

Self Charging Electric Bicycle

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Abstract: -Present rendition of Electric bike accessible in business sector is not self charging and this bike endures with more weight. Such bicycles utilized for short separation. The expression "SOLAIR" (Self charging electric bike) is utilized to depict "electric-engine controlled bikes," including both completely and incompletely engine fueled bikes. This anticipate is comprise six separate parts: The Battery, Dynamo as a wind generator, the BLDC engine, controller, charging framework and sun oriented board. Utilization of disentangled Mechanical outline and less weighted dry cell batteries to defeat the above issues. Wind-sunlight based blend is utilized for self charging. Because of that bike get to be brilliant and pace is expanded. Charging time required for battery of this bike is less and releasing time is more. A few parts, for example, engine, controller, battery, senator were introduced in like manner bike, it is called electric bike. The rate of electric bike is controlled by controller, which guarantee the electric bike security and it is additionally the center part. Fulfilled capacity of limit discovery, under-voltage insurance et cetera, as a result of PIC16F72 was taken as the principle control chip, make present day electric bike progressively more have a tendency to be wise. The main thrust of customary electric bike totally originate from engine, it diminish battery life extraordinarily as well as waste more power vitality. The configuration is exceptionally productive, savvy, and one day mass-made, particularly in creating nations where car transportation is an unthinkable. Here, the self-charging electric bike business sector would profit by further research both on the battery and on the drive innovation and their utilization with electric bikes. A self-charging electric bike in light of a brushless dc engine drive which has high effectiveness, zero contamination, spotless and helpful, is then planned and executed in this anticipate.

Keywords: Self Charging, Zero Pollution, Wind - Solar Combination, Electric Bicycle, BLDC engine.

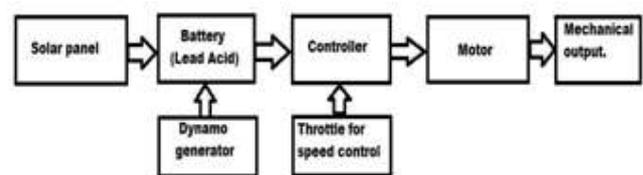
I. Introduction

Right when considering possible senior exercises, we overall inferred that we expected to fulfill something that would by some methods be useful to the planet. We picked that the electric bicycle would be the best fit. The electric bicycle offers an all the more spotless other choice to travel short-to-moderate detachments instead of driving a gas controlled auto. Starting late, the World has logically bolstered a cleaner circumstance and less dependence on outside oil. The expense of foul petroleum has extended on a very basic level over the span of late years and there is all in all no turning back. The earth has in like manner been to a more prominent degree a middle all through the world in the past couple of years, and it gives the idea that cleaner alternatives have been reliably on the rising with not a solitary end to be found. The electric bicycle is an errand that can progress both cleaner development and moreover a lesser dependence on oil. It will continue running on clean electric power with the ability to resuscitate the battery 3 separate courses: through the 230 VAC divider source, by creating power through the dynamo-sun based blend. An extra point of interest to building the electric bicycle is that it can in like manner show the general populace how a great deal less costly it would be to change over their typical bicycle into an electric bicycle instead of driving solely in their gas-powered vehicles. The more conspicuous importance of the earth on the planet prompts an open entryway for understudies in our position. With the economy endeavoring to escape a standout amongst the most perceptibly dreadful downfalls of the century, there are different open entryways for us to help. This is our opportunity to contribute a greener and more profitable planet. Bleeding edge electric bicycles join various advancements from development and arrangement, particularly in the earlier year. These progressions charm for

the thought of various customers. The time is right—biological and fiscal motivations favoring electric vehicles have never been more critical, nor the choices so contrasting, for such a substantial number of people.

A couple parts, for instance, motor, controller, battery, delegate were presented in like way bicycle, it is called electric bicycle. The pace of electric bicycle is controlled by controller, which ensure the electric bicycle security and it is furthermore the middle section. Completed limit of point of confinement revelation, under-voltage protection and so on, by virtue of PIC16F72 was taken as the rule control chip, make propelled electric bicycle continuously more tend to be insightful. The primary force of customary electric bicycle thoroughly begin from motor, it diminish battery life remarkably and squander more power essentialness. The trust is that this framework can end up being astoundingly capable, fiscally canny, and one day mass-conveyed, especially in making countries where auto transportation is an unfathomable probability. Each of these will be based upon and upgraded advance anyway this is our opportunity to contribute a greener and more capable environment.

