



ELECTRICAL VEHICLE CHARGING STATION BY SOLAR PANEL AND RASPBERRY PI CONTROLLER

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ABSTRACT: A solar charging station converts solar energy into electricity and stores it in a battery bank to ensure that automobiles are fully charged while being environmentally friendly. And if the battery's capacity is exceeded, it will draw power from the grid. It is imperative to charge electric vehicles using sustainable sources of electricity, such as solar or wind energy, if they are to be genuinely indestructible. In this project, a charging station powered by a solar panel provides electricity to recharge the battery. Operating off-grid is possible because of the integrated battery storage in the charging station. Raspberry Pi is accustomed to managing charging. Electric vehicles are being developed in order to lessen the pollution caused by motor vehicles. The fuel for these electric vehicles is electricity, which can be stored by using solar energy. Smart charging stations for electric vehicles are a promising alternative and an environmentally sustainable response to the current energy crisis.

Keywords: Raspberry pi, Solar panel, Grid power supply, Smart charging

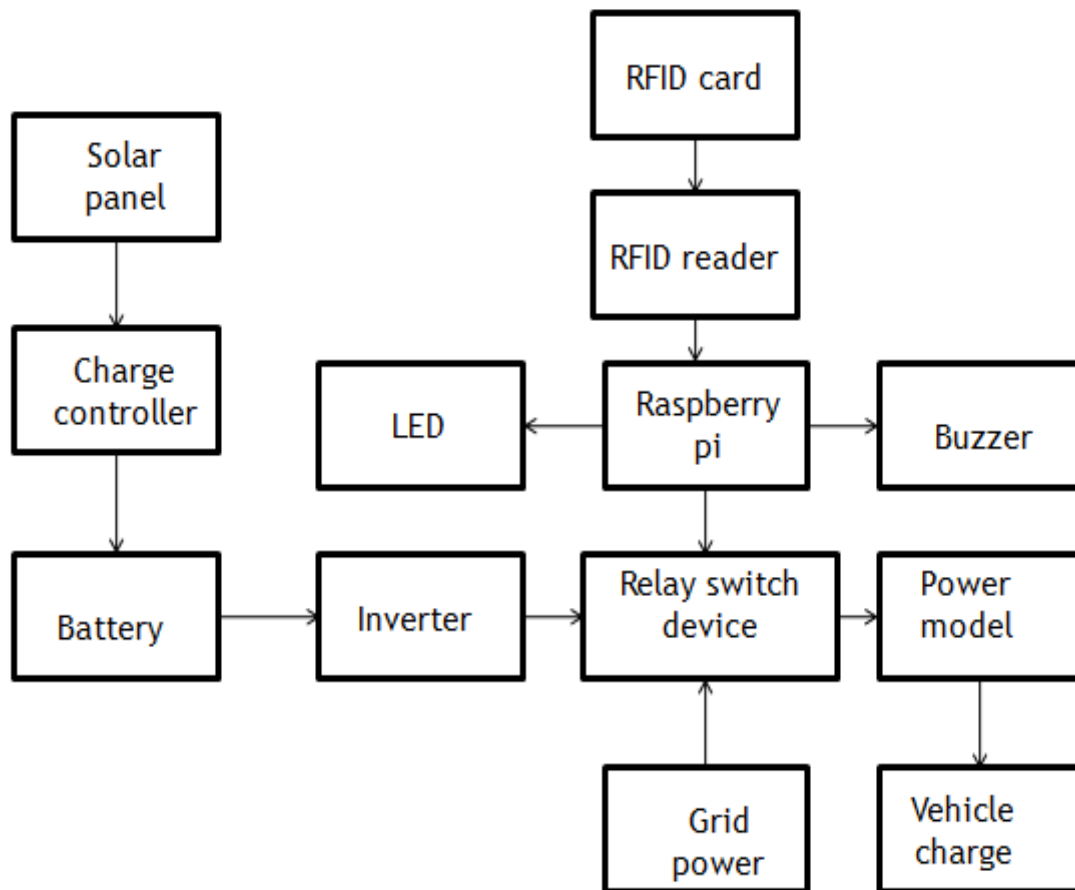
I. INTRODUCTION

One of the most significant issues in the world of renewable energy is solar energy conversion. . Particularly, solar radiation can be transformed into heat energy and electrical energy. Solar power is primarily used in a variety of systems, including satellite communications, water pumping, and rural energy. Solar Power is generally used for all intents and purposes large scale-grid system. This study demonstrates how important it is to charge electric vehicles using solar energy. Recently, it has become clear that new energy conversion and storage technologies are needed because of the essentially growing human population. The rapidly rising global population and geometric economic growth are mostly to blame for the rapidly depleting actual fossil resources and the steadily rising environmental concerns, such as greenhouse gas emissions. Now that new technology is being used in this project, more and more electronic gadgets are sort of being used to substitute labour, which causes a kind of further increase in energy consumption in a very significant amount. Contrary to common assumption, solar energy refers to energy that is obtained from the sun's radiations when they come into contact with the earth's atmosphere and/or surface as irradiances. Contrary to common assumption, humans have recently come to recognize this as the most important renewable energy source now in use. The energy generated throughout the day can sustain humanity even when traditional energy sources run out. This easily accessible renewable energy source can be obtained in a variety of ways, including photovoltaics, solar thermal energy, even synthetic photosynthesis, sun heating, and solar architecture in a significant degree. Studies have actually demonstrated that the solar energy at the centre of the sun is actually nuclear energy produced by the subtle, ongoing fusion of hydrogen and helium atoms every single second. There are several ways to obtain this readily available renewable energy source, including photovoltaics, solar thermal energy, even synthetic photosynthesis, sun heating, and solar architecture to a substantial extent. According to studies, the solar energy in the sun's core is actually nuclear energy created by the minutely ongoing fusion of hydrogen and helium atoms that occurs every single second. Photovoltaic processes ensure that access to electrical power for charging electric cars anywhere in the world is not only sustainable but also more efficient and reliable without causing environmental pollution thanks to the completely free and abundant solar irradiances, which provide the Earth with enormously more energy than we consume.

