

STUDY OF ELECTRICAL EQUIPMENT & ANALYSIS OF SOLAR CHARGING STATION FOR ELECTRIC VEHICLE

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Abstract : India is a creating nation. Transportation are developing step by step. Number of vehicle are increments and Fuel is primary hotspot for vehicle which causes contamination. For fuel sparing reason just as contamination abridge reason electric vehicle is a best vehicle. Proficiency of electric vehicle is one if the imperative parameter which thoroughly rely on the gear's of the electric vehicle and wellspring of vitality in light of the fact that appropriate determination of hardware results into the best possible working condition and monetarily beneficial. As electric vehicle required charging for its task implies need of electrical vitality and to satisfy this necessity. There is different alternative like breeze and sunlight based. As per the purpose of yield perspective of sunlight based is the best choice to use for the electric vehicle. Consequently there ought to be the correct examination of sun powered charging station implies the station yield ought to be with the end goal that it can satisfy the need of electric vehicle. In this paper we give the investigation of sun powered housetop framework on regular schedule concerning created control, voltage and current.

IndexTerms - Battery, Charge controller, Charging station, BLDC motor.

I. INTRODUCTION

The presentation of electric vehicles as naturally cognizant choices is relied upon to become around the world. India has been creating and providing electric power trains for these electric vehicles and it keeps on creating advancements and improve execution fully expecting the future expansion of earth good vehicles. This article examines a portion of the electrical part advances utilized in electric vehicle, for example, motors, motor controller, throttle, batteries that make up the electric power trains of these electric vehicles, alongside the particular. Inquires about have likewise been done to examine the restrictions and the impact of utilizing petroleum derivative and its conceivable effect on condition change. The interest for vitality is ascends as the total populace rises. Sun powered vitality become among the most testing vitality sources. Be that as it may, as a result of range requirement and batteries cost, EVs have not grown a lot of up until this point. Thus, the noteworthy test is to manufacture electrical vehicles, which can keep running on locally available batteries, for impressive separation, while keeping little, the financial matters of vehicle stockpiling battery.

II. LITERATURE REVIEW

Plan of a New Multifunctional Motorized Wheel for Urban Electric Vehicle, this paper talks about with structure of vehicle, motor and count parameter. Sun oriented Charging Station for Electric Vehicles, there are numerous topologies of sun powered charging station for electric vehicles, utilizing DC or AC flow to charge, which builds the employments of DC-DC and DC-AC converters.

Sun based Powered Charging Station, the sun based controlled charging station is planned with the goal that gadgets can be charged outside and in an ecologically well disposed way. Charging Strategy for Electric Vehicles Using Solar vitality, they portray the plan and assess a charging calculation that will organize EVs and fill some quicker than others. In this paper a period multiplexing technique is proposed and tried; along these lines contributing a basic yet successful strategy for accomplishing prioritization of EV charging.

III. OBJECTIVES

- To study of electrical equipment's for electric vehicle.
- To study standalone solar rooftop system.
- To analyze output solar power with respect to time.
- To study charging and discharging characteristics of battery.
- To analyze charging and discharging rate or characteristic of installed battery in electric vehicle.

IV. BLOCK DIAGRAM OF ELECTRIC VEHICLE

Above fig.1 comprise of square graph of electric vehicle which comprise of sun powered board of 1kW framework, sun powered charge controller, assistant battery bank, sunlight based inverter, and second rectifier circuit, electric vehicle battery, BLDC drive. at the point when sun oriented light falls on the sun oriented board of 1kW framework which give dc yield. Yield of sunlight based board is bolstered to sun powered charge controller which will manage voltage and current of sun based board and Constant DC vitality stockpiling in assistant battery bank. Power is feed to rectifier from assistant battery manage an account with the assistance of sun oriented inverter then steady DC control is given to electric vehicle battery which store control. For the drive the electric vehicle battery give capacity to BLDC drive.

