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EV Charging Station with Coin Based Payment System with Solar Power

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Abstract: ***The transportation sector of the world is in the transformation stage, shifting from conventional fossil fuel-powered vehicles to zero or ultra-low tailpipe emission vehicles. To support this transformation, a proper charging station (CS) infrastructure in combination with information technology, smart distributed energy generating units, and favorable government policies are required. The motive of this Project is to address the key aspects to be taken care of while planning for the charging station infrastructure for electric vehicles. The Project also provides major indignation and developments in planning and technological aspects that are going on for the enhancement of the design and efficient management of charging station infrastructure. The Project addresses the present scenario of India related to electric vehicle charging station developments. The Project specially provides a critical review on the research and developments in the charging station infrastructure, the problems associated with it, and the efforts that are going on for its standardization to help the researchers address the problems***
Keywords: electric vehicle; charging station; EV charging Station; smart charging; charging infrastructure etc

I. INTRODUCTION

In the present scenario, global warming and climate change are the major concerns that can severely affect the environment and life on earth. Greenhouse gases (GHGs) are the prime factors that are responsible for climate change

Air pollution and GHG emissions from the fossil fuel-based transportation sector in recent years have received the greatest ever attention, especially in large, dense cities.

Globally, in 2016, 7.87 billion tonnes of carbon dioxide-equivalents of GHG emissions were from the transportation sector and it increased to 8.04 billion tonnes of carbon dioxide-equivalents of GHG emission in the year 2017. According to an estimate, 24 percent of the world's CO emissions are due to the

Transportation sector in which 3/4th of these emissions account for road transportation.

In India, 291 Mt of CO equivalent emission was from the transportation sector in the year 2017 and it accounts for 18% of total energy consumption.

The use of electric vehicles plays an important role in improving the traffic and helps in maintaining a healthier living environment by zero or ultra-low tailpipe emissions and much lower noise.

Thus, the global automotive industry is shifting towards zero-emission vehicles In 2019, globally, almost 4.8 million battery electric vehicles (BEV) were in use and about 1.5 million new BEVs were added to the worldwide fleet

The development of an electric vehicle charging station and its optimal location is very important for easier adoption of electrically-propelled vehicles and the use of cheap and clean electrical energy from grid and renewable energy resources. A proper charging station network will help in alleviating the range anxiety of owners of electric vehicles (EVs), assuring the similar performance of EVs compared to that of the internal combustion engine vehicles. To lay more emphasis on continuous improvement in recharging technology, the share of electric vehicles in the market must be increased. The present problem with the adoption of EVs can be related to the "chicken or egg" theory. The consumers are waiting for proper charging infrastructure to get full assurance of successful

A. Motivation

The main motivation behind this Project is the sustainability we need to implement in our day to day lives. There is a very serious problem of global warming due to excessive use of fuels like Petrol and Diesel. Also, the demand for EV is rising day by day because of various such issues. Our proposed Project will serve the society in particular ways.

Also, using of EV Car can considerably prove economical as compared to rising cost of fuels.

Hence, we are motivated to design and develop and Electric Vehicle charging station with certain features as mentioned above.

