A Review on Solar E-Bicycle

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Abstract - This paper presents a study on eco-friendly solar E-bicycle. We all are aware that the present situation of air quality in metro cities and urban areas are getting critical and the price hike in fuel prices.To overcome these challenges this solar E-bicycle is made. This solar E-bicycle is a one-stop solution for a middle-class family that can not afford two-wheelers. It operates with clean energy and is eco friendly in nature. Every hour, each square meter of the upper atmosphere receives 1.367kWh of Solar Energy. Solar energy is a clean and renewable energy resource that is available in abundance. The solar plate mounted on the roof of the solar E-bicycle collects the energy which charges the battery and supplies the energy to the electric gear motor. When the weather is cloudy the battery can be charged through the external supply. This review paper also promotes the applications and benefits of using environmentally-friendly vehicles.

Keywords- Solar energy, Solar panel, Non-conventional resources, Fossil fuel, Eco-friendly.

I.INTRODUCTION

The sun based electric bike is implied as a test to encourage, on radiant late spring days, the preeminent pedal help conceivable out of the sun powered battery utilized. The sun powered electric bike is playful.It shouldn't cost significantly more energy to drive the sunlight based electric bike. At the point when there isn't any daylight or the batteries are vacant the bike ought to in any case be light running. E-bicycles need huge and weighty batteries to permit riding significant distances, in light of the fact that the battery is charged on only one event. The solar bike approach is different. The aim of the solar bike isn't to avoid wasting energy. An E-bicycle is unbelievably energy effective. The value of the power that might be expected to cycle an entire day is very less. As far as energy reserve funds, this is frequently unimportant. During this design, a relatively basic and modest vehicle is additionally determined without the work of any non-renewable energy sources. The sun based electric bike is well available, protected and down to earth with restricted support prerequisites on account of at least mechanical parts utilized. A device is fixed on the rear carrier and solar cells charged and stored within the battery. The battery supplies power to the gear motor of the rear axle and when there are no solar rays the batteries are typically charged through external charger and bicycle runs on the road.

II.HISTORY OF SOLAR

Humans have been striving to capture the sun's energy since we began evolving. As far back 2700 years ago when the human population was just a few million people we used glass to modify the sun's light into a focused beam for lighting fires. French physicist Edmund Becquerel found the "photovoltaic impact" in 1839 which is the operating principle of the modern day solar cell **[1]**. This discovery eventually led to the first ever Selenium cell rooftop solar array built in New York City in 1884 by American inventor Charles Fritts **[2]**. A few important improvements and transistors with the introduction of the better Silicon cell by Russell all in 1941 meant the technology was advancing quickly and under the guidance of these 3 scientists.Russell Ohl was an American specialist who is for the most part perceived for protecting the cutting edge sunlight based cell (U.S. Patent 2,402,662, "Light sensitive device"). Russell Ohl was an eminent semiconductor analyst preceding the creation of the semiconductor **[3].**

Bell Telephone Laboratories produced the first silicon solar cell in 1954 **[4]**. At Bell lab, Mohamed M. Atalla developed the process of silicon surface passivation by thermal oxidation in 1957 **[5][6]**. The era of modern day solar panels finally arrived and in the first photovoltaic technology was licensed to be sold by Western Electric. The first photovoltaic residential install was completed in 1973 by the project name "Solar One". In 1960 Wisconsin firm silicon sensor began the first large scale silicon based photovoltaic manufacturing facility. After this the solar popped up on everything. The technology, efficiency and even the look of the solar all improving rapidly as the world awakens to the abundant, clean, zero maintenance energy the sun offers. From Spain to Dubai, from China to India megawatt scaled plants are powering the lives of millions of people.

III.COMPONENT AND DESCRIPTION

DC Gear Motor

DC engines are characterized as an expansion of a DC engine which previously had its Insight subtleties. A series motor produces very high starting torque and is generally used for initial high inertia loads, such as trains, building lift. An equipped DC Motor integrates a stuff gathering appended to the motor. The speed of the motor is determined as far as revolutions of the shaft each moment and is written as RPM i.e Rotation per Minute. The gear assembly is used to increase the torque and reduce the speed of the motor. Involving the right mix of cog wheels in a surpassing stuff engine, its speed

is additionally decreased to any positive figure. This thought where cog wheels diminish the speed of the vehicle yet increment its force is known as stuff decrease. Gear engine adds mechanical pinion wheels to differ the speed/force of the engine for an application. Normally, such an expansion is to scale back speed and increment force.

Motor Controller

The motor controller is employed to provide the constant voltage to the BLDC motor. The motor controller consists of various styles of sensors called the Hall Effect sensors that sense position and direction of the magnet within the rotor and provide commands to excite the appropriate coils to rotate the rotor. A motor controller is an electronic circuit consisting of MOSFET, transistors, microprocessors etc, that are required for the upper and lower voltage, over current protection of the motor.

Battery

A lithium-particle battery or Li-ion battery might be a sort of battery-powered battery inside which lithium particles move from the negative cathode through an electrolyte to the positive terminal during release and back while charging. Commercial Li-ion batteries were developed by a Sony and Asahi Kasei team led by Yoshio Nishi in 1991 **[7]**. Li-particle batteries utilize an intercalated lithium compound in light of the material at the positive anode and normally graphite at the negative cathode. Lithium-particle (Li-ion) batteries are used in numerous items like hardware, toys, remote earphones, handheld power instruments, little and colossal apparatuses, electric vehicles and electrical energy stockpiling frameworks. While perhaps not appropriately overseen at the tip of their helpful life, they will actually hurt human well being or the climate. The expanded interest for Li-particle batteries inside the commercial center will be followed to a great extent to the high "energy density" of this battery science. "Energy density" signifies the amount of energy that a framework stores in a measure of room.Lithium batteries are more modest and lighter than different kinds of batteries while holding the indistinguishable measure of energy. This scaling down has considered a quick increment inside the customer reception of more modest convenient and cordless items.

