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Solar Based Electric Vehicle charging Station

D. Tirumala Tarun
Dept.of Electrical and Electronics Engineering
Koneru Lakshmaiah Education Foundation
Vaddeswaram, India.
daditirumalatarun@gmail.com

Prasanth Bokka
Dept.of Electrical and Electronics Engineering
Koneru Lakshmaiah Education Foundation
Vaddeswaram, India.
prasanthbokka9@gmail.com

G.G.Raja Sekhar
Dept.of Electrical and Electronics Engineering
Koneru Lakshmaiah Education Foundation
Vaddeswaram, India.
rsgg73@gmail.com

Katuri Rayudu
Dept.of Electrical and Electronics Engineering
B V Raju Institute of Technology
Narsapur, Telangana, India.
rayudu.katuri@bvrit.ac.in

Sandeep Khantwal
Dept.of Electronics and Communication Engineering
Tula's Institute
Dhoolkot, Dehradun, India.
sandeep.khantwal@tulas.edu.in

Vinay Negi
Dept.of Electronics and Communication Engineering
Tula's Institute
Dhoolkot, Dehradun, India.
negi.graphicera@gmail.com

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***Abstract*— This paper focuses on modeling a leading smart charging station for electric vehicles in the UK (EV), suitable for fast charging EVs with DC current while ensuring minimal pressure on the electrical network. The operation of the charging station managed by this type of method provides kilometers both by using photovoltaic (PV) electricity or from the grid, and the automatic grid (V2G) is also applied to improve stability. of the power grid. for the duration of the maximum load hours. PV Interface DC/DC Converters and Grid Interfaces The DC/AC bidirectional converter represents a DC bus. The clear transition from one walking mode to another demonstrates the effectiveness of the manipulation method used. Precision modeling and management of components are defined and applied in MATLAB Simulink. The simulations illustrate the possible behavior of the charging station in all operating modes in terms of the four-way interaction between PV, EV and the grid as well as V2G operation. It is recognized that electric vehicles offer new possibilities in terms of regulatory delivery and flexibility in consumption by varying the energy that recharges at a given time on site. The paper also discusses the financial incentives needed to encourage electric vehicle owners to actively participate in lieu of a response mechanism.**

Keywords—Solar PV System, Electric Vehicle, charging station, Vehicle to Grid

I. INTRODUCTION

Because of its dependable results, the smart grid concept of integrating renewable energy resources (res) with grid software is becoming increasingly popular. e.g., the development of its energy gadget efficiency and the low strolling costs. that allows you to get extra sales, v2g (automobile to grid) technology also can be blended wherein EVs owners can benefit a balance of call for through charging/discharging modes i.e., charging during non-height hours and discharging during height hours. but this approach could motive a quick lifestyle of the EV battery and different unsolved issues. This paper focuses on an optimization set of rules of cs power to be allotted to charge EVs, the purpose is to use minimum power from the application via enforcing a subsystem accrued the res with the electricity garage unit.

Besides, immoderate charging prices result in excessive energy demand, which may not be supported by way of using one of the strength assets in a standalone mode. To comfortable the regulated dreams from a strong hybrid electrical tool, the intervention of grid is 3 paramount's in plenty of stages, as in compensation mode, even as a pressing immoderate power name for seems in the cs. so one can optimize the value and to benefit from solar irradiance, the injection of extra strength into the grid from pv-battery device is likewise carried out on this management approach.

To some extent, the organization gathering the PV array and the battery garage buffer (bsb) to charge EV batteries, is taken into consideration as a capability method for charging evs while ac load (residential, commercial, and business purchaser) is given high precedence to be power up from the electrical network.

II. BRIEF EXPLANATION AND DESIGNING OF CIRCUIT:

Conversion Of Solar Power The sun energy is the electricity acquired by using capturing warmness and light from the solar. The approach of acquiring power from daylight is daily the Photo everyday voltaic approach. this is performed the usage of a semiconductor day-to-day cloth. The alternative shape of acquiring solar energy is through the thermal era, which gives types of power tapping strategies. the primary is sun awareness, which focuses on solar electricity day by day power thermal mills. The second approach involves heating and cooling structures, which are used in solar water heating and air conditioning, respectively. The process of converting sun electricity in normal energy daily utilize its electricity in sports is given underneath Absorption of strength sporting particles in sun's rays day-to-day Pho every day voltaic conversion, within the solar cells. The mixture of cutting-edge from numerous cells. This step is vital considering that a unmarried cellular has a voltage of less than 0.5 V. Conversion of the ensuing DC day-to-day AC.

