

Study of Universal Solar Charger

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Abstract: *This project based on Charging Electric Cars from Solar Energy was carried out at the Bharati Vidyapeeth Institute of Technology . Presently, developing new types of energy conversion and storage systems is becoming evident because of increasing human population and thus greater reliance on energy-based devices for survival. Due to the rapid increase in the world population and economic expansion geometrically, this is bringing about rapidly diminishing fossil fuels and the continuously growing environmental concerns as greenhouse gas emissions. Furthermore with the technological advancements in this modern era, more electronic devices are being used to replace manpower thus leading to a further increase in energy consumption. Energy obtained from the suns radiations when in contact with the earth's atmosphere and or surface as irradiances is called solar energy..*

Keywords: Solar Charger

I. INTRODUCTION

This project based on Charging Electric Cars from Solar Energy was carried out at the bharati vidyapeeth institute of technology . Presently, developing new types of energy conversion and storage systems is becoming evident because of increasing human population and thus greater reliance on energy-based devices for survival. Due to the rapid increase in the world population and economic expansion geometrically, this is bringing about rapidly diminishing fossil fuels and the continuously growing environmental concerns as greenhouse gas emissions. Furthermore with the technological advancements in this modern era, more electronic devices are being used to replace manpower thus leading to a further increase in energy consumption. Energy obtained from the suns radiations when in contact with the earth's atmosphere and or surface as irradiances is called solar energy. Presently, this is known by humans to be the prime renewable energy in existence till date, the energy produced in day is able of sustaining mankind even when traditional energy sources gets finished. This readily available environmentally friendly energy source can easily be obtain via series of methods as photovoltaic, solar thermal energy, artificial photosynthesis, solar heating and also solar architecture. Research works have shown that at the core of the sun, the solar energy is in form of nuclear energy brought about by continues fusion between hydrogen and helium atoms each second. Thus as a result of this, it radiates out close to 3.8×10^{26} joules of solar energy each second. With the free and abundant solar irradiances that provides enormous times more energy to the Earth than we consume, photovoltaic processes ensures that not only sustainable but greater efficiency and reliability to access electrical power for charging electric cars anywhere around the world without environmental pollution. With little upkeep, viable approach to self charging of electric cars wherever need via photovoltaic processes. Solar energy thus provides a unique, simple and elegant method of harnessing the suns energy to provide electric power to electric cars thus taking the world much step closer to a greener community. Sweden being one of those unlucky countries with very little(or no) fossil fuel availability for extraction, coupled with the rapid increase in its 13 population , and also active cars in circulation the demand for electricity so as to meet up the needs of the local masses is at an increase. With our focus area Maharashtra Navi Mumbai located at latitude/longitude: $56^{\circ}09'41''N 15^{\circ}35'11''E$, altitude: 18 m and also having an average annual temperature of 7.8 degrees centigrade ,our conceptual design based on harnessing solar energy to charge electric cars will not only make the region eco-friendly but also increase the solar energy availability but also encourage the masses to switch their choices from traditional cars to electric cars using solar electric power. The research work begins with a background study where related works were reviewed. Then, in chapter three, we present the problem statement, our objectives and main contributions. Furthermore, we present description of our system design and implementations in chapter four. In chapter

five, we present our conclusion and (or) recommendations. Finally we end the work with references, appendices and list of figures.

II. THE SOLAR PANEL SYSTEM

The sun has been playing numerous roles in humane existence. Not only supplying energy and light to earth but also used to understand how the other areas of universe interact

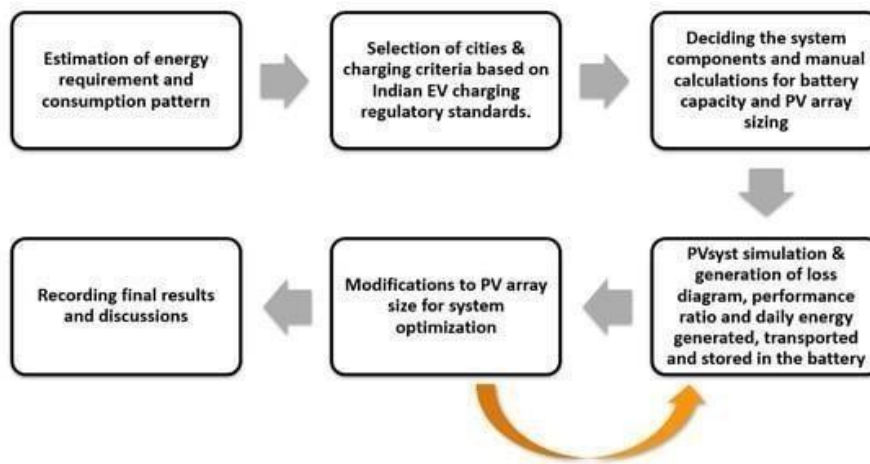
.With over 6.3×10^{11} watts/sq. meter of solar radiation produced constantly in the form of rays.as these rays spread from the sun’s surface their intensity reduce and upon getting to planet earth the rays becomes parallel innature.Though most of the rays are being scattered, diffracted and deflected upon reaching earth’s surface ,it’s found that the total solar irradiance (insolation) that actually absorbed by earth annually is close to 3.8 million exajoule . Thus, solar energy doubles what is produced by all other non-renewable energy sources annually .This brings the abundance of solar irradiance reaching the earth’s surface for an hourly base unable to be harnessed by humans and other living organism for a year.