II. DESIGN REQUIREMENTS



There are numerous key parts inside the piece chart for this framework as appeared in Figure. They comprise of a Lead corrosive battery, engine controller, photograph voltaic sun

based board, dynamo generator and a brushless DC engine. The force throttle controller are straightforward frameworks that are utilized to trigger the capacities for expanding speed, keeping the velocity steady, and killing the engine. The force hotspot for the framework was a DC battery source yield 48V. The battery piece is interfaced with the engine controller square. The engine controller controls all the utilitarian capacities and is the focal part of the framework. The fundamental necessity for the control is to manage the measure of force connected to the engine, particularly for DC engines. The engine controller can be acclimated to synchronize with different brushless engines. There are additionally numerous implicit capacities for this controller that fluctuate from recognizing any breakdowns with the engine corridor sensors, the throttle and secure capacities against extreme present and under-voltage. The control permits the battery to interface with the engine to be bidirectional which can supply and get power. Programming is given the controller with the goal that it can alter the setting and operations for a few of the controller's capacities.

Another wellspring of battery charging originates from the photovoltaic sun oriented board and wind mix. At first a light-weight and adaptable sun oriented board was coveted. The sun oriented board with the same necessities of yield 12V and 20 watts, 12V and 11W was found. This two sun based join with two 12V and 12W dynamo generator. Every one of the four are associated in arrangement. Once a voltage and current is created through the sunlight based wind square, it gives the 48V to battery. It is more proficient to have a higher current contribution to the help converter however for the present spending plan and assets, it is not down to earth. Because of the wasteful charging power supplied to the battery, it is not reasonable for the sun based dynamo mix to completely charge the battery. Its basic role is to give a more drawn out life cycle to the battery and to give some charge when access to an outlet is not accessible..

III. DESIGN SOLAR CELL

One way we considered charging the battery is using a sun based cell. Sun powered cells are gadgets that change over the vitality of daylight straightforwardly into power using the photovoltaic impact. The photovoltaic impact includes the production of a voltage in a material upon introduction to electro-attractive radiation the photoelectric and photovoltaic impacts are connected through daylight, yet are diverse in that electrons are shot out from a material's surface upon presentation to radiation of adequate vitality in photoelectric, and created electrons are exchange to various groups of valence to conduction inside the material, bringing about the development of voltage between two anodes in photovoltaic.

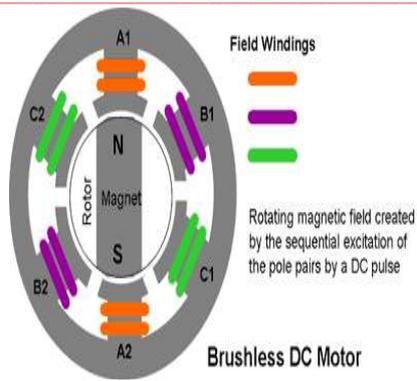
High effectiveness sun based cells are a class of sun powered cell that creates more power per episode sunlight based force unit. The vast majority of the business is centered around making the most cost productive sun based cell regarding cost per created power. There are a wide range of sorts of high proficiency sun oriented cells. The three primary sorts of the productivity sun powered cells are multi-intersection sun oriented cells, dainty film sun

powered cells, and crystalline/mass silicon. Out of every one of these decisions of sunlight based cells, we chose a polycrystalline sun powered cell which is the mass sort silicon. We picked this cell over alternate cells in view of expense and the measure of productivity we required. The multi-intersection sunlight based cell is much excessively costly for our financial plan, and the slight film sun based cell is not that solid. The crystalline sort sunlight based cells were the most dependable and industrially accessible sort. Monocrystalline might be more effective, yet with the application we're utilizing, it would not make any difference on the off chance that we utilized either crystalline sun based cell. Polycrystalline was less expensive and gave an adequate measure of yield voltage.