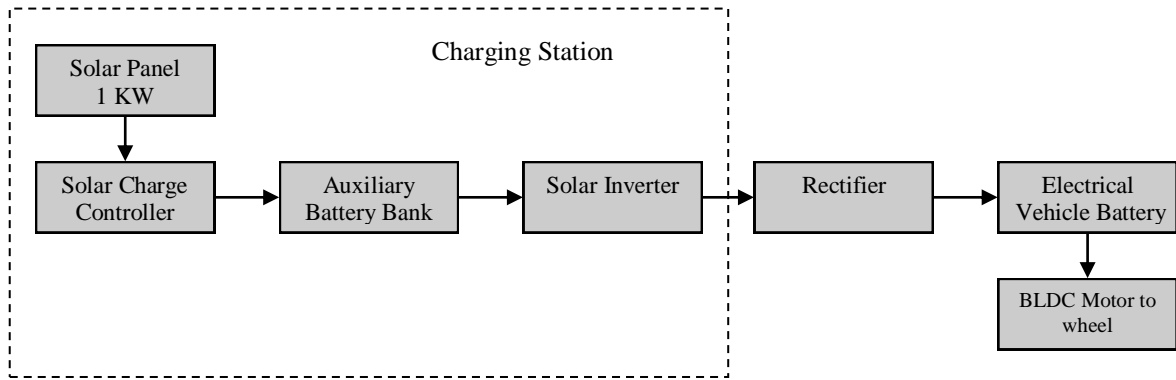


Fig.1: Block diagram of electric vehicle

V. COMPONENTS OF ELECTRIC VEHICLE

1) BLDC motor

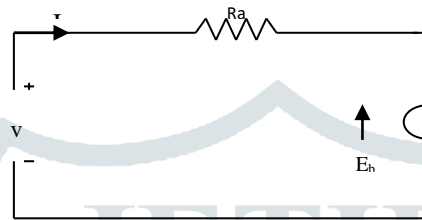


Fig.2: Equivalent circuit of BLDC

Above circuit comprise of proportionate circuit graph of BLDC motor and appropriate condition are given underneath Sum up condition of motor .The supply voltage to the armature will have armature opposition drop and rest of the supply voltage is countered by back emf of the motor. Subsequently voltage condition of the motor is given by,

$$V = IaRa + Eb \tag{1}$$

Where, I is armature current and R is armature opposition of the motor and Eb is the back emf and V is the supply voltage. Back emf condition

In a PMDC Motor, motion ϕ is steady and in this manner we can compose as

$$Eb = Km \omega m \tag{2}$$

Torque condition

$$Te = KmIa \tag{3}$$

$Km = Ea\phi$ is called speed-volt consistent or torque steady. The estimation of Km relies on the quantity of documented shafts and the armature conductors and so on.[1]

Table1: Specification of PMDC motor

Parameter	Rating
Voltage	36V
Wattage	1000W
Construction	Permanent Magnet
Motor type	Geared PMDC motor
Rated speed	2800 Rpm
Rated torque	1.9-3.2 Nm
Load Carrying Capacity	150-200 Kg
Max speed	20- 30 Km / hr
Rated Efficiency	>80%

2) Motor Controller

The motor controller convert driver contribution to activity by the motor. It does as such by controlling the voltage and current provided to the motor.

Table2: Specification of motor controller

PMDc 36V 30A CONTROLLER	
Rated Voltage	36V
Operating Current	30A
Rated Power	1000W

3) Battery

Lead corrosive sort is the most broadly utilized kind of electric vehicle batteries. Basically, these are viewed as the superior vehicle batteries as a result of their reasonableness and capacity to give a more volume of current. That is basic to begin the vehicle begin the vehicle. Different batteries are costlier and these make them ideal regardless of whether they are lighter and littler. For example, Lithium particle batteries are high vitality thick and lighter as contrast with lead corrosive batteries however they don't work in chilly climate. [2,3]

Specification: 1) voltage: 36V
2)Capacity:18Ah

4) Battery Charger

A battery charger is a gadget used to place vitality into an auxiliary cell or battery-powered battery by driving an electric flow through it. [3]

Table3: Specification of battery charger

Parameter	Rating
Input Voltage	100-240V 50/60HZ
Output Voltage	36V
Output current	2A
Power	75W

