SMART ELECTRIC VEHICLE CHARGING STATION

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ABSTRACT

Recently, Electric Vehicles are attracting significant attention as an environmental friendly, sustainable and economical substitute for vehicles with a conventional engine. It addresses the concerns associated with petroleum fuels, global climate change, and pollution control. In this paper, the design and development of a Photovoltaic (PV) and grid fed Hybrid charging station for electric vehicles is discussed, and the new control strategy is proposed for energy management under different operating conditions. The proposed control ensures the system working in an integrated manner to optimize the energy use from the grid. The system shares power between PV and grid, and directly charge the EV when solar energy is available using Maximum Power Point Tracking (MPPT) and automatically changes modes of operation when solar energy is not available. In addition, the system also delivers the solar power to the grid when solar power is available, but the station is not charging the EV. Reverse power feeding provision is also adapted for the futuristic smart-E-grid concept where EV shares the grid load. The proposed control strategy can be easily adapted to even for the conventional EV charging stations.

Key Words :

Solar Panels, MPPT,Auto Change Over Switch, Battery, Arduino UNO, Rectifier,Inverter,DC Charger ,T/F.

INTRODUCTION

Electric vehicles are a relatively recent technology that is seeking for its place in the market. It has several advantages, such as the reduced greenhouse emissions, fuel savings and its ease of use. The increase of the electric vehicles in the roads raises issues about their impact on the grid, in terms of power quality. In this the main considerations about power balance and the impact of an electric vehicle charge in the voltage, current, and total harmonic distortion. An experimental charging station prototype for Modes 2 and 3 is used to acquire data of voltage, current and active and reactive power for different charging profiles and battery state of charging.

Two major trends in energy usage that are expected for future smart grids are: -

1.Large scale decentralized renewable energy production through photovoltaic (PV) system.
2.Emergence of battery electric vehicles (EV) as the future mode of transport

Firstly, the use of renewable energy sources such as solar energy is accessible to a wider audience because of the falling cost of PV panels [1].

The new contributions of the work comparedto earlier works are as follows: 1.Determination of smart grid of PV cell andthe commercial supply.

2.Battery monitoring using time required forcharging.

3.Four types of vehicle can be charged.

LITERATURE SURVEY

Reference [1]

It Present, Electric vehicles are a relatively recent technology that is seekingfor its place in the market. It has several advantages, such as the reduced greenhouse emissions, fuel savings and its ease of use. The increase of the electric vehicles in the roads raises issues about their impact on the grid, in terms of power quality. This paper presents the main considerations about power balance and the impact of an electric vehicle charge in the voltage, current, and total harmonic distortion. An experimental charging station prototype for Modes 2 and 3 is used to acquire data of voltage, current and active and reactive power for different charging profiles and battery state of charge. The possibility of charging the battery of electric vehicles at a various working place like offices, colleges, hospitals, universities in Delhi, India using solar energy.

Reference [2]

This Present, We have collected information from the Indian Meteorological Department and it is used to determine the optimal orientation of solar panels for maximum energy production in Delhi. The seasonal variation in solar insolation is analyzed to determine the energy available for EV charging. Due to low range per charge people prefer to rely on conventional vehicle, so by increasing the number of charging station in between every 25 km. India's per capital energy consumption is 23.35(GJ) cagoules. India ranks 3rd in oil consumption with 211.5 million tons in 2016, after China and USA.

Reference [3]

It Present Currently, electric vehicles (EVs) are recognized as one of the most efficient modes of transportation with zero trailing emission. Considering the advantage of EVs, 3 million vehicles are already deployed on the road, and it is expected to cross 100 million by 2030 [1]. However, the execution of proposed plan demand for huge charging infrastructure and enormouelectrical energy. Moreover, EVs can only be sustainable when the electrical energy required for charging is generated from renewable and sustainable energy sources. However, the use of fossil fuels for electricity generation, does not reduce the emission but merely shift it from vehicles to the power plant. Therefore, the use of renewable energy sources for electricity generation can completely eliminate the emission and provides an environmental benefit. Among various available renewable energy sources, solar PV array, wind energy, hydro energy and fuel cell based energy, solar PV based generation is a most feasible solution for EV charging because it is available almost everywhere irrespective of the rural or urban region [2]. As far as the Indian region is concerned, it is available almost throughout the year. On the contrary to the solar PV array, the wind and hydro energies are location specific. The wind energy is mostly useful in the coastal region, and hydro energy is useful for hilly region.

