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## DESIGN & DEVELOPMENT OF SOLAR OPERATED MINI VEHICLE FOR MULTIPURPOSE OPERATION

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### ABSTRACT

Solar power is produced by collecting sunlight and converting it into electricity. This is done by using solar panels, which are large flat panels made up of many individual solar photovoltaic cells. It is most often used in remote locations, although it is becoming more popular in urban areas as well. Solar energy is the renewable energy. Solar powered mini vehicle can be described as the application of solar energy to power an electric motor rotates a blade which moves the wheel of the mini vehicle. It is a low maintenance, low running cost, eco-friendly and non-polluting product and can be used for all kinds of personal mobility solutions. Pollution is can be seen in own homes. In case of gas powered vehicles, emission of gases it is responsible for pollution and also the cost of fuel is increasing hence it is not efficient. To reduce the dependence upon fossil fuels and the air pollution from gas powered vehicles. It has been suggested as a way to replace bicycles in India with vehicles that will enable carriers to travel farther and carry more at a lower cost.

**Keywords-** solar panel, mini vehicle, photovoltaic cells, renewable.

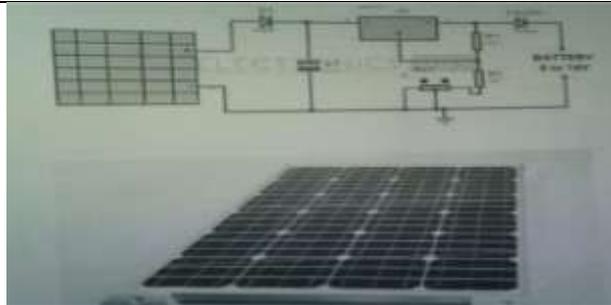
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### I. INTRODUCTION

Solar energy is the renewable energy. Solar powered multipurpose vehicle can be described as the application of solar energy to power an electric motor rotates a blade which moves the wheel of the vehicle. It is a low maintenance, low running cost and eco-friendly and non-polluting product and can be used for all kinds of personal mobility solutions. India is home to over 2.5 million vehicles. In recent years, vehicle companies have come out with alternative models such as Compressed Natural Gas (CNG) and Liquefied Petroleum Gas (LPG) vehicle to mitigate the pollution problem caused by traditional petrol models. Two main disadvantages exist with incorporating those technologies on the vehicle.

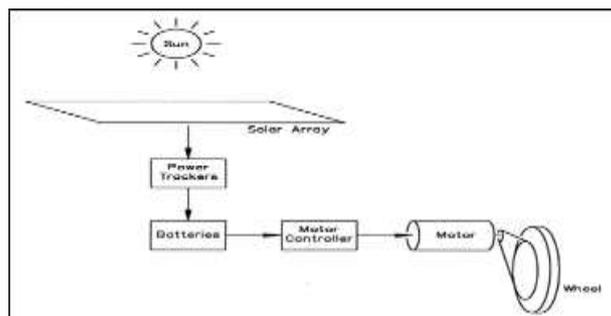
### II. LITRATURE REVIEW

Four 75W solar panels over the vehicle ceiling for battery charging. It was proved that the panels were insufficient for charging the batteries to run the 500W motor for a long time. To solve this problem, it is necessary to charge the batteries using electricity from the national grid, so a parallel charging mechanism is used for additional charging purpose excluded from the panel charging system. This hybrid „green“ vehicle can play around 10 hours. The SPR can run at 25 km per hour. The SPR has a longer battery life time because of infrequent charging. SPRs are faster than conventional vehicles, needless human effort to be plied on the street. From the types of SPR mentioned earlier in the paper, the latter one is the most economical & feasible for practical use. Solar Power is absolutely dependent on the availability of sunlight, so in case of rainy and foggy day, when the sun isn't visible, it will not be able to work properly. The greatest problem that faces the world today is Global warming. It is more apparent here in India than anywhere else, specially Rajasthan where temperatures over the last few years have risen from 32deg C to 36deg C to last summer of 42deg C to 46 deg C. Solar plate are made of 2 thin plates of silicon containing slight impurities which when exposed to sunlight experience a stimulation of electrons. If positive and negative terminals connected by a wire are added, as in a battery, the electrons will flow round the wire producing electricity. Solar vehicle is capable of a speed of 25-40 km/h. Capable of climbing up hill on an average inclination of 15 deg to 30 deg.