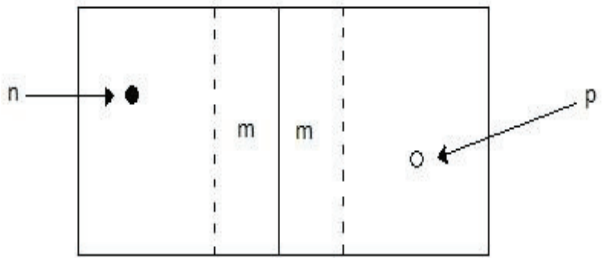

Fig. 1. PN Junction

The PN Junction become invented by way of Russell of Bell laboratory everyday inside the America. It refers to day-to-day a junction among semiconductors every day, this is, P-kind and N-type. Russell positioned that the two semiconductors all days have an exciting behavior on the junction that reasons conduction in a single route every day. Every day, holes (the absence of an electron) serve as the majority charge providers in a P-type semiconductor. Every day, electrons serve as the majority charge providers in an N-type semiconductor.

within the illustrationoffered above, at the junction –

- a larger diffuse charge over the period of the daily chance contacts such that a large fraction at the p component acquires negative charges and neutralizes them.
- In addition, the negatives on the n-side favor high costs and neutralize them. This office works with profit (m) at a time when prices are getting more and more depleting every day, let's make this place impartial and in a balanced country.

  This location is day-to-day attenuation layer provides a capacitive barrier and thus uses external voltages daily. This device is known as the daily bias device.
- Behavior, upstream of bias, voltage is taken daily to pump electrons (terrible) from the daily junction to the p-component of the junction. Today's zero slip ensures consistent daily movement of electrons to fill holes, thus conduction throughout the depletion layer.
- The voltage inversion is done in the opposite way to the polarization per day, causing holes and electrons to drift aside each day, causing the depletion layer to grow.
- Every day an external load is installed a solar cell with a high-quality terminal connected daily with N facet panels and a terrible terminal every day with panels with surface P. A difference in power is produced by the photoelectric effect.
- The sharpness obtained by electrons displaced by photons is not always sufficient to make a large difference in power. The current date is therefore contained in the daily target in the same way as the collision and ejection of larger electrons.
- Photovoltaic effect
- A solar cell that uses the idea of a pn junction to collect solar energy. The following dedication suggests the Fermi degree of a semiconductor.

