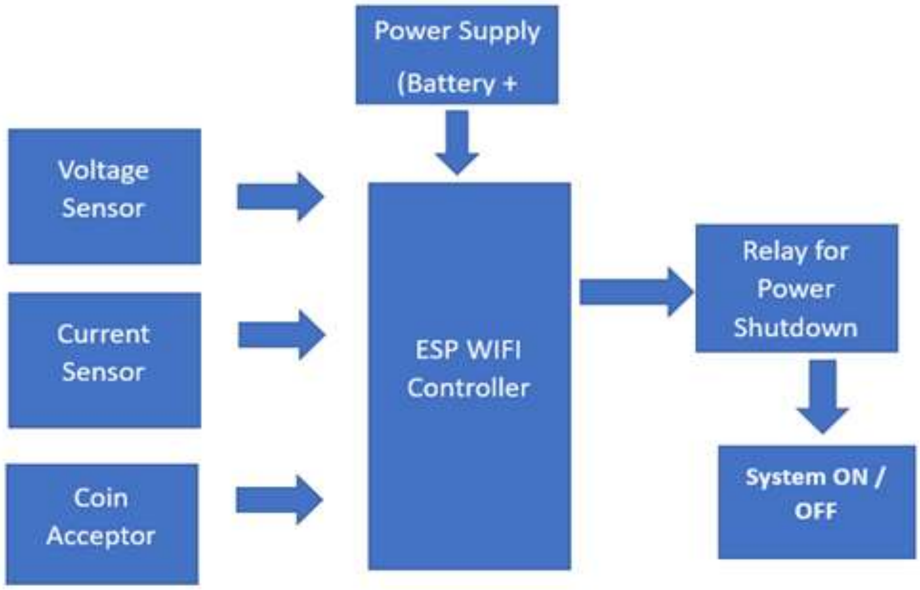


Figure 3.1 Block diagram of the proposed system

2.2 ESP WIFI Controller

The WIFI controller is part of the ESP 8266 family and is usually known as the Node MCU. This controller has both controller and IoT functionality, so it will be used in this project so that we can send live data to the mobile app.

Fig. ESP8266 WIFI Controller

2.3 Power Supply Module

• Transformer- To step down the Voltage from 230V to 12V

• Rectifier- To convert AC to DC

• Filters- To cut off the disturbance

• Regulator- To convert to specific Voltage

Fig. Power Supply Module

2.4 Software Requirements

2.4.1 Programming Software- Arduino IDE

The Arduino Coordinates Advancement Environment is a cross-platform application that's composed in capacities from C and C++. It is utilized to type in and upload programs to Arduino compatible boards, but also, with the assistance of third-party centers, other vendor development boards.

2.4.2 Programming Language- Embedded C

In each embedded system-based venture, Embedded C programming plays a key part to make the microcontroller run & perform the favored activities. At present, we regularly utilize a few electronic gadgets like portable phones, washing machines, security frameworks, fridges, advanced cameras, etc. The controlling of these embedded devices can be done with the assistance of an embedded C program. For illustration, in an advanced camera, on the off chance that we press a camera button to capture a photo at that point the microcontroller will execute the desired work to press the picture as well as to store it.

2.4.3 GUI-Blynk

Blynk is a new platform for quickly managing and monitoring hardware projects on iOS and Android devices. After downloading the Blynk app, you can create project boards and organize on-screen buttons, sliders, graphics and other widgets.

3. IMPLEMENTATION AND CALCULATIONS

3.1 Circuit Diagram

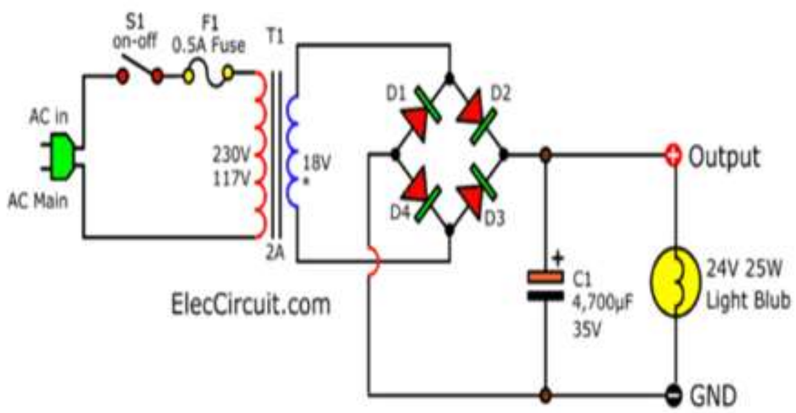


Fig. Circuit Diagram

3.2 Transformer T1 (main power)

Look at the load: 24V 25W bulb. Now if they use...

P/V = I

P = 25W; V = 24V

So I = 25/24 = 1.04A. You can use

1A transformer . But it will be hot after a long time, so use at least 1.5 times the load current. But we can't find transformer for 1.5A.

Therefore, it is better to use 2A.

As a rule, the DCV of a non-powered asset is 1.414 times the ACV. When the light is 24V. AC voltage = 24V/1.

Therefore, a second 18V 2A transformer is needed.

3.3 Capacitor Filter

Maintain a stable output voltage when using a load. Don't you like to count a lot? Now use 2000uF for 1A load current. Let's assume you are using a 1000uF capacitor. The light bulb may be dim. You will require extra capacitors. They can be connected in parallel for more capacitance. Or on the other hand if you can't find more capacitors. Transformer voltages up to 20V are available. Voltage is higher. However, when there is no load or low current load. Voltage is 28.28V.