Charger

Charger is likewise a device that stores energy in an incredibly extremely huge battery by running an electrical flow through it. This charger is utilized to charge the 24v lithium particle battery. It depends on the advanced high recurrence exchanging power supply structure, worked in microcomputer control, to accomplish quick, adjusted, tempestuous, drifting, charge speed, precise and solid. The ongoing rating of the charger is 1.2A to 2A. When there is no sunlight, the charger can be used as an alternate option.

Solar panel

Sun oriented beams falling on a silicon semiconductor are answerable for electrons to stream, making power. Sun oriented energy creating frameworks have something worth being thankful for about this property to change over daylight straightforwardly into voltage. Sunlight based cells convert the sun oriented radiation energy straightforwardly into electric energy using the photovoltaic cell. The photovoltaic impact includes the production of a voltage into an electromagnetic wave. There are two sorts of elective energy delivering systems: network or lattice related structures, which are related with the business power establishment and free structures, which feed capacity to an office for ensured use, or to A battery for limit. System related structures are used for homes, public workplaces like schools and crisis centers, and business workplaces like working environments and retail outlets . Autonomous systems are utilized during a spread of usage, including emergency power supply and

remote power where standard establishment is distant.

Throttle

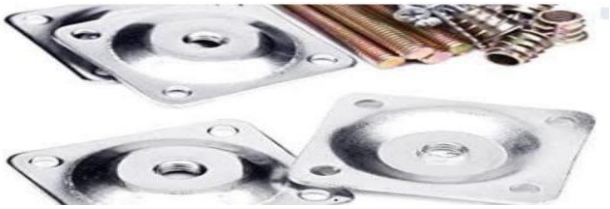
The concept is just about identical as in a very common motorcycle. These allow to directly control the amount of power that the motor is producing in real-time. There are several types, as thumb throttles (the throttle is engaged by pushing the lever forward along with your thumb), full twist throttles (the throttle is engaged by twisting the throttle grip, seen in most motorcycles) or half twist throttles (the throttle is engaged by twisting the throttle grip, which is that this case is simply half the grip. These are the foremost common throttles employed in e-bikes.

Brake levers

A brake diminishes the speed of a bike and prevents it from moving. The three significant assortments of breaks are: edge brakes, circle brakes, and drum brakes. Most bike stopping mechanisms comprises of the three fundamental parts that is, a system for the rider to utilize the brakes, similar to slow down switches or pedals, a component for communicating that sign, as Bowden links, water powered hoses, bars, or the chain and furthermore the brake instrument itself, a caliper or drum, to squeeze at least two surfaces together to change over, by means of grinding, mechanical energy of the bicycle.

Mounting plates

A mounting plate is the part of a pivot that appends to the wood. Mounting plates might be utilized in entryways, cabinetry and furniture. They'll likewise make it more straightforward to collect cabinet slides. Mounting plates are accessible during a kind of sizes and wraps up to ensure that each venture has appropriate equipment. The size of the mounting plate influences the entryway overlay, so woodworkers should take care to pick the legitimate pivots for their tasks. Wrong sizes might cause holes or covering entryways. There are mounting plates available that are



intended to be stowed away from view, which could improve the vibes of cabinetry. A few styles of stowed away pivots are introduced inside the cabinet, while others are decorated for a flush fit.

Chain

A Chain is a variety of connections kept intact with one another with steel pins which is used to transfer the mechanical power to the real wheel in rotatory motion. It is attached to the sprocket. The arrangement is made more enduring and long lasting to bear the power of the motor.

Sprocket

The chain drawing in with the sprocket changes over the rotational power into the turning power as well as the other way around . The sprocket which looks equivalent to stuff might vary in three perspectives. Sprockets have many drawing in teeth however equips only a couple.The teeth of a stuff contact and slip against each other yet there is essentially no slippage simply in the teeth of sprockets . The type of the teeth aren't comparable in pinion wheels and sprockets.

DC-DC step up booster

DC-DC booster is used to adjust the output voltage of a solar panel and make it equivalent to the battery output voltage. It has 4 terminals i.e two for input voltage and two for output voltage. The voltage is adjusted by rotating the potentiometer of the dc-dc step up booster.

IV.COST ESTIMATION

S.NO	DESCRIPTION	PRICE IN INR
1	Solar panel	3500
2	Battery	6500
3	Materials & Equipment	5600
4	FABRICATION COST	2500
5	WHEEL	1000
	TOTAL COST	**19100**

V.TOP 5 ELECTRIC BICYCLE MANUFACTURING AND COSTING IN INDIA

Manufacturing	Costing	E-Bicycle Model
Hero	Price start from Rs.23,000 to Rs.1,35,000	 LECTRO EHX20
GEEKAY Bikes	Price start from Rs.35,000 to Rs.48,000	 ECOBIKE PRO PLUS
E-TRIO	Price start from Rs.32,599 to Rs. 37,799	 ASHVA
NIBE Motors	Price start from Rs.32,000 to Rs.89,000	
SWAGTRON	Price start from Rs. 39,490 to Rs.79,990	

VI. CONCLUSION

The aim of this review paper is to style and construct a less expensive solar e-bicycle. After analyzing all the performance study it's obtained that the storage system can run the solar e-bicycle upto 15-18 kmph. So, the solar and electric powered vehicle designed and constructed during this review are often used as a green vehicle in developing countries because of its less costly and no pollution affect nature.

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