The sun oriented cell was purchased from shop about RS. 750(4NOS) It gives a yield voltage of around 12V and 5W with a lifespan of around 25 years. This present module's productivity is around 10%, which is adequate in our application. The measurements are 22 in. × 14.2 in. × 0.98 in. We chose to mount the sun based board on top of the battery, which is situated over the back tire. Thusly, the rider is not kept from riding the bicycle serenely and shields the battery from straightforwardly being warmed by the sun. There will house for the sun based cell that will keep it set up and give security from harm.

Brushless Direct Current Motor

Picking an engine was the initial phase in making a suitable framework for the electric bicycle. At first, the task was to be driven by DC miniaturized scale engines that were arranged to turn a sprocket. The sprocket is utilized to transmit revolving movement between two shafts. To change riggings and rates of the bike, the breadth of the sprocket should be changed. Rather than having various estimated sprockets in parallel, the underlying thought was to put numerous miniaturized scale engines in parallel to expand the measure of current supplied to the sprocket for more yield force. This framework appeared to be over confused and the smaller scale engines would not supply enough power and torque to bolster a bike at high speeds. It was settled that the best arrangement in driving the bicycle is with an electric DC engine; along these lines, making an electric bicycle. In the DC engine, a static field flux is impelled utilizing lasting magnets or a stator field winding. Situated on the rotor of the DC engine is the armature winding. The armature winding is the arrangement of leading loops, each associated in fragments of a commutator that are twisted around the iron center in which voltage is incited. This causes it to pivot inside an attractive field; if the wires are broken or harmed, the armature won't turn appropriately. For the DC engine to create any torque, the curls of the armature must be associated with an outside DC circuit with a considerably number of brush heads. Figure demonstrates a circuit model of a DC engine.



The main advantages and characteristics of a BLDC motor compared to a conventional DC motor include .

- Longer life and higher reliability
 - Higher efficiency
 - Ability to operate at various speeds, including high speed applications
 - Can reach peak torque from stand still
 - Construction of motor rigid
 - Operational in vacuum or in explosive or hazardous environments
 - Eliminates radio frequency interference due to brush commutation
 - Heat is generated in the stator: Easier to remove and maintain.
 - Rotor has permanent magnets vs. coils thus lighter less inertia: Easier to start and stop
 - Linear torque/current relationship smooth acceleration or constant torque
 - Higher torque ripple due to lack of information between sectors
 - Low Cost to manufacture
 - Simple, low-cost design for fixed-speed applications
 - Clean, Fast and Efficient
 - Speed proportionate to line frequency (50 or 60 Hz)
 - Complex control for variable speed and torque
- All of this contributed to the decision to use a BLDC motor as the driving source of our electric bike. The benefits of the BLDC motor give the electric bike thereliability and features it needs to make it a practical and reliable alternative source of transportation.

All of this contributed to the decision to use a BLDC motor as the driving source of our electric bike. The benefits of the BLDC motor give the electric bike the reliability and features it needs to make it a practical and reliable alternative source of transportation. Compared to a typical DC motor, the BLDC motor implements an electriccommutator instead of a mechanical commutator which, in effect, increases the reliability. Additionally, the rotor magnets in a BLDC motor generate the rotor's magnetic flux, in turn giving it higher efficiencies than a normal DC motor. The BLDC motor is essentially the opposite of a brushed DC commutator motor, in which the permanent magnets in the motor rotate around the conductors while the conductors are stationary. Current polarity in the DC commutator motor is controlled and varied by the brushes and commutator. With the BLDC, the

polarity of the current is driven by power transistors that switch synchronously with respect to the rotor position. In order to monitor the position of the rotor, sensors are typically used, one of which is the Hall Effect sensor which is not needed in conventional DC commutator motors.

Inside view of BLDC hub dc motor.



