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'DESIGN AND IMPLEMENTATION OF ELECTRIC VEHICLE CHARGING SYSTEM FOR TWO WHEELERS'

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ABSTRACT

India, a developing nation, is rapidly embracing electric vehicle (EV) technologies and gradually phasing out fossil fuel-based vehicles as part of its efforts to combat climate change and increasing pollution in cities. In April 2017, the Government of India announced a plan to have all EVs on the market by 2030, and it has been following the Faster Adoption and Manufacturing of Electric Vehicles scheme to promote this transition. The electric charging infrastructure is a critical component of the electric mobility ecosystem, and it is crucial for the EV charging station market to keep up with the pace of EV adoption and growth. The limited range and speed of EVs are major concerns for customers, and the availability of charging stations and their network on the road is key to encouraging a shift from fossil fuel vehicles to EVs. As a result, the accessibility of a plug point for charging is an ongoing challenge faced by most EV manufacturers and customers.

INTRODUCTION

Global population increase has led to an exponential rise in the quantum of transportation vehicles. nearly all of these vehicles are run on fossil energies, which causes environmental problems. The rapid-fire drop of reactionary energy reserves is an inversely intimidating issue. As a green result, electric vehicles are gradationally getting more and more popular. Electric vehicles have several advantages over regular vehicle; they don't bear any gas, they emit no dangerous substances into the atmosphere, they're subsidized by the government, and they bear lower conservation. still, there are a many disadvantages of these vehicles as well. For case, electric vehicles aren't suitable for countries facing major deficit of power. EV having battery bank which needs to be charged at regular basis. The charger used to charge these vehicles contain iron core transformer, which gives rise to power losses, and hence inefficient charging operation.

In Bangladesh, the use of electric three wheeler bus cabs known as easy bikes are getting more and more popular. The charging stations all employ the conventional iron core bowl which is only about 80 effective. Hence, there exists an excellent occasion to save energy by perfecting the effectiveness of easy bike battery chargers. Using the proposed bowl, it's possible to achieve edge of the order of 90. A considerable quantum of exploration has been done over the times regarding the colorful aspects of electric vehicle charging.

LITERATURE SURVEY

1. Fast Charging System

To alleviate the driving range anxiety and support the wider adoption of electric vehicles (EVs) worldwide, there is a need for a charging system that can replace traditional oil stations. Fast charging stations (FCS) can charge an EV up to 80% in just half an hour, but reducing the charging time from 7-8 hours to 30 minutes requires a high level of power from the grid. As a result, FCS are usually connected to the medium voltage (MV) network, although some are connected to the low voltage (LV) grid. The voltage drop caused by connecting FCS along the distribution network lines must also be considered and kept below 10%, according to the EN50160 standard.

Energy storage systems (ESS) can be used to mitigate the impact of fast charging stations on the MV grid by reducing peak power demand and providing additional network services. ESS can also increase the voltage level if there is too much voltage drop along the lines, but this requires voltage control implementation. To further minimize the impact of FCS on the grid, renewable energy resources can be integrated within the charging stations. During the day, when solar energy is available, EV batteries can be charged from solar photovoltaic (PV) sources, reducing the risk of overloading the MV network. At night, when solar energy is not available, EV batteries can be charged from the grid. EVs can also support the grid at peak load demand if necessary, ensuring that the grid remains stable with a high pulse power of charging from EVs [3]

2. Adaptive System

In this system when a EV battery is connect to the system then it collect data about condition of battery with the help of sensors like current, voltage and temperature and send this data to aurdino uno then it will give command to system and provide current accordingly and charge the electric vehicle battery safely.

The electric vehicle market is growing steadily. A large fraction of electric vehicles today can be charged by plugging into the electrical grid at public or private charging points. The high demand imposed by plug-in electric vehicle charging will create new challenges for the reliable operation of the distribution system. In particular, opportunistic charging of EVs could lead to transformer overloading, voltage sag, increased losses, and reduced equipment lifetime. Nevertheless, the elasticity of the EV charging load, which implies that the charge power can be adjusted within certain bounds, has given rise to various control algorithms aiming to enable the distribution grid to accommodate a higher penetration of EVs without requiring costly network upgrades. Related work on controlled EV charging can be divided into centralized and decentralized control methods.[7]

The decentralized methods offer several advantages including lower communication overhead, improved scalability, and the ability to protect private user data. In a decentralized method an optimization problem is often formulated and decomposed into a number of subproblems, each solved independently by a charging point. This optimization problem relies on the system model which is typically inaccurate or nonexistent in practice. It is possible to incorporate an approximate model which ignores losses and reactive power flows, but the resulting model cannot be used to control voltage and does not guarantee that the available network resources are fully utilized.

BLOCK DIAGRAM

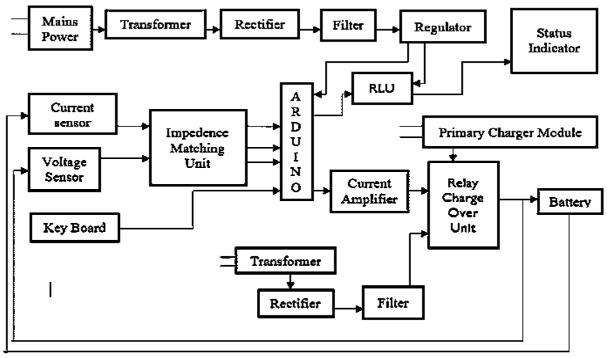

Fig. Block Diagram of Electric Vehicle Charging System

METHODOLOGY

First of all, we use transformer having 230V AC input then by step down transformer give 48V AC. After transformer we use rectifier (Full wave bridge rectifier) to convert AC to DC supply getting from grid, current passing through rectifier to filter then we get pure DC, then there is regulator to regulate. When battery is connected to the system, system sense the battery condition using various sensors such as current and voltage sensors which collect the information about battery and send to the Arduino uno.

Arduino uno is for the signal system and giving information to the system. If the condition of the battery is good then the Arduino send the signal to the primary charge unit to charge battery with higher rating current and voltage. If the condition of battery is poor or not good then the battery is charge according to their conditions.

OBSERVATION

We test our charging system on 48V lead acid battery can achieve is **52 V** at 100% charge. The lowest voltage for a 48V lead battery is **42.3 V** at 0% charge.

Table 1: Fast Charging mode

Sr No.	Time (min)	Voltage (v)	Battery Capacity
1	20 min	43.7 V	20 %
2	40 min	46.5 V	40 %
3	60 min	48.1 V	60 %
4	1hr 27min	50.4 V	80 %
5	1hr 45min	52 V	100 %

In fast charging system output current is **4.56A.**

Table 2: Slow Charging Mode

Sr No.	Time (min)	Voltage (v)	Battery Capacity
1	52min	43.8 V	20 %
2	1hr 22min	46.1 V	40 %
3	2hr 20min	48V	60 %
4	3hr 10min	50.5 V	80 %
5	4hr 5min	52 V	100 %

In slow charging system output current is **2.42 A.**

RESULT

Charging	**Battery Voltage**	**Time Required to full charge**
Fast Charging Mode	48V	1hr 45min
Slow Charging Mode	48V	4hr 5min

We have used 48V,13Ah battery capacity of two-wheeler vehicle which was successfully charged and tested.

CONCLUSION

Modelling and analysis of charging system successfully done.

Observation and result shows that battery is getting fully charged and charger working properly.

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