

# Design and Fabrication of Solar powered Bicycle

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## Abstract

The hybrid powered electric bicycle have different ways of charging a battery. These are with the help of solar energy, through Dynamo and through 220 Volt AC charge. As nowadays fuel prices are increasing rapidly. So, there is a need to look for some resources which can solve our purpose with cheaper cost and less pollution. To overcome these problems, various efforts are being made in employing alternative sources of energy for the vehicles. One such method is to use solar energy for giving power to bicycle. The solar bicycle developed is driven by DC motor & operated by solar energy. Solar panels are also mounted over it to collect solar radiations. This type of bicycle is totally eco-friendly as this requires only solar energy for its working. This paper presents the working model of solar bicycle citing the main components which it uses for its working.

**Keywords:** Solar panel, Solar powered bicycle, D C motor.

## Introduction

Bicycles and motorcycles are the two important form of two-wheeler transport in India. Bicycle has an advantage of very low running cost but has a drawback that, its range is mainly dependent on the physical fitness of the rider. On the other hand, motorcycle has a very high range as compared to the bicycle but its running cost is very high. With increasing oil price, the running cost of motorcycles will go up further in coming years. So, the present need is to develop an alternate means of transport which has the advantages of both bicycle and motorcycle. The term "hybrid" means using of more than one energy sources.

## Contribution of various researchers in chronological order:

S.no	year	Researcher	Parameters	Findings
1	2013	Sankar et al. [1]	Design of solar assisted bicycle.	Operating cost per kilometre is 0.70 Rs/km.
2	2015	Sivapragash et al. [2]	Based on Microcontroller with automation technology.	Electric propulsion system using BLDC motor with sensory speed control is proposed which gives good performance.
3	2017	Upara et al. [3]	Study of different techniques used in bicycle.	Efficiency is low by the use solar energy but still is good as its eco-friendly.
4	2018	Pleasant et al. [4]	Solar power bicycle	Can be recharged with AC adaptor.

5	2018	Vishal et al. [5]	Portable solar Bike	Can be carried easily because of its portability.
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## Experimental Set up

The project consists of the following parts:

- (1) A bicycle
- (2) Solar panel
- (3) Throttle
- (4) Brush less DC Motor
- (5) Lead acid battery

Specifications of solar cell are as follows:

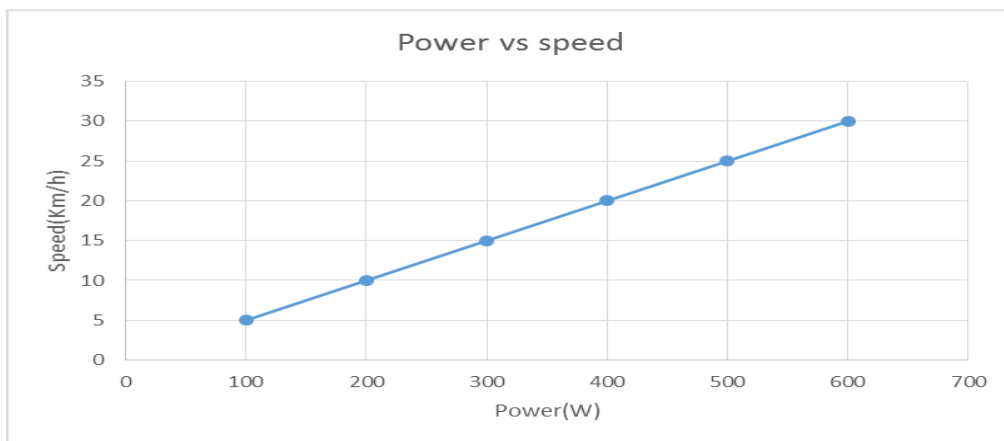
Power <sub>Max</sub> (W)	50
I (Amp)	2.9
Voltage (V)	21.3
Voltage <sub>Max</sub> (V)	17.25
Power Measured at Standard Test Condition	1000W per m <sup>2</sup> at 25 <sup>0</sup> C
Lifespan	20 years
Size	510mm × 330mm × 36mm

**Table.2.** Solar cell specifications

## Result and Discussions

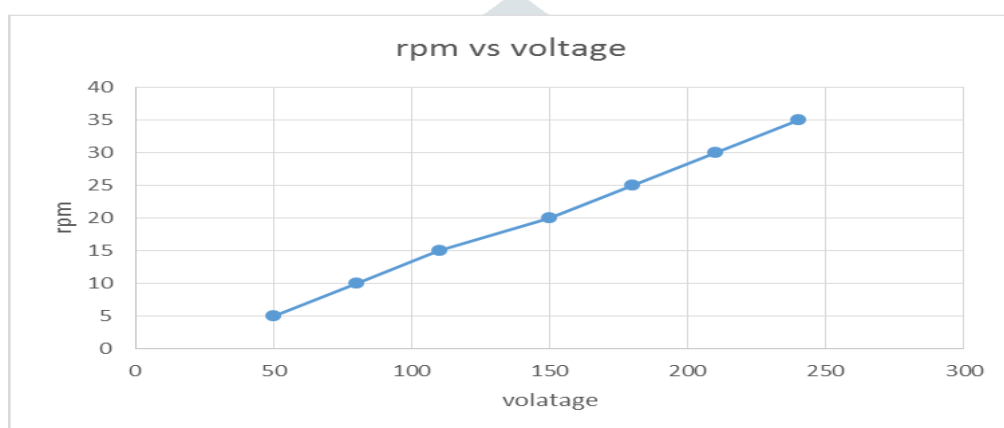
Parameter	Solar Assisted Bicycle	Ordinary Bicycle
Speed Limit <sub>Max</sub> (km/h)	25-30	10 to 15
Peddalling	No (if required)	Yes
Cost	13080	3000
Weight	42 kg	14 kg
Charging time	8-9 hr. For 50 W.	Not applicable
Driving noise (dB)	noiseless	noiseless

**Table.3.** Comparison sheet with conventional bicycle



**Figure.1.** Graph between Speed Vs power on a horizontal road (30 degree)

As seen from the above graph that at 600 W power maximum speed of 30 kmph is generated and it varies linearly.



**Figure.2.** Graph between DC voltage vs rpm

As seen from the above graph, at voltage of 240 V, rpm is about 35 and it also varies almost linearly.

**Cost analysis:**

Item	Cost/unit (INR)	Number	Cost (INR)
DC motor(400W)	4200	1	4200
Li-ion Batteries(12V-7Ah)	1100	1	1100
Speed controller	380	1	380
Bicycle	3300	1	3500
Fabrication cost Elect	400	1	400
Solar panel(40W-12V)	3000	1	3000
Fabrication cost +other cost	1000	1	500
			<b>Total=13080</b>

**Conclusion**

This Solar powered bicycle is one of the cleanest and sustainable form of transportation. It is very environmentally friendly and also have minimum investment cost. In this project, bicycle uses solar energy for its working. In future, other renewable sources like Wind energy can also be used for this purpose. Also,

this costs approximately 13000 INR which is its plus point with maximum speed limit of 25-30 kmph. Still a lot can be done in this field. We can also use indicators, advance sensors, Navigation system etc. for its more advancements.

## References

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