



## Solar Electric Cycle

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### Abstract—

Solar Electric Cycle: Harnessing Renewable Energy for Sustainable Power Generation. Solar electric cycle is helpful for senior citizen. It Take less man effort. For short distance, we can use electric cycle for carrying goods. Solar is a renewable source energy, Solar panels are devices that consist of solar cells that convert light into electrical energy well. The battery is connected to the driver which converts electrical energy. To supply to the motor. And motor works. When electricity is supplied to the motor, the magnetic flux rotates and the motor move. And throttle is given to the driver for controlling the speed of the motor and increasing and decreasing the speed of the motor. In throttle there is key switch which will make the operating as a power lock. When we will put the key and operate it then only it will on . Otherwise it will cut off the power. And accelerator also shows the indicating of the battery. How many percent is it charge? . The electric cycle load capacity is. 80 to 90 KG. And battery voltage is 24 Volt. 8A. Solar panel is monocrystalline. 24 Volt. The motor we have used is PMDC motor 24 Volt 250 Watt the electric cycle maximum speed is expected is about 15 kilometers per hour with maximum distance of. 20 and charging time of battery is. ,5 hour 30 minutes. Mileage and travel time are affected by the weight of the rider. And most efficiency is we can utilize our solar. Energy.

**Keywords—** PMDC gear-motor, Travelling, Electric Cycle, Electric Energy, Solar Panels, throttle and Driver etc

### Introduction

The Solar Electric Cycle heralds a new era in sustainable energy utilization, epitomizing the fusion of cutting-edge technology with environmental consciousness. At its core, this innovative cycle embodies the seamless integration of solar power generation into our daily lives, offering a beacon of hope in the quest for a cleaner, greener future. Harnessing the boundless energy radiated by the sun,

the Solar Electric Cycle represents a pivotal shift away from conventional fossil fuel dependency towards renewable energy solutions. We have to introduce our new project about “Solar Electric cycle” which runs with the help of sun light without any fuel. In this project we have produce our ideas to future generations for transportation. In our solar cycle solar energy is converted into electrical energy by means of solar panel, battery, solar controller. solar electric cycles represent a sustainable and environmentally friendly mode of transportation that harnesses the power of the sun to provide clean and renewable energy Due to this years the usage of the solar electric cycle for shorter distance will be increased and it also helps to reduce the pollutions like air & noise. It take less man's effort to reach. The minimum and maximum distance.

### LITERATURE REVIEW

In 2002 Lomonova, E. A. The paper discusses the generic mechanical, electromechanical, electromagnetic, control design and test approaches leading to the system integration, design solutions and physical Solar Electric Cycle as a result of the co-operative research work done by the Dutch Company – electric cycle and Technical University of Eindhoven.

This concept of Solar Electric Cycle is very versatile and highly usable, the concept discussed in the studied research papers point that, that this Solar Electric Cycle can be used in many use cases while reducing the carbon emission as it uses solar power.

In 2016 Dumitrache, Florin, Marius Catalin Carp, and Gheorghe Pana said Hybrid Solar Power Systems: This section would explore the integration of solar power with other energy sources such as fossil fuels, wind, or biomass to provide a more reliable and consistent power supply.

Seebauer (2015) investigated solar electric cycle Environmental Analysis: Here, researchers would evaluate the environmental impact of solar electric cycles compared to conventional power generation methods. This might include cost analysis, lifecycle assessments, and comparisons of air pollution gas emissions.

### Problem Definition

The above literature survey reveals following several problems associated with solar electric bicycle BLDC motor the designing and makes the system complicated. The maximum speed of bicycle when external BLDC motor used 15 to 20 Kmph. Solar energy not suitable for night time. There effect the battery not continue charge. Rainy and cloudy season issue of battery charge, Amount of losses and friction faces. Hilly area cycle speed was reduce. Solar supporter or stand design has complicated.

### Methodology

#### Working Principal

The working principle of a solar electric cycle converting solar energy into electricity to power an electric cycle. This typically involves photovoltaic (PV) panels mounted on the cycle roof, which absorb sunlight and convert it light energy into electrical energy through the photovoltaic effect. The electricity generated is then stored in batteries onboard the cycle, supply the power the electric motor, and motor rotating the wheels. We can vary the speed by throttle.