III. THE MICRO CONTROLLER

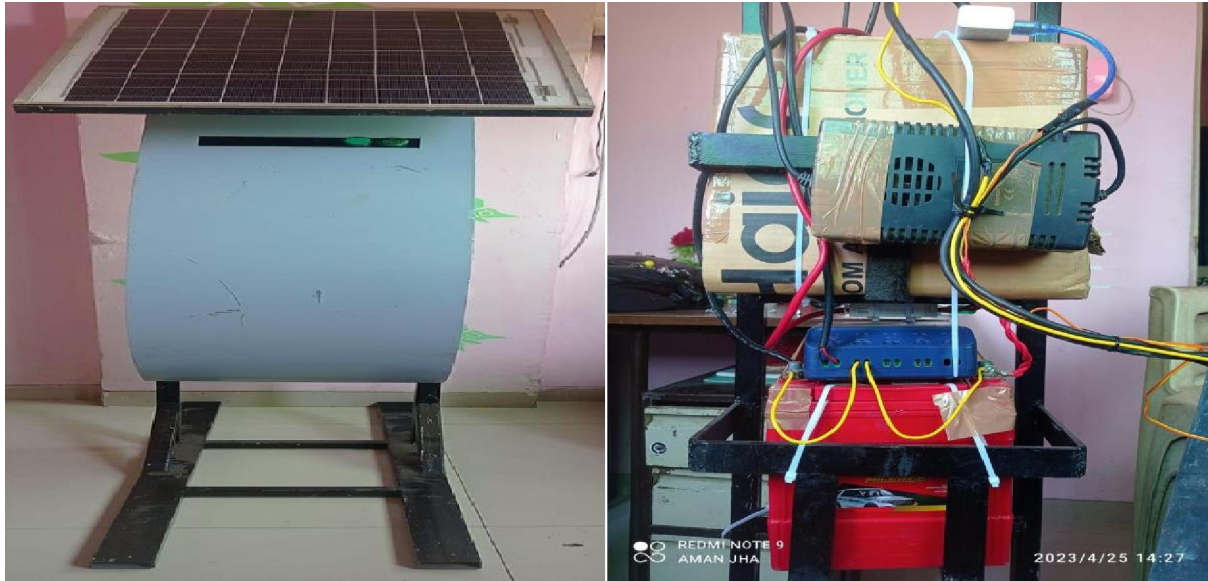
Generating solar energy consist of harnessing the maximum irradiance at true solar noon. When the solar intensity is maximum, the electric car battery might be fully charged as well. To save this extra energy that is being generated photovoltaic charge controllers are needed to redirect the energy to storage battery cells. Series of microcontrollers used for photovoltaic were reviewed by other scholars. They did stress that importance of on and off, Pulse Width and Modulated (PWM) and Maximum Power Tracking micro controllers for increasing the efficiency of solar power generation. Stating that the on and off micro controllers operate both in series and shunt modes. Series controllers basically stop further charging when load is fully charged while shunt charge controller diverts excess electricity to other loads. On the other hand, Pulse width modulation (PWM) and maximum power point tracker (MPPT) technologies are more technologically sophisticated, and also adjusting charging rates depending on the battery's level, to allow charging closer to its maximum capacity .

IV. METHOD

System sizing starts with identifying the standards and regulations for EV charging stations. This is followed by the selection of cities for which simulation will be performed. Solar energy is directly related to the location’s climatology; hence, comprehension and analyses of weather patterns become imperative. Next, a daily load for the charging station is decided, after which suitable system components are chosen and manual calculations are done to size the battery bank and the solar array capacity. Then, using simulation, the system performance is analyzed, and the array capacity is altered to minimize unwanted losses. Further simulations are performed on the new array capacity, and modifications are done if required. This is an iterative process, and amendments are made to attain the most optimized version of the solar PV system. Finally, the performance data, thus calculated, are recorded and compared for different locations.



V. RESULT



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