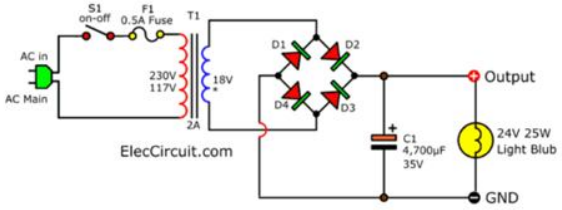
II. LITERATURE SURVEY

Name of the Paper Author Year of Publishing Methodology / Conclusion A Comprehensive Review on Developments in Electric Vehicle Charging Station Infrastructure and Present Scenario of India Shubham Mishra, Shreya Verma, Shubhankar Choudhary, Ambar Gaur 2021 Adoption of new technologies like V2G, Smart Grid, Smart charging technique, etc., for EV charging will be very helpful in maintaining the energy balance of the power system and effective utilization of available renewable nergy. It will also help in meeting customer satisfaction and economic charging rates.EV charging stations and modes: International standards Maria Carmen Falvo; Danilo Sbordone; I. Safak Bayram; Michael Devetsikiotis 2014 The work includes also a summary on possible types of Energy Storage Systems (ESSs), that are important for the integration of EVs fast charging stations of the last generation in smart grids. Finally a brief analysis on the possible electrical layout for the ESS integration in EVs charging system, proposed in literature, is reported. Development of Electric Vehicle Charging Station Management System in Urban Areas Prasetyo Aji; Dionysius Aldion Renata; Adisa Larasati; Riz 2020 Application development is used to make a tool in the form of a CSMS application to monitor and control CS with the name SONIK (electric vehicle charging operation system) Concept of charging stations for electric cars Oliver Marcincin; Zdenek Medvec 2014 This paper is about active charging stations for electric cars. Active charging station is usually part of modern electrical grids, known as a Smart Grids or Micro Grids. This paper also includes an executive summary existing knowledge about the structure and service of electricity distribution network, analysis of electric car industry and its potential impact on the electrical network and also conceptual solution charging stations electric cars with minimal effects on the power network.Solar based electric vehicle charging station Md Sohail Tanveer; Sunil Gupta; Rahul Rai; Neeraj Kumar Jha; Mohit Bansal 2019 This paper investigates the possibility of charging the battery of electric vehicles at a various working place like offices, colleges, hospitals, universities etc in Delhi, India using solar energy.

III. TECHNOLOGY USED

1) *Programming Software-Arduino IDE:* The Arduino Integrated Development Environment is a cross-platform application that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards programming paradigms, including procedural, object- oriented, and functional programming.
2) *Language- Embedded C-*
3) *GUI- Blynk-* Blynk is a new platform that allows you to quickly build interfaces for controlling and monitoring your hardware projects from your iOS and Android device. After downloading the Blynk app, you can create a project dashboard and arrange buttons, sliders, graphs, and other widgets onto the screen

IV. IMPLEMENTATION



A. Transformer (T1)—Main Power.

Look at load: 24V 25W light bulbs. They use current are…

P/V = I, P = 25W; V = 24V

So, I = 25/24 = 1.04A.

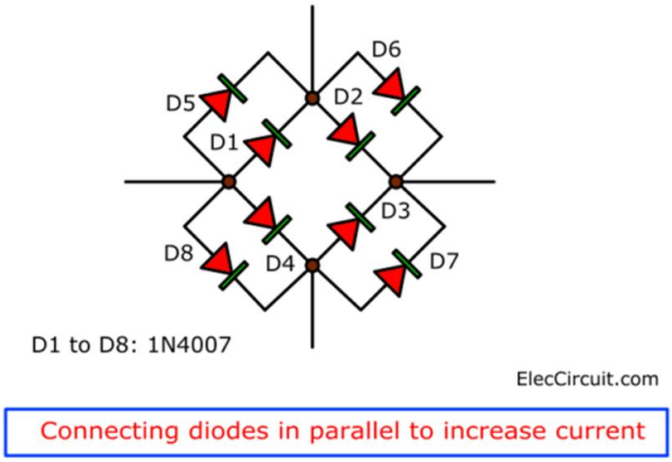
You may use a 1A transformer. But in a long time, it is hot. We should it is at least 1.5 times of load current. Or 1.5A in this case. But we cannot find a 1.5A transformer. So, use of 2A is better.

Then, How much voltages of the transformer (ACV)?

As Principle of unregulated power supply DCV is 1.414 times of ACV.