### Solar Panel



Figure No 1 (Solar Panels)

A solar panel is a device Installed the roof of cycle. There are use 2 panel each panel is 50 watt 1 panel cell quantity is 36 in one cell is 0.5 watt that converts sunlight into electricity by using photovoltaic (PV) cells. PV cells are made of semiconductor materials that produce electrons when exposed to light. The electrons flow through a circuit and produce direct current (DC) electricity, the power storage in battery. Solar panels are also known as solar PV modules.

### DC Motor



Figure No 2(PMDC Motor)

DC motor convert electric energy into mechanical energy. When DC voltage is applied to the motor, it creates an electromagnetic force that interacts with the magnetic field produced by the stator. This interaction causes the rotor to rotate, as the magnetic forces push and pull it in a continuous motion. A DC motor is an that uses direct current (DC) to produce mechanical force and forcefully rotate the mechanism.



Figure no 3 ( Battery)

A sealed lead acid battery or gel cell is a lead acid battery that has the Lead-acid batteries function as energy storage devices that convert chemical energy into electrical energy. external electrical current is applied to the battery, causing a chemical reaction that converts lead sulfate on the plates back into lead dioxide and pure lead. This process releases electrical energy, which is stored in the battery and electricity supply the electric parts.

**Sprocket**



Figure no 4 (Sprocket)

Sprocket is used to connect the rear wheel with the motor by a chain.

**Chain**

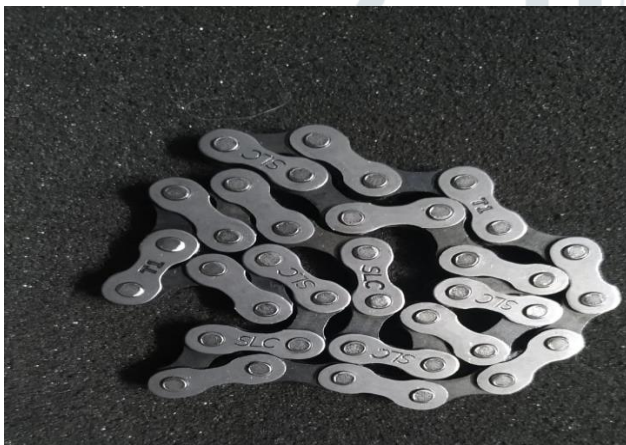


Figure no 5 (Chain)

Chain used to connect the gear shaft of motor and rear wheel for driving. And to transmit the power. To the rear wheel.

**Solar Controller**



Figure no 6 (Solar Controller)

A solar controller is an electronic device that controls the circulating pump in a solar hot water system to harvest as much heat as possible from the solar panels and protect the system from overheating. The basic job of the controller is to turn the circulating pump on when there is heat available in

the panels, moving the working fluid through the panels to the heat exchanger at the thermal store. Heat is available whenever the temperature of the solar panel is greater than the temperature of the water in the heat exchanger. Overheat protection is achieved by turning the pump off when the store reaches its maximum temperature and sometimes cooling the store by turning the pump on when the store is hotter than the panels.

**Throttle**



Figure no 7 (Throttle)

Throttle is used for wearing the speed of motor or the wearing the speed of cycle

**Controller**



Figure no 8 (Controller)

A brush controller typically regulates the speed and direction of a motorized brush used in cycle. Additionally, brush controllers often incorporate feedback mechanisms such as encoders or sensors to provide real-time data for accurate speed and position control, enhancing overall efficiency and reliability.

**Electric brake**



Figure no 9 (Electric brake)

Electric brake is used to cut off the power from the driver and controller. And it is used in two ways, electric way and. Mechanical way, mechanical way will be stop the vehicle by breaking the rim. . Rear wheel. When we have to stop the cycle, we have to cut off the power supply from the motor also, so electric brake is used.

**Key switch**



Figure no 10 (Key switch)

Key switch is used to operate the cycle by continuing the supply by key. Just like in bike. It is used for as a power lock. For locking and unlocking the cycle.