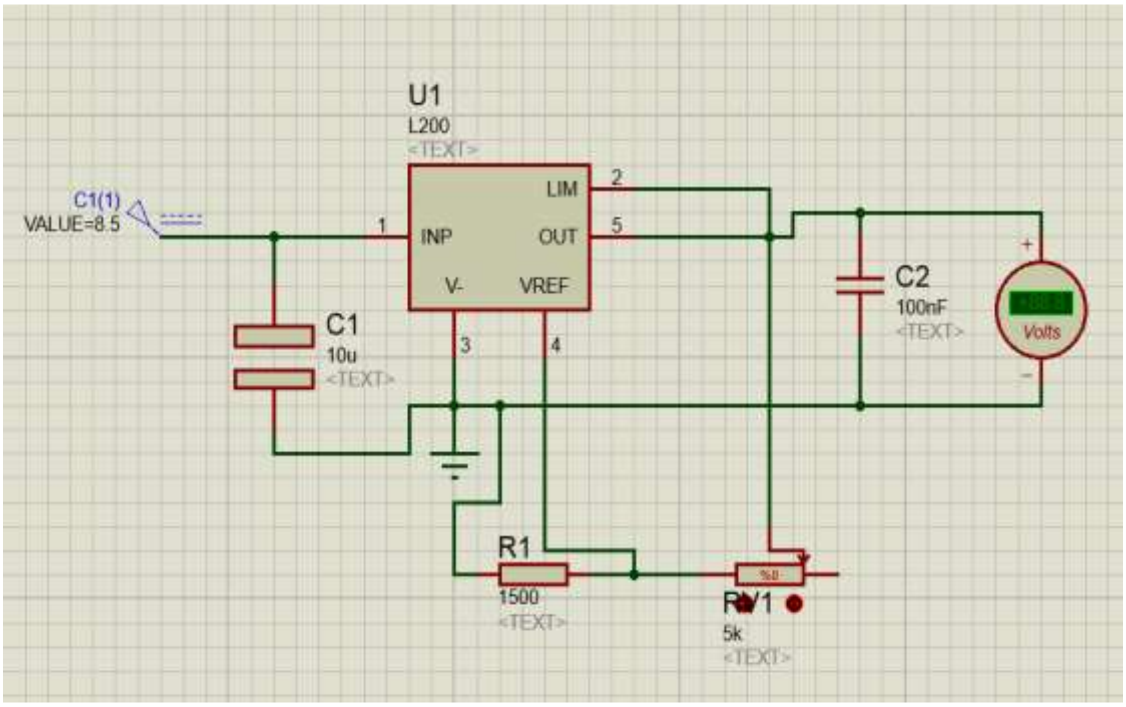
Flow down more

If you want more current up to 5A, 8A, 10A. He looks the same for example, a 5A power supply. 5A transformer, diode rectifier bridge 10A 100V should be used. Capacitor filter 2200uF x 5 (parallel) = 10,000uF 35V.

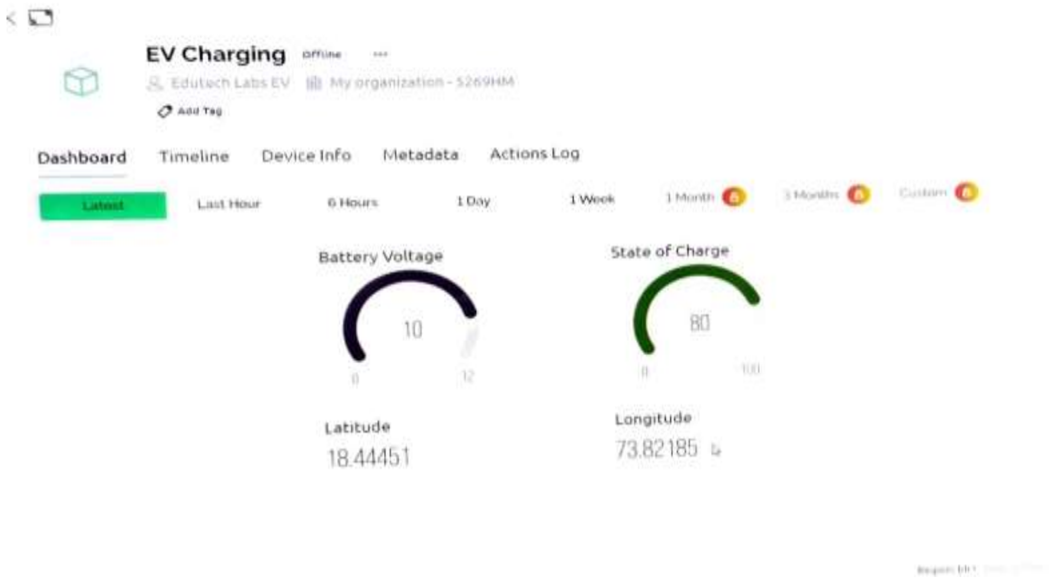
4. SIMULATION AND TESTING

4.1 Proteus Simulation of Variable Power Supply

Proteus Simulation for Variable Power Supply Design, as rest of the sensor and Module Libraries are not supported in the Proteus Basic Version, we are implementing only Power Supply Simulation and attached below its screenshot.



4.2 GUI-Blynk Test Result



CONCLUSION

That's why we researched, simulated and tested design concepts using simulation software like Proteus and IoT apps like Blynk. We also used IoT concepts such as real-time data monitoring of project parameters such as voltage and current monitoring. Therefore, we concluded that this project could better accommodate a level 1 or level 2 batteries by providing an EV generator that uses electricity to run on AC power and replaces DC Charges. The power supply is variable so it can charge batteries from 24V to 48V. Parameters such as voltage and current can be monitored and displayed on the screen.

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