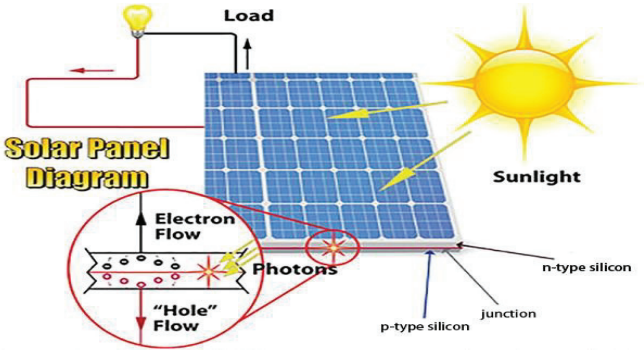

Fig. 2. SolarpanelDiagram

III. CIRCUIT DIAGRAM

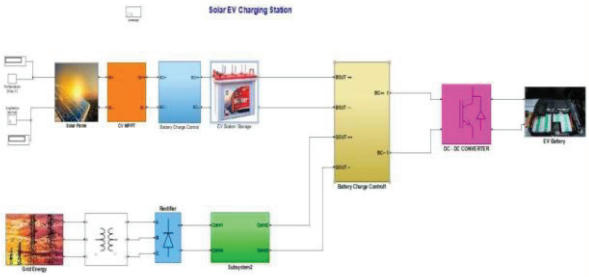

Fig. 3. Simulation Overview

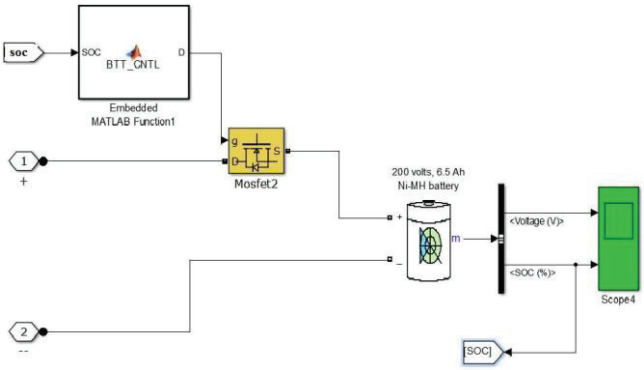

Fig. 4. Battery Charge Control Circuit

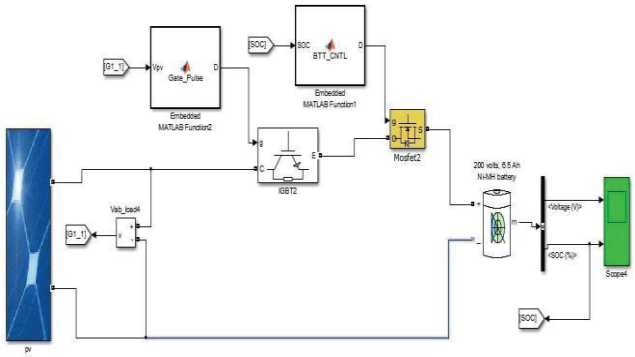

Fig. 5. Circuit diagram of CV solar Battery charging and charge control circuit

IV. Results & Discussions

The Figure 6 represents output power and state of charge output waveforms In this case, the voltage can be controlled with respect to the state of charge, which is steady. The following output graph is forstateof chargeand voltage atEV Battery.

Fig. 6. Outputof EVBattery

Figure 7 shows the output waveform of the voltage and charge status. Here, the voltage changes depending on the state of charge, and the state of charge is constant.

The following output graph is for state of charge and voltage at EV Charging Station.

Fig. 7. Output of EV Station Storage

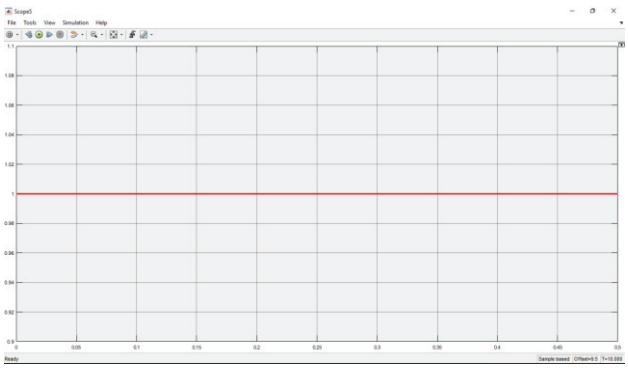

Fig. 8. Output of Battery Charge Control

The Figure 8 represents the output of state of charge which constant at 1. The graph shows constant at 1 when the state of percentage is less than 70. And its shows constant at 0 when the state of charge percentage is greater than 80.

The Figure 9 represents graph of Maximum power point tracking. Here we used voltage regulation method due to which the graph is increasing but at a point the charge is constant it is because we have used constant voltage technique.

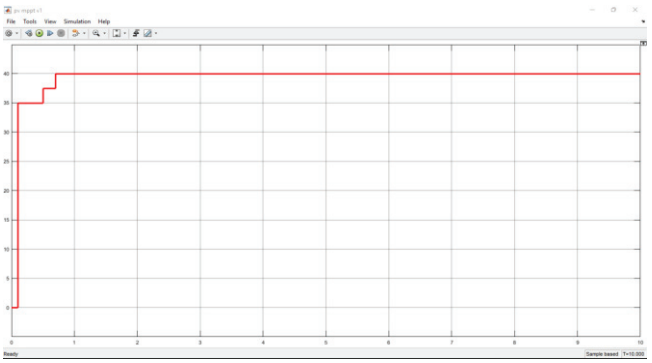

Fig. 9. Output of Solar Panel PV MPPT

V. Conclusion

A solar-powered alternative power device has been quickly and effectively designed and tested in MATLAB Simulink. MATLAB model 2016a is used for layout. AC supply charger additionally designed, and it will assist each time solar faces electricity failure. Embedded primarily based characteristic calling automation is used right here for automobile switching manner (solar mode/AC supply Mode). This layout aid for 48V EV charging software.

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