**Working**

So in our basic working of the solar electric cycle is having components like solar panel. Battery, motor controller driver and some key switches. Where solar panel is adjusted on the roof of the cycle with 30° for maximum efficiency of utilizing sunlight. When sunlight strikes on the solar panel, the photovoltaic cell generate electricity. And help battery to be charged by solar charge controller. Which is automatic fully secured. When battery is fully charged, the solar panel is cut off. And when battery is discharged, the solar panel automatically connect the charging system.

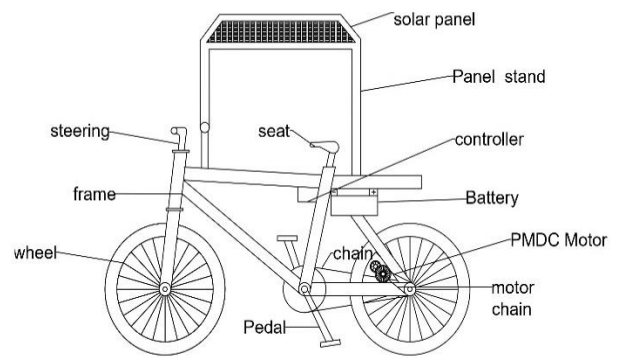


Figure no 11 (2D diagram of solar electric cycle)

Where The motor is connected to the controller. When battery gives current to the controller then it is sent to the. Accelerator. Key switch add electric braking system. And there is. A button push button on an accelerator which will close the circuit. And provide current to the total when we will accelerate and it varied the speed or increase the speed. So if when we have to stop the vehicle, we have to press. The lever of electric brake which will cut off the circuit from the controller . Of current. And stop the motor. And when we will press the clutch of electric brake then One circuit loop of stoplight will be glow, For backside of vehicle that we have stopped the electric cycle. And there is another switch. For indicating left or right. Which is the controller display shows how many percentage of battery is charged and display. And display how many percent it is charged and the voltage of. Solar panel. Showing the voltage. Like. 27 Volt 26.8, 28.8 . And. Our cycle load weight is. Is around 30 KG. Add It can sustain a load of 80 to 90 KG. and it can run about 15 to 20



kilometers per hour.

Figure No 12 (Actual Photo Of Solar electric cycle)

## Results

The results of the solar electric cycle are:

solar panel takes. 5 or 30 minutes to charge the full battery, which is about. 2 Amp. solar electric cycle speed is up to expected is 15 to 20 kilometers per hour. charging time of battery is. 5 hour 30 minutes. . Mileage and travel time are affected by the weight of the rider. . The electric cycle load capacity is. 80 to 90 KG. .Solar energy not suitable for night time. There effect the battery not continue charge. The total weight of solar electric cycle is 30 kg.

### Advantages of solar electric cycle

- It is one of the most used, cleanest and sustainable forms of energy obtained through solar cells.
- Solar panels keep charging the batteries for our continuous use
- Suitable for senior citizen
- It is eco friendly.
- And it is free from pollution.
- Free from noise.
- free from fuel.
- No carbon emission. .

### Disadvantages

- The solar energy cannot be produced at night time. Because it needs sunlight. At night time if battery is dead. Then we have to move by pedal.
- It cannot sustain more than 150 KG.

### Feature of scope

In our future days we can use our electric cycle. With solar panel as efficient way of transportation. Because it does not harm the environment. Impact of using a PMDC motor In future we can use hub motor which will reduce the weight of the cycle also and having a high speed power cycle.

### Conclusion

Based on the results of the discussion and testing of electric cycles with solar panel, conclusions can be We have been modified our electrical cycle with solar electric cycle which is implanted on the roof of the cycle. So our solar panel takes. 5 or 30 minutes to charge the full battery, which is about. 2 Amp. Our solar electric cycle speed is up to expected is 15 to 20 kilometers per hour. But effect of the rider and the weight of the travel traveler is also dependent. If the weight is heavy then it will take more time and the speed of the vehicle, will be less. And when the lightweight will be seated, then it will take less than. And more speed. Mileage and travel time are affected by the weight of the rider.

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