IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 3, April 2023
Impact Factor: 7.301

# Solar-Powered Electric Car

**M. V. V. Appala Naidu[1], M. Akash[2], N. Nagamani[3], J. Nitya[4], P. Dharani Priya[5], S. Anil[6]**
Assistant Professor, Department of Electrical and Electronics Engineering[1]
UG Scholars, Department of Electrical and Electronics Engineering[2,3,4,5]
Aditya Institute of Technology and Management, K. Kotturu, Tekkali, Andhra Pradesh, India

**Abstract:** *The project's major objective is the development of a solar-powered vehicle. A car that relies entirely or partially on solar power is referred to as a solar car. In solar automobiles, photovoltaic (PV) cells are frequently employed for converting sunlight into power. Solar cars are designed with environmental preservation in mind because they don't emit any greenhouse gases or other pollutants when they're in use. Solar-powered cars have the potential to significantly reduce our dependency on fossil fuels, which would delay their depletion and help to moderate the worst effects of climate change. One of the most difficult aspects of designing and manufacturing solar cars is striking the correct balance between the vehicle's weight and the size of its solar panel array. A car's ability to absorb solar energy from the sun improves with the size of its solar panel array; however, a larger array also makes the car heavier, which can reduce efficiency. In this project, we'll look into how a charge controller may be used to regulate how much electricity a solar panel array generates and how it gets to a battery pack. The energy subsequently stored will be used to power a PMSM motor. We will use a motor controller to regulate the direction and speed of the car's motion. We will also go over the steps involved in putting the mechanical parts of the car together. Finally, we'll show you how to join the electrical system to the mechanical frame of the car.*

**Keywords:** Electric Car.

## I. INTRODUCTION

There is always a need for gasoline that is trustworthy, safe, pure, and healthy for the environment. Environmentally hazardous and non-renewable are fossil fuels and other fuels made of carbon. The sun, wind, tides, hydropower, biomass, and renewable energy sources—which comprise all fuel types and energy carriers—are alternatives to fossil fuels. The choice of these sources is solar energy because it has the po3ntial to provide the most environmentally friendly, long-lasting energy throughout the course of the following several billion years. A doubling occurs every two years in photovoltaic production, which has increased by an average of 48% a year since 2002. Due to their multiple benefits for the environment, the economy, and society, PV systems have become the energy technology with the fastest rate of growth. One may argue that our inability to develop equipment that is both efficient and reasonably priced is the greatest barrier to the widespread usage of solar energy as a source of electricity. Despite the fact that nothing in our world is free, what if we adopted free rides? It would be fantastic if we didn't have to spend billions of dollars a year on fossil fuels and deal with the environmental issues that their combustion causes. If we could drive a solar-powered car, that automotive dream would come true. Solar energy would be captured by solar panels on solar automobiles. A photovoltaic cell, commonly referred to as a solid-state solar cell, is packed and included in a solar panel.

