

FABRICATION OF PEDAL ASSIST BICYCLE

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ABSTRACT - During the revolution for the eco-friendly technologies bicycles were the most depended modes of transportation, along with this the consideration of the increase in fuel price and the environmental factors .we must admit that it is far more better to use a bicycle over a motor vehicle for short distance travelling. Imagine how useful would the bicycle be if even the small effort applied by man for climbing slopes and riding on rough terrain is reduced in it. We thought the same way to develop the basics of our project "The e-Bike". The unit developed by us is a combination of the standard geared bicycle with an electric power motor that would assist the rider throughout his journey. Our idea of implementation of the project was mainly based towards providing a tribute to the "GREEN ENERGY".

Key Words: Bicycle, Gyroscope sensor, Motor, Sprocket, controller system, Gear.

1. INTRODUCTION

Global warming and scarcity of traditional resources are becoming major problems in the current scenario. Due to the economic challenges India is facing in automotive sector the hybrid bicycle market has a huge growth potential. People try to move towards "clean" energies. Bicycles with such a supporting electric motor belong to the innovative vehicles, which are whole heartedly suitable for everyday life. So it becomes very necessary to manufacture the electric cycles so cheaply that the common people in our country can afford to buy it. The currently existing electric scooters are far more costly and due to budgetary constraints. Along with the development of technologies the theory must be also implemented to design and manufacture a product that can be sold off at a greater frequency, which has a very low production cost and one that is of good quality.

2. MECHANICAL DESIGN AND INTEGRATION

The main aim is to fabricate a prototype that would be very light and comfortable This is our major challenge, for this purpose we developed the motor at its minimum possible size and also at the lowest possible cost. Mounting a battery, the location of the mounting could have been anywhere in the rest of the space available near the motor or we could have used up the empty space near the carrier. Keeping in mind the comfort of the rider the battery casing was mounted behind the rider, near the carrier location. Looking at the complicated arrangement of the system one may easily think that the drive arrangement could have been completed in a single step.

3. DC MOTOR

PMDC MOTOR (Permanent magnet DC motor): Permanent magnet DC brushed motors (PMDC motors) consist of permanent magnets, located in the stator, and windings, located in the rotor. The ends of the winding coils are connected to commutator segments that make slipping contact with the stationary brushes. Brushes are connected to DC voltage supply across motor terminals. Change of direction of rotation can be achieved by reversal of voltage polarity. The current flow through the coils creates magnetic poles in the rotor that interact with permanent magnet poles. In order to keep the torque generation in same direction, the current flow must be reversed when the rotor north pole passes the stator south pole. For this the slipping contacts are segmented. This segmented slip ring is called commutator.



Fig-1 Brushed DC Motor

3.1. Specification

Rpm-2650, Rated current-13.7A, Voltage-24v, Sprocket-11 teeth

4. BATTERY

Desirable attributes of dry cell batteries are providing clean energy and sufficient discharge, economically viable and long calendar and cycle life. Lead acid batteries, used currently in many electric vehicles, are potentially usable in hybrid applications. Lead acid batteries can be designed to be high power and are inexpensive, safe, and reliable. Due to leakage issues and low safety in an open system like cycle we did not use lead acid batteries over dry cell ones. The chosen battery Type: Dry cell (lead gel type); Rated voltage: 12V; Rated current: 18Ah; Number of batteries: 2; Battery Rating = 12 V * 18 Ah = 216 W. PMDC MOTOR (Permanent magnet DC motor) It consist of

permanent magnets, located in the stator, and windings. The ends of the winding coils are connected to commutator segments that make slipping contact with the stationary brushes. Brushes are connected to DC voltage supply across motor terminals. Change of direction of rotation can be achieved by reversal of voltage polarity. In order to keep the torque generation in same direction, the current flow must be reversed when the rotor north pole passes the stator. Motor Specifications:- Power: 150W, Voltage: 12V, Current: 18A, RPM: 1000, Overall length: 0.23m, Mass: 1.5Kg.



Fig-2 BATTERY

5. SPROCKET

Sprockets are used in bicycles, motorcycles, and other machinery to transmit rotary motion between two shafts where gears are unsuitable or to impart linear motion to a track, tape. The most common form of sprocket may be found in the bicycle, in which our cycle the pedal shaft carries a 2 large sprocket-wheel, in which 1 drives a chain, which, in turn, another one connected with motor Sprockets and chains are also used for power transmission from one shaft to another where slippage is not admissible.



Fig-3 10-TOOTH SPROCKET

6. GYROSCOPE SENSOR

i. MEMS Devices

Micro-electro-mechanical Systems (MEMS) Technology is one of the most advanced technologies that have been applied in the making of most of the modern devices like video projectors, bi-analysis chips and also car crash airbag sensors. This concept was first explained by Professor R. Howe in the year 1989. Since then many prototypes have been released and revised and has thus become an integral part of the latest mechanical products available in the market today. During its early stage, the MEMS chip had two parts. One part included the main structure of the chip and the other part included everything needed for signal conditioning. This method was not successful as the total space taken by the device was larger, and thus the different parts of a single chip needed multi-assembling procedures. The output obtained from such a device had less accuracy and the mounting of such a device was difficult. The main idea behind this technology is to use some of the basic mechanical devices like cantilevers and membranes to have the same qualities of electronic circuits. To obtain such a concept, micro-fabrication process must be carried out. Though an electronic process is carried out, an MEMS device cannot be called as an electronic circuit. MEMS duplicate a mechanical part and have holes, cantilevers, membranes, channels, and so on. But an electronic circuit has a firm and compact structure. To make MEMS from silicon process, the manufacturer must have a deep knowledge in electronics, mechanical and also about the materials used for the process.