II. OBJECTIVE

1. This must advance in order to use automation technology to more intelligently control the components.
2. By creating a control panel with commands to launch the programmes that are intended to operate and monitor the system, this study incorporates the modernisation of the conventional system.
3. The primary goal is to find the most effective way to provide the EV charging station continuously from PVS, Grid, and BES.

III. BLOCK DIAGRAM



IV. WORKING PRINCIPLE



Fig 1: Model of EV charging station

Source one is a solar panel which convert light energy into electrical energy. This converted energy is stored in the battery storage. To avoid reverse flow of power charge controller is connected between solar panel and battery. The power stored in the battery is in the form of DC, but we required power in the form of AC. Therefore inverter is

connected to the battery to convert DC to AC. RFID cards gives driver alternative way to pay for charging. When card is swiped it gets read by RFID reader and then raspberry pi gives signal to the buzzer and buzzer will be beep. Raspberry pi also gives signal to the relay switching device. Relay works as a open or close circuit. When signal is given by raspberry pi relay switch is on and through power model electrical vehicle will get charge. And also to provide continuous supply to the charging station grid contention is also provided.

V. COMPONENTS:

1] Solar Panel

When you place a solar energy system on essentially your home, you may utilise it to both power and charge essentially electric automobiles for emission-free transportation in a largely significant way. Solar panels and substantially electric cars are actually a marriage made in heaven. Solar energy costs in particular are declining quickly, and manufacturers like Nissan and Tesla are quietly producing electric cars that are generally suitable for daily usage. Now, and this is rather important, it is actually possible to install a solar PV system big enough to power both your home and your cars. However, despite the fact that both technologies are eligible for subsidies and rebates, the majority of homes still cannot afford to install solar panels and essentially purchase an electric vehicle at the same time.



Fig 2: Solar panel

2] Charge controller

The charge controller is unquestionably a switching mechanism that has the ability to cut off the battery's charge, effectively take control of charging, and essentially end charging at a somewhat acceptable voltage. This will primarily safeguard the batteries from overcharging damage and primarily control the flow of power from the solar panel to the batteries. Once it determines that the battery is unquestionably fully charged, a microcontroller in the circuit will actually read the battery level and switch off the power supply from the solar panel to the batteries. Without this in particular, the solar panels would undoubtedly continue to supply the batteries with energy, causing the batteries to overheat and harm their internal components. The benefit of generally including a microcontroller in the system is that it will effectively leave a check of future additions to the system open.

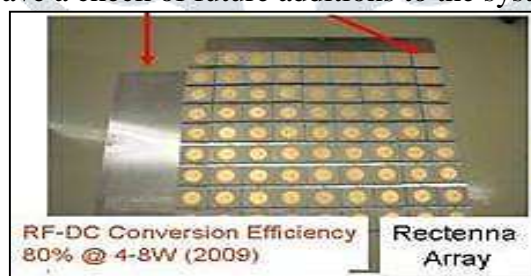


Fig 3: charge controller

3] Inverter

A solar inverter, also known as a PV inverter, transforms a photovoltaic solar panel's fluctuating direct current (DC) output into a utility-frequency alternating current (AC) that can be used by a local, off-grid electrical network or fed into a commercial electrical grid. It is an essential part of a solar system that enables the use of typical industrial appliances.



Fig 4: Inverter

4] Raspberry pi 3B

Product Name: Raspberry Pi 3B

Product Description: The third-generation Raspberry Pi is the Raspberry Pi 3 Model B. This robust single board computer, which is the size of a credit card, replaces the Raspberry Pi Model B+ and Raspberry Pi 2 Model B and may be used for a variety of tasks. The Raspberry Pi 3 Model B offers you a more potent processor that is 10 times speedier than the Raspberry Pi 1 while preserving the well-liked board structure. The perfect choice for robust connected designs, it also offers wireless LAN & Bluetooth connectivity.



Fig 5: Raspberry Pi 3B

5] RFID Card

A Radio Frequency Identification Card gives drivers an alternate way to pay for charging sessions. RFID cards are uniquely linked to a driver account and this give secure access to our network via a physical card.

VI. ADVANTAGES

1. It can track your electricity usage.
2. It can reduce charging time.
3. There are no emissions.
4. It is reasonably priced
5. It lessens noise pollution.
6. There is no pollution.

VII. DISADVANTAGES

1. The initial outlay is substantial
2. Electricity costs money.
3. It requires more time to recharge.
4. The driving range is limited.
5. Cities with electricity shortages should not use it.

FUTURE SCOPE

The number of charging stations will rise in the future. This demonstrates how important it is to increase the number of EV charging stations in parking lots and along highways in order to ensure complete coverage and user attractiveness. EV charging stations should be as easy to use as possible and integrated into parking facilities, close to stores, sports and recreation facilities. When an electric vehicle is parked, the solar panels that make up the parking space charge the vehicle while it is in the resting position. Not only are more charging stations on the roads needed, but also more private parking. Electric charging has no greater risk of catching fire than a regular car, according to study. Prior to manufacture, charging stations undergo testing. All parking, whether it is public or private, is necessary to expand the number of EV charging stations.

CONCLUSION

This paper presenting PV-based model with grid supplied for charging Electric vehicle, which is generally used to reduce the use of non-renewable energy sources. This study develops a model that combines the solar power station and Electric vehicles to mostly reduce pollutants emission from the power generation and transportation sector in a suitable way.

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