VISVESVARAYA TECHNOLOGICAL UNIVERSITY

Jnana Sangama, Belagavi-590018

Project Synopsis on

"LOW-COST SELF CHARGING HYBRID ELECTRIC BICYCLE"

BACHELOR OF ENGINEERING

in

ELECTRONICS AND COMMUNICATION ENGINEERING

submitted by

ROHAN H R(rohanhr6155@gmail.com)	**1AR19EC020**
SHARATH R(sharathrgowda74@gmail.com)	**1AR19EC022**
SHRINIDHI S(sshrinidhi663@gmail.com)	**1AR19EC024**
SHWETHA S(shwethasuresh2001@gmail.com)	**1AR19EC025**

Guided by

Prof. Hamsaveni.N(hamsasooraj@gmail.com)

BVV Sangha Bagalkot

AIEMS

BENGALURU

DEPARTMENT OF ELECTRICAL AND COMMUNICATION ENGINEERING

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ABSTRACT

There is increased interest in alternative vehicle technology due to various factors such as increased fuel consumption, depletion of available fuel resources day by day, increase in fuel cost and increased exhaust emission with increase in number of vehicles. This led to demand of cleaner and highly efficient alternative vehicle technology which can save energy resource. Hybrid Electric Vehicle is one such alternative vehicle technology which has potential to reduce the use of fossil fuels and decrease the emission of harmful gases. The design hybrid electric bicycle involves two ways of charging the battery: Dynamo method and 220V AC wall charge method. This stored charge is used by DC motor to operate the bicycle. The hybrid powered bicycle can be driven through the electric DC motor or it can be driven manually through Pedalling. When bicycle moves in the downstream the mechanical energy is converted into electrical energy through the motor, where motor acts as generator and charge produced is stored in the battery (Self charging).

KEY WORDS: Hybrid electric Bicycle, Dynamo, DC Motor, Manual pedalling.

INTRODUCTION

The term "hybrid" usually implies that more than one energy source. There are many types of bicycles in the world such as normal bicycle, that people need to peddle to move, motorized bicycle that uses current as its prime power and electric bicycle, that can only be sufficient for some hours. Due to the drawbacks in the existing system, the system had been improved with the different technique. When the vehicle is travelling in the down streams without peddling or while pedalling the dynamo gets energized and charges the battery. This idea is used to make the battery of the bicycle last longer and can automatically recharge. This helps traveler to travel long distances. Rechargeable Lithium batteries are used to increase the battery life. The hybrid bicycle is a project that can promote both cleaner technology as well as lesser dependence on fuel. It will run on clean electric power with the ability to recharge the battery in two separate ways: through the 230 V AC wall source and with the Dynamo.

OBJECTIVES

1. Developing hybrid Bicycle
2. Provide dual mode of operation.
3. Increasing the efficiency of the battery.
4. Eco-friendly vehicle.
5. Increase in the speed of the vehicle in comparison with electric bicycle.
6. Cost effective.

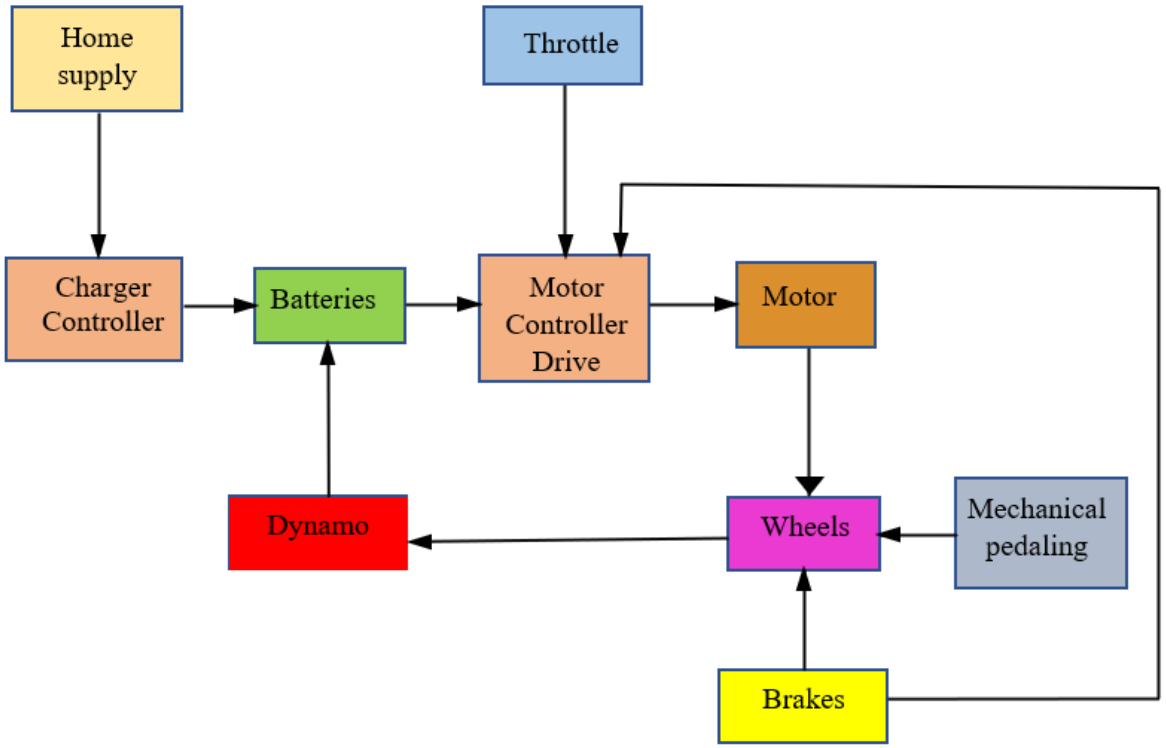
MATERIALS REQUIRED

- Brushless DC motor
- 24 Volts Motor Controller Drive
- Sensor Brakes
- Control Key
- Throttle
- Dynamo
- Lithium Batteries
- Charger Controller
- Head light with horn
- Digital Volts Indicator
- Conduit and sleeve