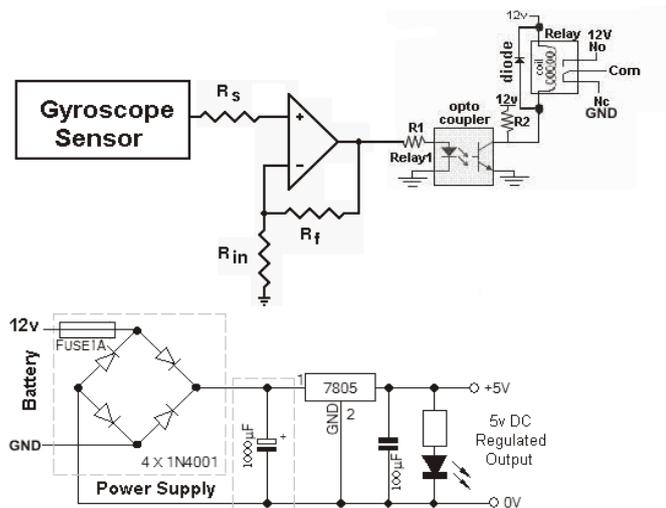
Advantages

1. MEMS device are very small and can be applicable for many mechanical purposes where large measurements are needed.
2. The small size of the device has also helped in reducing its cost.
3. If two or three different devices are needed to deploy a particular process, all of them can be easily integrated in an MEMS chip with the help of microelectronics. Thus, data reception, filtering, storing, transfer, interfacing, and all other processes can be carried out with a single chip.

APPLICATIONS

1. The device is highly applicable as an accelerometer, and thus can be deployed as airbag sensors or in digital cameras in order to stabilize the image.
2. Can be used as a pressure sensor so as to calculate the pressure difference in blood, manifold pressure (MAP), and also tire pressure.
3. It is commonly used in a gyroscope, DNA chips and also inkjet printer nozzle.

7. CIRCUIT DIAGRAM



8. WORKING

Our project has four sprockets, two are connected at pedal section, one at rear wheel and one at motor respectively. One with rear wheel and another one with motor. When we pedal the cycle we feel comfort only in straight path in case if we pedal in slope or hill areas we may feel difficult to pedal for this purpose only we have found this. While you are pedaling the cycle, if you feel trouble you need not to do anything because gyroscope sensor will sense the angular position of bicycle and it sends the output to the circuit. From there circuit differs the voltage level which passes through the motor through this it may vary the speed. It is noted that speed of motor depends upon the voltage allowed by the circuit from where it will get the signal from sensor.

Advantages

1. It provide us extra pulling force
2. It is cost effective than scooters
3. Easily maintainable
4. Rechargeable battery
5. It is Eco-friendly
6. 0% pollutant
7. Reduces the human effort

DISADVANTAGE

1. Motor cost is quite high
2. Battery should maintain properly

9. DEVELOPEMENT OF PROTOTYPE

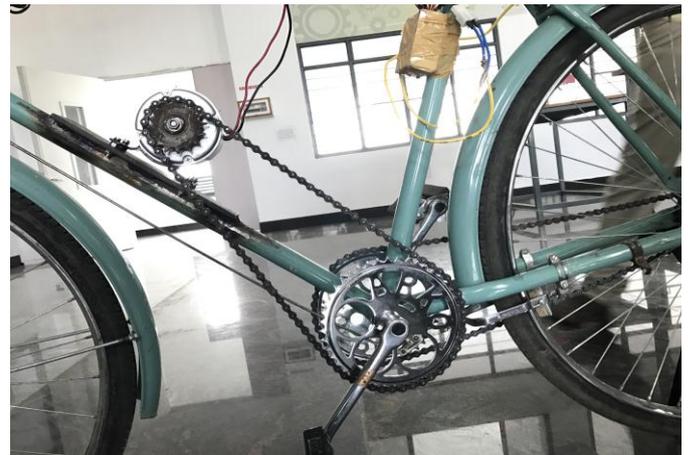


Fig-4 FINAL ASSEMBLE PROTOTYPE

10. CONCLUSION

It is clearly seen that hybrid economy ensures a cleaner and more economical solution to the energy crisis. People use bikes and fuelled vehicles for even travelling short distances without making use of cycles and other non-fuelled vehicles. This an electric assistance has been provided to the cycle that will ease the user to ride the unit with the help of a motor. Even the hardship of climbing slopes and riding on rough terrains has been reduced. All these aspects are available keeping in mind the factor of pollution being affected at all.

We are proud that we have completed the work with the limited time successfully. The **"FABRICATION OF PEDAL ASSIST BIYCLE"** is working with satisfactory conditions. we are able to understand the difficulties in maintaining the tolerances and also quality.

We have done to our ability and skill making maximum use of available facilities. In conclusion remarks of our project work. Thus we have developed a **"FABTICATION OF PEDAL ASSIST BIYCLE"**. By using more techniques, they can be modified and developed according to the applications.

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