Reference [4]

This Paper Presnt, Transportation is trending towards electrification nowadays. EVs are gaining prominence due to technological advance- ments especially in renewable energy sector. Similar to land transportation, marine sectors are also reflecting the alterations to be all electric. Thus the impact on atmospheric pollution by using fossil fuel can be reduced to have a better future society.Unlike the electric cars or buses, the marine vehicles travels dawn to dusk. The stored energy may not be enough for their voyage. So the requirement of charging points on the way in sea routes is inevitable as diverting to shore for charging is impractical. Normally the existing on-shore charging stations will be far from the sea route.

The shore power can be grid supported and/or renewable energy based and can ensure sufficient power all the time. Ships in voyage can‟t access the shore power most of the time. So the construction of an FCS is a reliable option for electric marine vehicles. Thus the capacity of on-shore charging station can be considerably reduced and the land used for the renewable energy based charging station onshore can be used for some other applications or preserved. Also the generation and storage requirement of each ship/vessel can also be reduced if charging points are available throughout their

voyage. The offshore charging station can be supported on an offshore platform model and can be placed at an optimal distance from sea route. Thus the floating charging station is completely isolated from conventional grid and must be self-sustained, similar to islanded mode grid operation, with renewable energy integration and storage solutions. So a floating solar PV charging station with hybrid energy storage system is proposed and initial analysis is considered in this paper.

Reference [5]

It Present,The issue of climate change is no longer a matter of urgency but is a crisis. Unarguably, the indispensable transition towards decarbonization must come from the top-down and the bottomup. In the U.K., researchers and policy makers across the sectors have therefore been actively engaged in meeting the Paris agreement of net zero emissions through means of sustainable development.

As the U.K.'s largest emission contributor, the transport sector is yet to have a key role in the transition. Today, advances in Electric Vehicles (EV) technologies have made it possible to tackle carbon emissions, The carbon emissions involved with the life cycle of EV's remains to be questioned. Irrespective of the emissions associated with the manufacturing process of the battery, EVs have shown to reduce the road transport carbon footprint, The U.K. has introduced incentives and funding to stimulate interest in EVs and ambitiously aims for complete transition to zero emission vehicles by 2050.