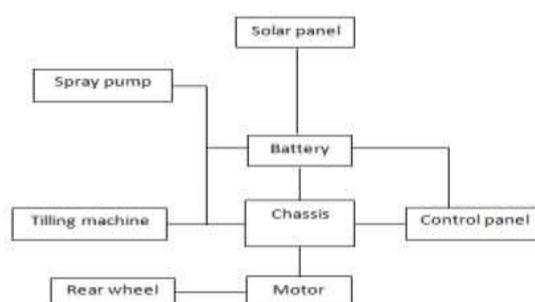
**Figure 1:** Parallel charging mechanism

There are two possible approaches to charge the EV using the PV, namely the PV-grid and the PV-standalone. The PV-grid charging has the advantage that during insufficient solar irradiance, the charging can be carried out using the grid. It is also more flexible because in the absence of the EV (to be charged), the PV power can be injected to the grid. On the other hand, the PV-standalone is more beneficial in remote areas where utility supply is not available or too costly



**Figure 2:** Basic Block Diagram

In addition to the Solar-Balancing mode that charges the battery modules at low voltage by solar power, due to the limitation and unpredictability of the solar power, the proposed system also has a Storage-Balancing mode to balance the battery modules during discharging using the stored energy and a Charge-Balancing mode to save the active discharge energy and store together with the solar energy to the storage cell during the vehicle's parking period. This is a unique feature of the proposed system, with which the solar energy is utilized as much as possible. The operating mode of the proposed system is selected based on the vehicle and weather conditions. A hybrid vehicle that uses two or more distinct power sources to move the vehicle. The term most commonly refers to hybrid electric vehicle (HEVs), which combine a solar energy and electric energy. But instead of using a solar panel for energy, electric vehicles get their energy from batteries. When the batteries run out, they must be recharged by plugging or solar panel the vehicle into an electric power outlet like home. If you drive an electric vehicle, you would recharge its batteries overnight while you slept. Hybrid vehicles have the best mileage rating of all vehicles. There are many hybrid vehicles available to buy today.



**Figure 3:** Basic Block Diagram of Solar Vehicle

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### III. CONCLUSION

The conclusions drawn are the solar powered vehicle can be a replacement for conventional vehicle. The solar panel mounted above provides shade as well as power. For higher power, motor of higher capacity can be used. The parking place for solar powered vehicle does not require a shed. The ride is noise free, eco-friendly. The battery can be charged even during riding. This ensures continuous energy input to the vehicle without any additional cost. The vehicle run with the help of solar-electric power results in reducing the air and noise pollution up to 30% in urban areas.

### IV. REFERENCES

- [1] Gaurav Kumar; Alok Kumar Gupta; Om Prakash; Deepak kumar & Sumeet kumar "Solar Operated Multipurpose E-Rickshaw" International Journal of Research ISSN: 2348-6848 Vol-3, Special Issue-3 Held on 27th January 2016.
- [2] Abdul Rauf Bhatti, Zainal Salam , Mohd Junaidi Bin Abdul Aziz and Kong Pui Yee "A critical review of electric vehicle charging using solar photovoltaic" Int. J. Energy Res. 2016; 40:439–461 DOI: 10.1002/er.3472.
- [3] Preetham G, Shireen W. Photovoltaic charging station for plug-in hybrid electric vehicles in a smart grid environment. Published in: Innovative Smart Grid Technologies (ISGT), 2012 IEEE PES, IEEE. Washington, DC. 16–20 Jan. 2012; 1–8. 12639899. DOI:10.1109/ISGT.2012.6175589.
- [4] Tong SJ et al. Off-grid photovoltaic vehicle charge using second life lithium batteries: an experimental and numerical investigation. Applied Energy 2013; 104(0):740–750.
- [5] Mesentean S et al. Smart charging of electric scooters for home to work and home to education transports from grid connected photovoltaic-systems. In Energy Conference and Exhibition (EnergyCon). 2010 IEEE International, 2010.
- [6] Chen Duan, Caisheng Wang, Zongzheng Li, Jianfei Chen, Shidao Wang, Adrian Snyder and Chenguang Jiang "A Solar Power Assisted Battery Balancing System For Electric Vehicles" 2332-7782 (c) 2018 IEEE.
- [7] Ranjeet Singh, Manoj Kumar Gaur, Chandra Shekhar Malvi "Study of Solar Energy Operated Hybrid Mild Cars: A Review" International Journal of Scientific Engineering and Technology www.ijset.com, Volume No.1, Issue No.4, pg : 139-148 (ISSN : 2277-1581) 01 Oct. 2012.