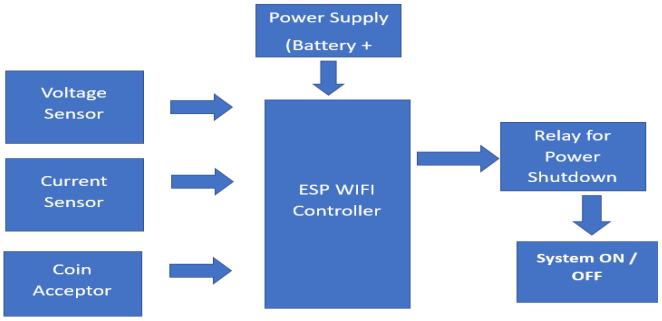
When 24V light bulbs. ACV = 24V/1.414 = 16.9V
We may use the 18V transformer. If no load the voltage is about 26V.
And In load voltage may be lower 22V. But it can keep light stable.
So, we should 18V 2A secondary transformer.

B. Diodes rectifier (D1-D4)—use 2 times of load current.
In this I use 1N5402, they can give 3A output.
Or you can get 1N4007 in parallel both can get 2A**.**



C. Capacitor Filter(C1)—It keeps output voltage is stable when using a load.
You don't like to calculate a lot, right? Use 2,000uF per 1A load current right now.
Suppose you use a 1000uF capacitor. The light bulb may be low light. And voltage drops.
We need to use more capacitors. You may connect them in parallel to more capacitance.
Or the other hand, if you cannot find more capacitors. You may use the voltage of the transformer up is 20V.
The voltage is higher. But when no load or low current load. The voltage is 28.28V
More current up:-
If you want more current up to 5A, 8A, 10A. It looks the same. Such as 5A power supply.
You need to use 5A transformer, Diodes rectifier is Bridge 10A 100V.
And Capacitor filter is 2,200uF x 5 (in parallel) = 10,000 uF 35V (total).

D. Design
In this section, we will include all the technicalities of the Project including block diagram, Proposed System, Specifications, selections etc.



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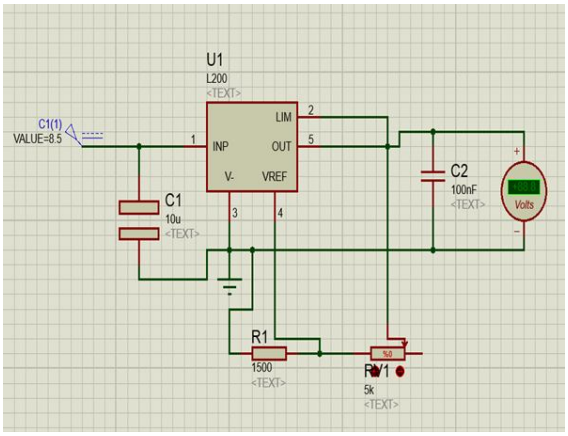
V. SIMULATION AND TESTING

A. 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 its screenshot



VI. OTHER SPECIFICATION

A. Advantages

1) No Human required for this Operation
2) Large profits can be made by Owner
3) Simple and efficient
4) Compact Design

B. Disadvantages

1) No Human required for this Operation
2) Large profits can be made by Owner
3) Simple and efficient
4) Compact Design

VII. CONCLUSION

1) Thus, we have studied, Simulated and tested the Project concepts using Simulation Software like Proteus and IoT App. like Blynk.
2) We also Implemented the IoT Concepts like Live data monitoring of the Project parameters like Voltage and current monitoring.
3) As the result, we came to a conclusion that this Project has all the Capacity to serve the Society in a better way by providing the Autonomous EV Charger System that runs on AC supply and coverts the charge to DC to Charge the Batteries of Level 1 or Level 2.
4) We also can say that Coin acceptor can solve the problem of manual collection of cash which is not transparent in many public places.
5) Also, Solar panel can be used to power on the Embedded Circuit which is an additional Benefit to the system. The conclusion of this project is that we can use ESP Controller to control the System without Human Interference and can even monitor the System on Mobile App.
6) The Power supply can be made variable so that it can charge a range of 24V to 48V Batteries
7) The parameters like Voltage, Current can be monitored and displayed on the Screen.