Motor Controller

To drive and control the BLDC engine, the utilization of an engine controller was executed. The engine controller is a vital gadget for any engine driven gadget. The engine controller is practically equivalent to the human cerebrum, preparing data and encouraging it back to the end client. Obviously, the utilizations of an engine controller change taking into account the errand that it will perform. One of the least complex applications is an essential switch to supply energy to the engine, therefore making the engine run. As one uses more elements in the engine, the intricacy of the engine controller increments. To drive the BLDC engine, the engine controller sends rectangular/trapezoidal voltage stirs that are combined with the position of the rotor. The voltage feeds of the BLDC engine should be connected to the two periods of the 3-stage winding framework so that the edge between the stator, flux and the rotor flux is kept near 90 degrees so as to produce most extreme torque from the engine. With a specific end goal to do that, the engine controller is utilized to electronically control when the voltage strokes are connected.



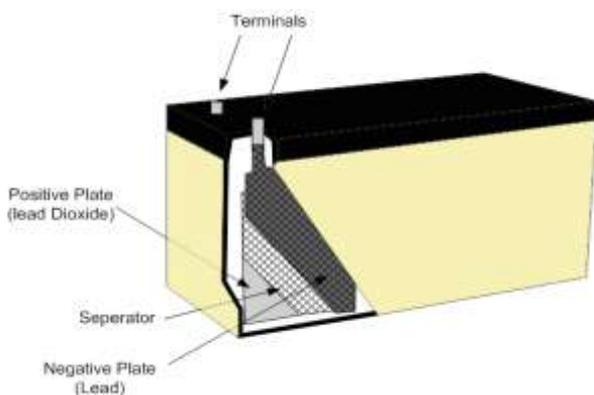
IV. MOTOR CONTROLLER

Seal lead acid battery

The lead–acid battery was developed in 1859 by French physicist Gaston Planté and is the most established kind of rechargeable battery. In spite of having a low vitality to-weight proportion and a low vitality to-volume proportion, its capacity to supply high surge streams implies that the cells have a moderately extensive energy to-weight proportion. This element, alongside their minimal effort, makes it appealing for use in engine vehicles to give the high current required via car starter engines. As they are

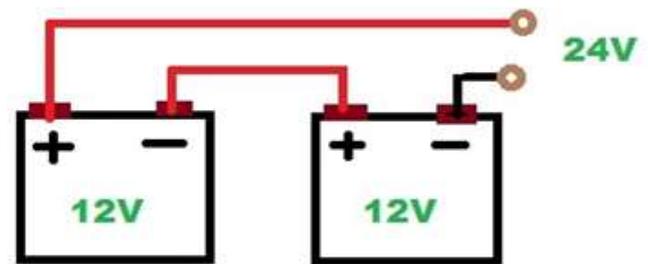
cheap contrasted with more up to date advancements, lead-acid batteries are generally utilized notwithstanding when surge current is not vital and different plans could give higher vitality densities. Extensive arrangement lead-acid plans are generally utilized for capacity as a part of reinforcement force supplies in mobile phone towers, high-accessibility settings like healing facilities, and stand-alone power frameworks. For these parts, altered variants of the standard cell might be utilized to enhance stockpiling times and lessen support prerequisites. Gel-cells and consumed glass-mat batteries are basic in these parts, all in all known as VRLA (valve-directed lead-acid) batteries.

Charging:- Charging Sealed Lead Acid (SLA) batteries does not appear an especially troublesome procedure, but rather the critical step in charging a SLA battery is boosting the battery life. Basic consistent current/steady voltage chargers will carry out the occupation for some time, yet the battery future cited by the producer will be enormously decreased by utilizing non-clever chargers like this. Amplifying the life of your SLA battery by utilizing an insightful charger is not just practical, it is likewise better for the earth. Before taking a gander at the distinctive charging strategies it is vital to comprehend the battery science and what happens amid typical charge and release cycles. Normally the positive plates in a SLA battery are produced using lead dioxide and the negative plates from a wipe lead. The electrolyte is generally sulphuric corrosive blended with a gelling operator and is to a great extent consumed and held by protecting separators between the plates, see Figure



