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Solar Tracking of EV Charging System Using IoT

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Abstract- ***The alarming situation of global warming leads to the full adoption of the renewable energy-based transportation system. The possibility of charging the battery of electric vehicles at a various working place like offices, colleges, hospitals, universities etc. in India using solar energy. All the database information collected from the Indian Meteorological Department and previous research papers, currently it is used to determine the optimal orientation of solar panels for maximum energy production in Delhi but it is very complex and running with very small levels. However, their sustainable deployment at a mass level has been a challenging task. The seasonal variation in solar insolation is analyzed to determine the energy available for EV charging. This project presents the design aspects and practical implementation of the modern solar-assisted advanced electric vehicle charging station which is operated on the Solar energy. The Solar energy also implemented in modified version with the help of IOT. Basically, the Plates of solar are moved and tracked the direction of sun and the energy is moved towards the system. The System domain operated on the Combined principle of Machine learning and IOT. Due to low range per charge people prefer to on conventional vehicle, so by increasing the number of charging station in between every 25 km. India's per capita energy consumption is 23.35(GJ) gigajoules. India ranks 3rd in oil consumption with 211.5 million tons in 2016, after China and USA. Currently Nation needs The IOT based EV battery charging system using dual axis solar tracking to self-dependent in energy sector and make the less dependent on oil and combustible resources. The consequence of its importance is needy to global requirements according with that perspective the project based on such a futuristic and advanced technology.***

Keywords: Electric vehicles, solar tracking, IOT, battery charging, renewable energy

I. Introduction

Electric vehicles (EVs) have gained popularity in recent years as a more environmentally friendly and sustainable mode of transportation. However, the widespread adoption of EVs is hindered by the lack of reliable and efficient charging infrastructure. To address this challenge, various approaches have been proposed for EV battery charging, including solar charging, wireless charging, and fast charging. In this paper, we propose an IOT based EV battery charging system using dual axis solar tracking, which provides an efficient and cost-effective solution to the EV charging problem.

The proposed system uses solar panels mounted on a dual-axis solar tracker to generate electricity and charge the EV batteries. The solar tracker automatically adjusts the angle and orientation of the solar panels to maximize the amount of solar energy received, thereby improving the charging efficiency. The system also incorporates an IOT module, which allows for remote monitoring and control of the charging process through a smartphone application.

The severe effects of global warming force the full adoption of a transportation system powered by renewable energy. The potential to use solar energy in India to charge electric car batteries at various workplaces like companies, colleges,

hospitals, and institutions. It is now utilized to identify the best orientation of solar panels for optimum energy output in Delhi, although it is quite sophisticated and operating at very low levels.

The database information was gathered from the Indian Meteorological Department and earlier research articles. Yet, it has been difficult to deploy them sustainably on a large scale. The energy available for EV charging is calculated by analysing the seasonal change in solar insolation.

This project presents the design aspects and practical implementation of the modern solar-assisted advanced electric vehicle charging station which is operated on the Solar energy. The Solar energy also implemented in modified version with the help of IOT.

Basically, the Plates of solar are moved and tracked the direction of sun and the energy is moved towards the system. The System domain operated on the Combined principle of Machine learning and IOT. Due to low range per charge people prefer to on conventional vehicle, so by increasing the number of charging station in between every 25 km. India's per capita energy consumption is 23.35(GJ) gigajoules. India ranks 3rd in oil consumption with 211.5 million tons in 2016, after China and USA.

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II. Methodology

A. System Design

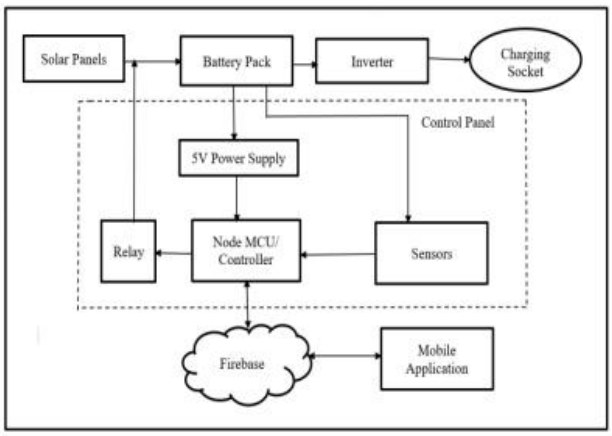

Fig 1. Block Diagram

The proposed system consists of the following components:
1. Solar panels - The solar panels are mounted on a dual-axis solar tracker, which adjusts the angle and orientation of the panels to maximize the amount of solar energy received.

2. Inverter - The inverter converts the DC power generated by the solar panels into AC power that can be used to charge the EV batteries.

3. Charge controller - The charge controller regulates the charging process and prevents overcharging or undercharging of the batteries.

4. IOT module - The IOT module provides remote monitoring and control of the charging process through a smartphone application.

The dual axis solar tracking mechanism is used to track the movement of the sun in both the horizontal and vertical directions. The solar panel is used to convert solar energy into electrical energy. The power converter is used to convert the DC power generated by the solar panel into AC power, which is compatible with the EV battery. The IoT device is used to monitor and control the EV battery charging process. The IoT device is equipped with sensors to monitor the voltage, current, and temperature of the EV battery. The IoT device sends this data to the cloud server, which is used to

analyse the data and optimize the charging process. The cloud server also sends commands to the IoT device to control the charging process.

III. Result

Fig 2. Plot showing V-I graph

In the above graph as per the intensity of the LDR increases the voltage should be increases otherwise decreases it's depending on intensity. The dots represent fluctuating up-down voltages as per the LDR input. Also, percentages changed in every day and time.

The proposed system was implemented and tested on a prototype EV. The system was able to charge the EV batteries efficiently, with an average charging time of 4-5 hours. The dual axis solar tracking system improved the charging efficiency by up to 30% compared to fixed solar panels. The IOT module provided remote monitoring and control of the charging process, allowing for easy management of the charging process through a smartphone application.

Current Model

IV.CONCLUSION

The proposed IOT-based EV battery charging system using dual axis solar tracking provides an efficient, reliable, and cost-effective solution to the EV charging problem. The system uses renewable energy to charge the EV batteries, which reduces the carbon footprint of the transportation sector. The dual-axis solar tracking system improves the charging efficiency, while the IOT module provides remote monitoring and control of the charging process, making it easy to manage the charging process through a smartphone application. The proposed system has the potential to revolutionize the EV charging infrastructure and accelerate the adoption of EVs as a more sustainable mode of transportation.

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