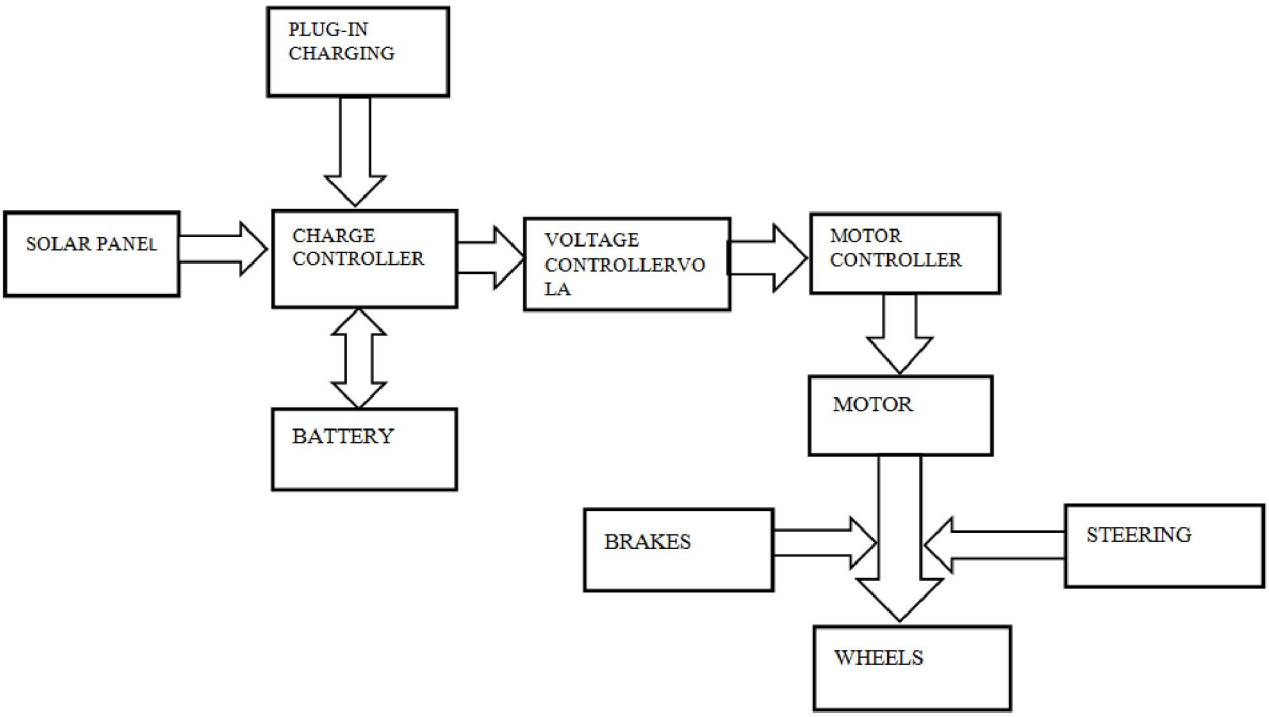
## II. LITERATURE SURVEY

With the creation of a solar car in 1980, Arye Braunstein and his Israeli engineering department colleagues at Tel Aviv University made certain contributions that have been well-researched in the literature. The solar car features a roof-mounted and hood-mounted 432-cell solar panel with a 400-watt peak output capacity. Using eight batteries, each rated at 6 volts, the photovoltaic energy is stored in the solar car. The 1320-pound solar critic vehicle's top speed was 40 mph, and its maximum range was 50 miles, per the engineering department. In 1981, Larry Perkins and Hans Tholstrup developed a race car that is fueled by solar energy. In 1982, between Perth and Sydney, the two made history as the first individuals to travel in a solar-powered vehicle across a whole continent. Universities have since then constructed a

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 3, April 2023
Impact Factor: 7.301

variety of solar vehicles for events like the Shell Eco-Marathon. At a speed of 42 mph on average, the GM Sun Racer travelled 1866 miles in 1987. An additional solar vehicle for sale is the Venture Astrolabe. In the aerospace, bicycle, alternative energy, and auto industries, the technology used in solar automobiles is frequently encountered. New battery technology was sparked by regulations that called for "zero emissions" from automobiles in the 1990s. Government and auto industry researchers have spent the majority of their time developing batteries with higher energy densities.

## III. BLOCK DIAGRAM




## IV. CAR MECHANICAL DESIGN

Electric vehicles have grown in popularity over the past ten years, but they have almost exclusively used single-ratio gearboxes up to this point. [1] The use of multiple gear ratios has a number of potential advantages, including allowing the electric traction machine and inverter to operate in a more efficient region, increasing vehicle acceleration, grade ability, and top speed, and lowering overall tachometer readings.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 3, April 2023
Impact Factor: 7.301

Electric vehicles with automated transmissions are now available on the market; however, the topic of this study is an electric vehicle with a manual gear system. [2] Before we talk about how manual transmission electric cars operate, both manual and automatic transmission systems are important to understand from multi-speed transmissions.
There are electric cars with automatic gearboxes on the market right now, but the study's emphasis is on manual-transmission electric cars. [2] prior to discussing an electric automobile.