When an SLA battery is being discharged; the lead (Pb) on the negative plate and the lead dioxide (PbO₂) on the positive plate are converted to lead sulphate (PbSO₄). At the same time the sulphuric acid (H₂SO₄) is converted to water (H₂O). In a normal charge, the chemical reaction is reversed. The lead sulphate and water are electro-chemically converted to lead, lead dioxide and sulphuric acid. During a full charge cycle any gasses produced need to be re-combined in a so called 'oxygen cycle'. Oxygen is generated at the positive plates during the latter stages of the charge cycle, this reacts with and partially discharges in the sponge lead of the negative plates. As charging continues, the oxygen produced also re-combines with the hydrogen being produced on the negative plate forming water. With correct and accurate cell voltage control all gasses produced during the charge cycle will be re-combined completely into the negative plates and returned to water in the electrolyte.

Hence we use 24 volt lead acid battery to run 24v.dc motor. .Battery connection as shown in fig.



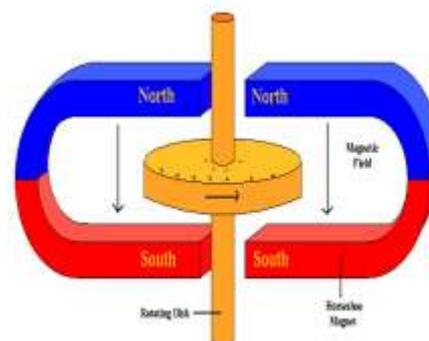
V. DYNAMO

A **dynamo** is an electrical generator that produces direct current with the use of a commutator. Dynamos were the first electrical generators capable of delivering power for industry, and the foundation upon which many other later electric-power conversion devices were based, including the electric motor, the alternating-current alternator, and the rotary converter. Today, the simpler alternator dominates large scale power generation, for efficiency, reliability and cost reasons. A dynamo has the disadvantages of a mechanical commutator. Also, converting alternating to direct current using power rectification devices (vacuum tube or more recently solid state) is effective and usually economical.

VI. HOW DYNAMO WORKS

A bicycle dynamo is a type of generator attached to a bicycle to produce electricity for the bicycle's lights. The top of the dynamo touches the tire's rim, which spins when the bicycle starts moving. Currently, the term dynamo refers to mechanisms that are capable of producing direct current, such as the small devices fitted to bicycles to generate power for the lights.

Typically, a bicycle dynamo has one or more permanent magnets with coils of wire spinning inside their poles. The device consists of a stationary part called a sator and a rotating part called an armature. When the coil spins in the magnetic field created by the magnets, the magnetic flux begins to change through the coils, resulting in an electric field that generates the charge carriers through the wire. This process produces an electric current. Small bicycle dynamos attain a low efficiency in converting mechanical motion into electricity. However, there are large machines, such as water wheels, that attain high efficiency under ideal conditions.



VII. WORKING OF DYNAMO (CNSTRUCTION)

Dynamo use in our project to charge the battery while discharging..



Flow process

- 01) Charging of battery through solar cell,
 - 02) motor controller, motor, throttle speed controller get starts when all wires are connected to each other.
 - 03) when cycle is running dynamo generate dc current and charge the battery . Main purpose of provide dynamo is to charge battery when cycle is in running position. Due to which we will get more battery back up and we can cover more distance.
- Future use of solar energy in automobiles

Solar Powered Cars



VIII. CONCLUSION

This project brought together several components and ideas to achieve a common goal: to prove that it is possible to build a bicycle with 3 separate charging sources. We put a lot of time into this bicycle to make sure that it was perform best it possibly could. Now that the project as a whole is finished, we hand it over to future generations to design and improve each component. Possibly future projects may include:

- 1) Design of a charge controller for the battery: The battery management system (BMS) built within the battery was very hard to access, so we couldn't get an idea of how it was designed. Having a BMS with the ability to take in a wider range of voltages and currents will be ideal.
- 2) Design of the motor controller: The current motor controller is a very nice size and weight, but the connections that it provides are not as stable and protected as it can be. Limiting the amount of wiring and connections may also be desired.

We understand that this bicycle can be intimidating because of its weight and its ability to go 30 MPH. This bicycle has become very special to all of us, and we hope that it will be well taken care of and improved upon. Good luck to the future recipients and REMEMBER to have fun.

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