Various Functions can be added to make the system more advanced and reliance for commercial use.

VIII. ACKNOWLEDGMENT

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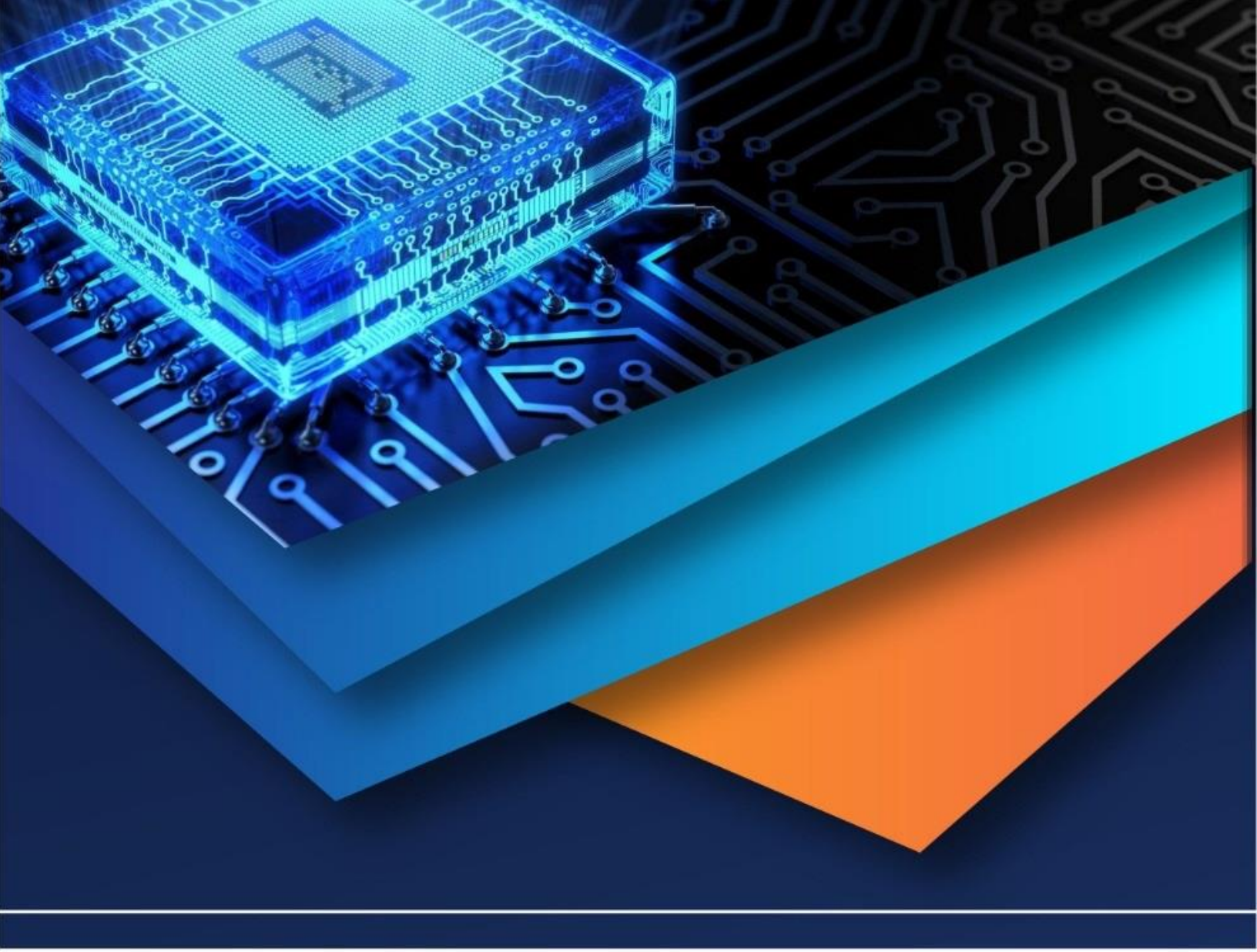

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