## V. BATTERY AND SOLAR PANEL CALCULATIONS

1. The battery's energy storage capacity is 12 x 100 x 5 = 6000 Wh.
2. If the battery is 50% exhausted, the discharged battery capacity (in Watt-hours) is equal to 6000 x 50%, or 3000 Wh.
3. Assume we use lead-acid batteries. The energy required for a full charge is 3000 / 85% = 3529 Wh with an efficiency of 85%.
4. Assume that your solar array has a 250-watt capacity and an MPPT charge controller. In light of this, solar output is 250 x 95%, or 237.5 W.
5. In the National Renewable Energy Laboratory PV Watts Calculator, we select 14.08% as the default number for system losses. With corrections, solar output is equivalent to 237.5 x (100% minus 14.08%) = 204.06 W. Charge Period: 17.27 hours (3529 divided by 204.06)

## VI. BATTERY CHARGING TIME

1. The battery has a capacity of 100 Ah.
2. Maximum charging current of 15 A
3. 60 V charging voltage
4. Lead-acid batteries have an efficiency range of 80–85%.
5. The charging time equals 3.92 hours when the battery capacity's depth of discharge is divided by the charge current efficiency. (100 x 50%) divided by (15 x 85%).

## VII. FUTURE SCOPE AND CONCLUSION:

### 7.1 Future Scope

Consequently, there is a great future for solar-powered cars. These cars are now produced using technology that has seen major advancements. We already know that these cars can provide us with more freedom, and soon we will begin to experience that promise. The aforementioned car can also be controlled by voice commands and through a remote control. Following that, the user will have access to a variety of details, like the Charge Left speed limit, etc. Information on charging systems is available thanks to market segmentation worldwide. In order to assist in power generation, we can add a dynamo to the system's flywheel ring in addition to the regenerative function of the motor controller.

### 7.2 Conclusion

As a result, we developed an electric vehicle that runs on solar energy. It uses a permanent magnet synchronous motor as the driving motor and an MPPT and an EV charger to charge the battery.
On a single battery, it can travel more than 50 kilometres. The vehicle's top speed is 50 kilometres per hour. This car has enough room for the driver and three more passengers. The manual gearing system and speed changer switch allow the driver to effortlessly control the vehicle's speed.

## REFERENCES

**[1].** Light-year Zero Solar EV Enters Production At A Rate Of One Per Week, InsideEVs, January 18, 2023
**[2].** The failure of the Lightyear 0 unit may have an uncertain effect on future automotive ambitions. found by DutchNews.nl on 2023-01-26.
**[3].** InsideEVs, 2023-01-24, "Light-year 0 Production Is On Hold As The Company Focuses On An Affordable Model".

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Impact Factor: 7.301
Volume 3, Issue 3, April 2023

**[4].** The Low-Cost Electric Vehicle That Will Revolutionise the Industry Bring your A-game. 2022-08-11. 18 minutes. the 25th of August 2022.

**[5].** D. Pimentel's "Renewable Energy: Economic and Environmental Issues." The first draught was archived on September 24, 2020. Found 2011-01-28.

**[6].** [H/first-solar-car.htm [The "History of the Solar Car"] California, San Bernardino, 92415 Auto-Story 386N. Arrowhead Ave. Retrieved on 2018-02-22, from cit. web Examine the value of |url= (help)

**[7].** Sunlight-based energy sources include photovoltaic, John Lynch

**[8].** Vanguard News, The Forward Edge, 2014-03-03. Retrieved 2022-06-17 from "The Solar Car," p. 137 in Tamai, Goro, and Robert Bentley, Inc., 1999.