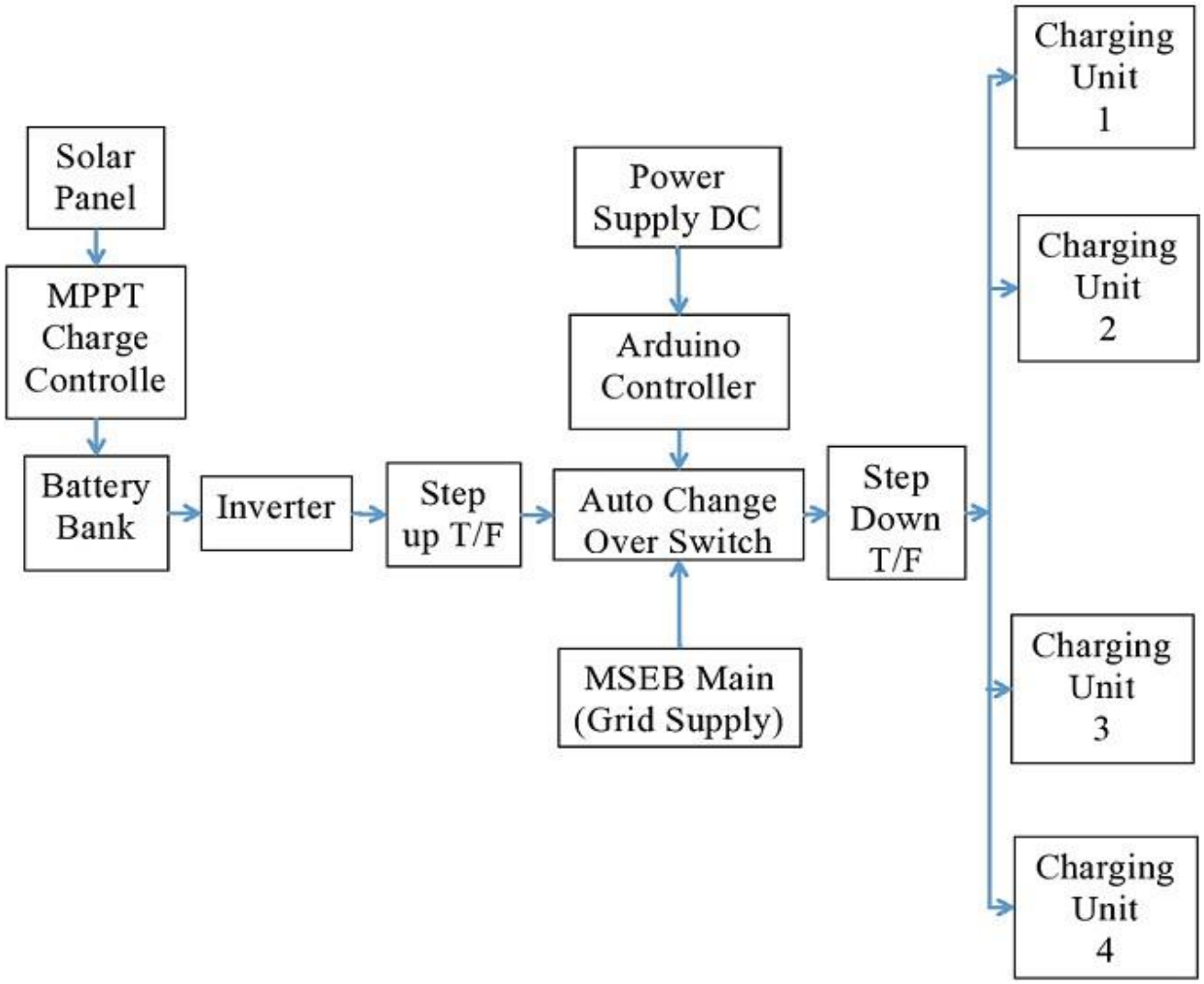
The advances of such a technological shift are still challenged by many factors. Among those is the concentrated large load EV introduces into a main grid during the charging process, not to mention, the sustainability of charging EVs by carbon- emitting sources. In fact, studies suggest that emissions of the current charging infrastructure are worse than that of internal combustion engine vehicles.

METHODOLOGY

In "Smart Hybrid Electrical Vehicle Charging Station" project we are going to make the charging station for electrical vehicles which are coming in the market.in this system we are using two supply such as renewable and non-renewable, renewable supply is solar supply and non-renewable which is take from state electricity board. One supply taking supply from solar (photo voltaic cell) and this DC supply is given to the Maximum power point tracker (MPPT) it is basically DC to DC converter it's main function to maximize the energy available from the connected solar module arrays at any time during its operation. Then apply to change over unit, and source to from state electricity board taken and apply for rectification and this supply after rectification apply to change over switch. Output of change over switch is given to the battery bank it is then connected to the sine wave inverter which will further connected to the battery bank.

The output battery bank connected to transformer 12V/230V and this transformer output is connected four parallel transfers of 230V/12V then the output of first transformer is connected to 5 Amp charging circuit, output of second transformer is connected to
8 Amp charging circuit, output of third transformer is connected to 10 Amp charger circuit and the output of fourth transformer is connected to the 15 Amp charging circuit.

BLOCK DIAGRAM



DISCUSSION

In this project we have to study, Charging Station should be work in day time on Solar energy. In case failure of Solar energy it automatically connected to commercial supply.

The charging station for electric vehicles offer way in which pollution can be reduced and helps to create jobs in region where employment is little.

ADVANTAGES

1. Reduce carbon emission.
2. Charging cost is reduce.
3. The load on the grid reduce.

APPLICATIONS

1. It can be used at parking.
2. It can be used at petrol pumps.
3. It can be used at gas station,
4. It can be used on National highway,State highway.

LIMITATIONS

1. As to sources are used so high
2. initial cost.
3. Battery bank capacity required is high.
4. Frequent maintenance is required.

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