METHODOLOGY

To increase the efficiency of the battery, the Lead acid battery is replaced by Lithium battery which is lesser in weight, higher power density, faster charging rate and lasts longer. Brushless DC motor is used for the better performance of the vehicle and BMS system is done for the two batteries of 12V which is connected parallelly in the model. Conduit and Sleeve is used for safety purpose of vehicle. The vehicle operates in two modes i.e., Electrical mode and Mechanical mode. The vehicle can be charged in three ways: first method by using 230V AC wall socket, charged through adapter cable. Second method of charging is through Dynamo, the charges are generated during motion. Third mode of charging is Reverse charging, when bicycle moves in the downstream the mechanical energy is converted into electrical energy through the motor. Hybrid mode helps the traveler to travel in two alternative ways.

WORKING PRINCIPLE



Block Diagram: Low-Cost Self Charging Hybrid Electric Bicycle

To increase the efficiency of the battery, the Lead acid battery is replaced by Lithium battery which is lesser in weight, higher power density, faster charging rate and last longer.

- The vehicle operates in two modes:
  - Electrical mode, where DC motor is energized through Lithium battery.
  - Mechanical mode, where muscle power is used for pedaling.
- The vehicle charging methods:
  - 230V AC wall socket, charged through adapter cable.
  - Dynamo, the charges are stored during motion.
  - Reverse charging, when bicycle moves in the downstream the mechanical energy is converted into electrical energy through the motor where motor acts as generator and produces charges which is stored in the battery.
- Hybrid mode, which helps the traveler to travel in two alternative ways.

COMPARISON OF HYBRID ELECTRIC BICYCLE WITH EXISTING MODELS

Sl no	Parameter	Hybrid Electric Bicycle	E-Bikes (eg;-Yula and vogo bikes from Govt)	Normal Bicycle
1	Speed	25-30	30-35	Depends on the pedalling operation
2	Drivers Pedalling Requirement	Optional	No	Yes
3	Type of Energy used	Electrical energy and Muscle Power	Electrical power	Muscle power
4	Battery life	2-3 Years	1-2 Years	No battery used
5	Total cost in Rupees	18000-20000	45000-50000	5000-8000

Table of Comparison of Hybrid electric bicycle, E-bike and Bicycle

RESULT AND CONCLUSION

Speed

PEDALING	THROTLE	THROTLE + PEDALING
Depends on Person	25-30km/hr	Not Defined

Table of Speed Estimation

Mileage

PEDALING	THROTLE	THROTLE + PEDALING
Depends on Person	6kms	10-12kms

Table of Mileage of Hybrid Electric Bicycle

Charging

SOCKET (0-100%)	PEDALING (0-100%)	THROTLE (0-100%)
45min	24kms	Not Defined

Table of Charging time

- Battery Output : 26.1volts
- Dynamo : 24-25 Volts
- Bicycle weight : 20 kg
- Maximum weight support by bicycle : 100-120

CONCLUSION

Hybrid electric bicycles is the most promising vehicle which combine the pedaling power of a traditional bicycle with the assistance of an electric motor and they have become increasingly popular in recent years. They offer a number of benefits over traditional bicycles such as the ability to travel more distance with less effort, ability to tackle hills and headwinds more easily and the option to choose between pedaling and using the electric motor depending on the rider's preference. Overall, hybrid electric bicycles can be a great option for anyone looking for an eco-friendly and efficient mode of transportation. They can be used for commuting, leisurely rides, or even for more intense workouts. While they do come with a higher price tag than traditional bicycles, the long-term savings in fuel costs and maintenance expenses can make them a worthwhile investment. As with any form of

transportation, it is important to follow safety guidelines and wear appropriate safety gear while riding a hybrid electric bicycle. It is also important to ensure that the bike is properly maintained to ensure optimal performance and safety.

INNOVATION IN PROJECTS

Developing Hybrid Electric Bicycle

- There are two modes of operation.
- There are three modes of charging.

Self Charging

- Whenevr the bicycle moves in a downstream, we do not use throttle or pedal. During this time the motor acts as gemerator and charges are produced. These charges are stored in the battery.

Dual Mode of Operation

- Mechanical Mode
- Electrical Mode

Helps rider to ride in alternative way.

FUTURE SCOPE

- To reduce the weight of the bicycle ,use aluminium for the body design.
- To increase the speed (if needed) the higher power motor could be used.
- Motor with different gear ratio could be used to increase power generation and for easy movement of the bicycle.
- High powered batteries can be used to match the specifications of increased motor power.

Estimation of the Project: 18000-20000/- rupees