5) Solar charging station

Unadulterated Energy Solar has created and fabricates two kinds of high caliber, rough Solar Charging Stations that give solid, independent sunlight based power for an assortment of areas. Our Solar Charging Stations have been introduced in school grounds. Electric Vehicles (EV) are the fate of transport. With the regularly rising contamination and its unfavorable impact on the earth, there has been a vast scale perspective change towards EV's. sun oriented innovation is comprising of two kind monocrystalline and polycrystalline in which monocrystalline have greatest productivity. [5,6,7]



Fig.3: Solar charging station

6) Specification for solar charging station

For develop 1 kW sunlight based charging station we required three sun powered PV board of rating 330W which is associated in parallel for coordinating the interest of framework. open circuit voltage is 46 volt. [8]

7) Analysis of solar charging station

Age of intensity through the sun powered charging station is absolutely rely upon sun based irradiance factor for that reason we break down the sun oriented accusing station of separate the irradiance. Complete investigation of 1 KW sunlight based housetop framework with considering standard temperature with the assistance of table comprising time, radians level, voltage, current, control, and so forth. [9, 10]

Analysis has been done during different time of day (30 minutes interval time) and various results were obtained which are shown in the below given table:

Table4: Analysis of solar charging station

Time	V-dc(V)	I-dc(A)	Solar Power(Watt)	Battery Voltage(V)
9.30am	30.2	11.5	367	28.5
10.00am	31.2	11.6	380	28.6
10.30am	34.8	9.3	353	28.9
11.00am	33.4	11.2	383	28.8
11.30am	35.8	6	245	27.9
12.00pm	32.4	9.6	332	27.7
12.30pm	34.1	8.8	334	27.8
1.00pm	34.3	9.4	348	27.9
1.30pm	32.7	9.8	340	27.7
2.00pm	31.7	9.7	329	27.7
2.30pm	28	13	388	27.3
3.00pm	31.9	9.8	331	27.7
3.30pm	27.3	11.8	346	27.3
4.00pm	28.2	10.2	304	28.4

Graphical portrayal of the distinctive parameters determined with the estimating instruments, they are Time V/s Voltage, Current, Power.

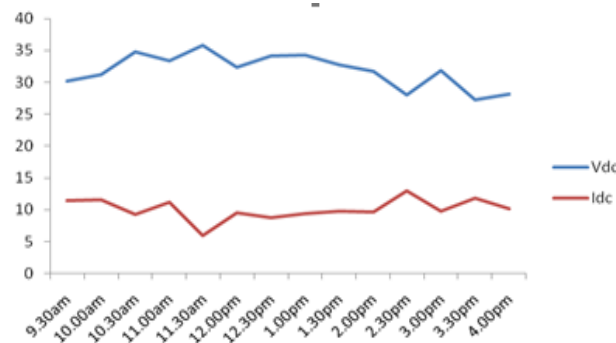


Fig.4: graph between PV Vtg & current vs time

From above chart top voltage created at 12:00 pm that is 35.8 V and averagely steady voltage delivered in the middle of time 12:30 pm to 2:30 pm. Blue line demonstrate the voltage of PV board and red line show current of PV board.

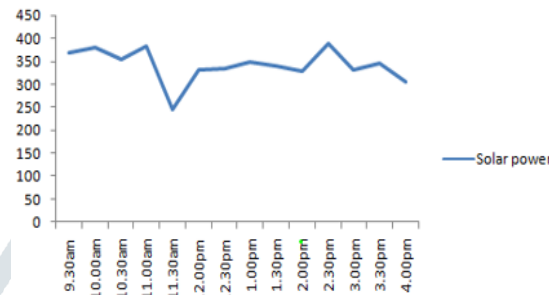


Fig.5: graph between solar power vs time

Above chart comprise of sunlight based power versus time. Pinnacle control produces from PV board 388watt at 2:30 pm. Normal power created by PV board is 341 watt.

CONCLUSION

Sun based charging station of 1KW PV framework is contemplated for an electric vehicle. The vitality delivered by the PV framework is additionally determined on half hourly. Likewise the impact of worldwide radiation on the age of sun based vitality is delineated. In this undertaking we have think about the electrical gear and the investigation of sun based charging station of the framework with including estimation of the different parameters, for example, control, yield voltage, flow, Energy produced by PV.

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