BATTERY OPERATED E-CYCLE

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Abstact- This project is based on regenerative power control of bi-cycle. A permanent magnet dc motor is used for its speed control. The regenerative dc-link over voltage is monitored and control by using Electronic circuit. The mechanical energy from pedaling bicycle itself by used as prime mover. Hence to reduce the human effort and for variety of application at various places. This electric bicycle is proposed in this project.

The main aim of this review paper is to present the idea of harnessing the various energy and use it in today's existence of human life. For human being travelling has become vital. In order to sustain in this fast forward world he must travel from place to place. It is very important that time taking for travelling should be less, also it should be economical and easily available. With the fast depleting resources of petrol and diesel, there is need to find intermittent choice. Taking all this into account, a shift away from conventional based fuels to using a renewable sources of energy is a must.

Electric bike which will be driven with the help of battery and thus provide required voltage to the motor. The focus of this report is to perform power calculations and system design of this Electric Bike. This bike can be driven with the help of electricity or also with the help of solar energy. Therefore, the manufacturing of such bike is indispensable.

I. Introduction

The project is based on regenerative power control of bicycle. The permanent magnet dc motor is used for its speed control. This project is proposed to knowing the benefits of society by reduce the human efforts. The large use of the travelling vehicles has increased the problems connected to the air quality and to use of the petroleum. The human sensibility for the energetic and environmental problems is encouraging the research in alternate to solution like electrification.

At the same time particularly as concern to urban areas, new standards have imposed substantially modification in the mobility. The electrically assisted vehicles are normally powered by rechargeable batteries and their driving performance is influence by battery capacity, motor power, road types, operation weight, control and particularly by the management of the assisted power. The vehicle electrically assisted which integrates the electric motor into bicycle framed or wheels, and it is driven by motor force just using the handle bar throttle, second kind of power assisted vehicle called battery operated e-cycle which is human electric hybrid bicycle that supports the rider with electric power only when driver is pedaling.

II. Efforts towards Pollution Control

Plug-in electric vehicles (also known as electric cars or EVs) can help keep your town and your world clean. In general, EVs produce fewer emissions that contribute to climate change and smog than conventional vehicles. Direct emissions are emitted through the tailpipe, through evaporation from the fuel system, and during the fuel process. Direct emissions include smog-forming pollutants (such as nitrogen oxides), other pollutants harmful to human health, and greenhouse gases (GHGs), primarily carbon dioxide. All-electric vehicles produce zero direct emissions, which specifically helps improve air quality in urban areas. Plug-in hybrid electric vehicles (PHEVs), which have a gasoline engine in addition to an electric motor, produce evaporative emissions from the fuel system as well as tailpipe emissions when operating on gasoline. However, because most PHEVs are more efficient than comparable conventional vehicles, they still produce fewer tailpipe emissions even when relying on gasoline.

Life cycle emissions include all emissions related to fuel and vehicle production, processing, distribution, use, and recycling/disposal. For example, for a conventional gasoline vehicle, emissions are produced when petroleum is extracted from the ground, refined to gasoline, distributed to stations, and burned in vehicles. Like direct emissions, life cycle emissions include a variety of harmful pollutants and GHGs.
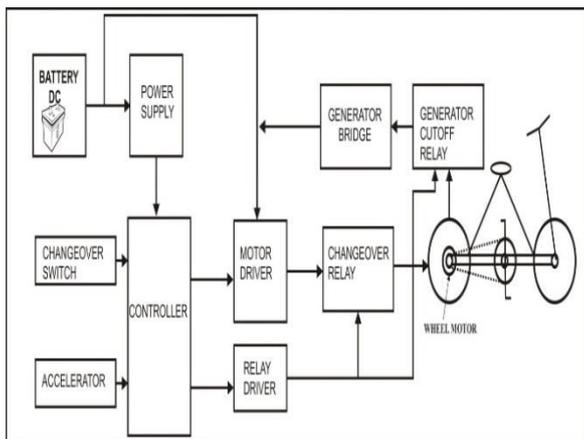
III.   Block Diagram

Fig.-Block diagram of battery operated e-cycle

IV.   Equipment Required For E Cycle

- The Generator Bridge
- Accelerator
- Controller
- Relay Driver
- Battery
- Power Supply
- Changeover Relay
- Generator Cut Off Relay
- Motor Drives
- Generator

1.The Generator Bridge

Four diodes are connected in bridge circuit for when cycle moves in back and forth motion in both the condition it generates power.

- High Reliability
- Low Forward Voltage Drop
- Chip:100% Fully Amper Chip
- Copper:100% Red Pure Copper
- Generator Excitation Specially Designed For Stamford Series Products.

2.Accelerator

This is used to control the speed of the e-cycle. Variable potentiometer is use for the speed controller.The ability to smoothly accelerate down the road while using an adequate amount of energy attributed to the accelerator.

The accelerator position information is transferred to the microcontroller to decide motoring or drive mode in-case of High/Low speed. means ,if the generator generates more than 24 volt and the throttle position is less than 25% in this case , controller automatically switch the position of relay from motoring to generation mode every after 10 seconds for a maximum of 2 seconds.

3.Controller

PIC (Programmable Interface Controllers) microcontrollers are the worlds smallest microcontrollers that can be programmed to carry out a huge range of tasks. These microcontrollers are found in many electronic devices such as phones, computer control systems, alarm systems, embedded systems, etc. Various types of microcontrollers exist, even though the best are found in the GENIE range of programmable microcontrollers.

These microcontrollers are programmed and simulated by a circuit-wizard software.

Every PIC microcontroller architecture consists of some registers and stack where registers function as Random Access Memory(RAM) and stack saves the return addresses. The main features of PIC microcontrollers are RAM, flash memory, Timers/Counters, EEPROM, I/O Ports, USART, CCP (Capture/Compare/PWM module), SSP, Comparator, ADC (analog to digital converter), PSP(parallel slave port), LCD and ICSP (in circuit serial programming) The 8-bit PIC microcontroller is classified into four types on the basis of internal architecture such as Base Line PIC, Mid Range PIC, Enhanced Mid Range PIC and PIC18.Controller decides to know much amount of energy while required for motor drive so it take from a battery. PIC controller is used. It controls all the functions which is given to the motor.

4. Relay Driver

A Relay driver IC is an electro-magnetic switch that will be used whenever we want to use a low voltage circuit to switch a light bulb ON and OFF which is connected to 220V mains supply. The required current to run the relay coil is more than can be supplied by various integrated circuits like Op-Amp, etc. Relays have unique properties and are replaced with solid state switches that are strong than solid-state devices. High current capacities, capability to stand ESD and drive circuit isolation are the unique properties of Relays. There are various ways to drive relays. Some of the Relay Driver ICs are as below.

- High side toggle switch driver
- Low side toggle switch driver
- Bipolar NPN transistor driver
- N-Channel MOSFET driver and
- Darlington transistor driver
- ULN2003 driver

It performs the function of switching.

5. Battery

Two batteries are used each of 12 volt,7 amp

6.Power Supply

Voltage sources in a circuit may have fluctuations resulting in not providing fixed voltage outputs. A voltage regulator IC maintains the output voltage at a constant value. 7805 IC, a member of 78xx series of fixed linear voltage regulators used to maintain such fluctuations, is a popular voltage regulator integrated circuit (IC). The xx in 78xx indicates the output voltage it provides. 7805 IC provides +5 volts regulated power supply with provisions to add a heat sink. IC 7805 is used in power supply to convert 24 volts to 5volt because our controller required 5 volts.

7. Changeover Relay

It gives command to motor in generating mode or in motoring mode.

8. Relays:

In our citation multiple SPDT relays are used, which is of 12v and the contact ratings are of 7 amp max. Relays used for following purposes.

1) Drive/Generate mode
2) charging mode
3) Low battery cut off

9 Motor Drives:

In driver controllers varies the speed by varying accelerator potentiometer.The MOSFET (Metal Oxide Semiconductor Field Effect Transistor) transistor is used to amplify the voltage as well as current. The MOSFET is a core of integrated circuit and it can be designed and fabricated in a single chip because of these very small sizes. The MOSFET is a four/three terminal device with source(S), gate (G), drain (D) and body (B) terminals.

To charge full battery we require speed of 300 rpm, but we can't pedal 300rpm so we pedal cycle at 150 rpm and it generated 12-volt voltage. And we use dc to dc converter to covert 12v to 24v.
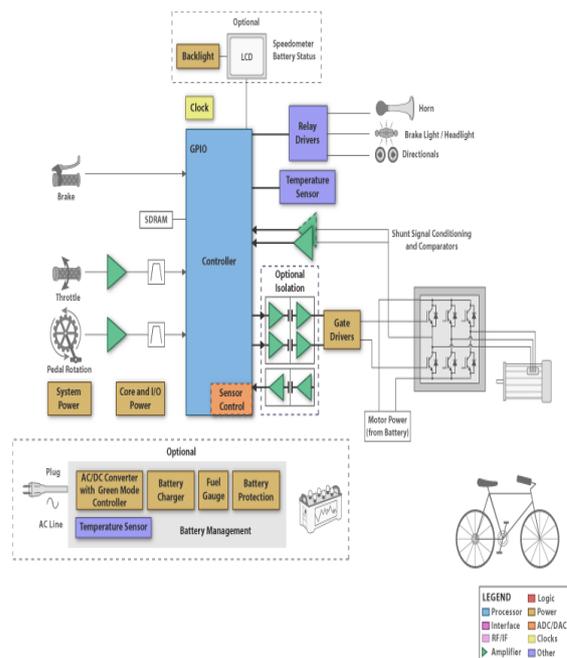
10 Generator:

This is used to generate a 12v dc while driving a cycle. In our project we used two generators connected in series to generate 24vdc to charge 24v batteries. Maximum output of a genertor is of 24 watts at 300 rpm, which is used to charge the batteries.at 1.2Amp current.

It is a 4 pole permenant magnet type generator which will be driven by th wheel of our cycle.

V.   MODEL ASSEMBLING

VI.   RESULT

To charge full battery we require speed of 300 rpm, but we can't pedal 300rpm so we pedal cycle at 150 rpm and it generated 12-volt voltage. hence we use dc to dc converter which covert 12v to 24v. As generator used in our project generates 24v, 1.2Amp at 300r RPM and to completely charge the battery at 1.2 Amp current it takes 4 hours of continuous peddling(around 35Km).

VII.   Conclusion

- During this semester the electric bicycle project has provided an opportunity to grasp the full scope of it means to design a product. This opportunity allowed an initial idea to be realized in a team environment.
- The initial design of the electric assisted bicycle, carried along with its constraints that had to be worked around. The constraints were mainly financial in nature. They represent pieces of equipment in the design that had to be carried over from another semester. The constraints on the equipment consisted of the battery, motor and the bicycle frame. The motor bicycle relationship could not be altered, mainly due to the type of mounting on the motor.

- once all constraints were known, the goals for the design were clearly identified. The goals were readjusted as needed. With communication between the team and hard work, the final objectives were obtained. The design project provided the team with valuable experiences in design and teamwork.

VIII. References

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