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FABRICATION OF CRUISE CONTROLLER IN E BIKE

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Abstract - *In our project we are going to fabricate cruise control for E bike. The main objective of this project is to ride a two wheeler in a constant speed. This project is useful for the long drives. A system that automatically controls the speed of a motor vehicle. The microcontroller is programmed and that takes over the throttle of the vehicle to maintain a steady speed as set by the driver. As the vehicle is throttled and if the driver need to ride the vehicle at constant speed ,the switch will be placed near throttle When the switch is pressed , the vehicle will be moving at a constant speed and if driver need to cut the cruise brake should be pressed and the cruise controller is switched off . This method saves the fuel when the vehicle speed is maintained constantly.*

***Key Words*: EBike, Cruise Controller, Hub motor, Battery, switch**

1. INTRODUCTION

Energy crisis is one of the major concerns in today's world due to fast depleting resources of petrol, diesel and gases. In combination with this, environmental pollution is an additional factor which is contributing to the depletion of resources which is an alarming notification. Our paper proposes the solution for this above problems. The system which we proposed is the Electric Bike with cruise control. This project has external benefits thereby making awareness of using alternative modes of transport. The Electric Bike which works on the battery that is powered by the motor is the general working principle. The Electric bike which will be running on battery, the power is supplied by the motor. The main purpose of using this E-bike is that it is user friendly, and pollution less.

In the proposed design the rear wheel is driven by the electric hub motor. The hub motor is driven by the battery and which is totally controlled by a microcontroller .Cruise control is achieved by programming the microcontroller. 0Once programmed microcontroller can work on its own since it has stored set of instructions that it executes as and when required. Battery is rechargeable after every use.

2. BLOCK DIAGRAM

The experimental setup of our project consist of ordinary bike , microcontroller, battery, hub motor, cruise controller, and accessories. Microcontroller plays a vital role and it controls every action of the vehicle. The working of the cruise control is to lock at a specific speed while travelling long distance. Cruise control is connected to microcontroller and microcontroller is programmed accordingly. Power comes from the battery and it goes through microcontroller and it passes to hub motor.

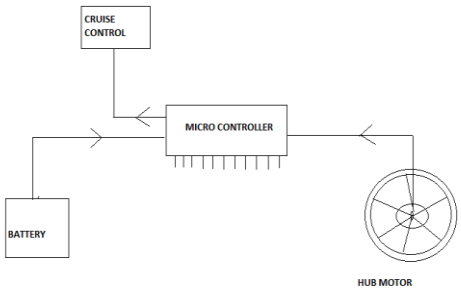

Fig 1 –Block diagram

3. COMPONENTS USED

Table1 – Components

SL.NO.	ITEM/COMPONENT
1	Hub motor
2	Microcontroller
3	Battery
4	Switch

3.1 HUB MOTOR:

The brushless hub motor is used as a power unit for the front wheel drive. Based on the calculations a suitable 48V, 500W brushless hub motor was selected.

Fig 2- Hub motor

This hub motor will be powered by 48V battery attached to the vehicle. The switch will be used to turn on and turn off the hub motor. The hub motor will be attached to the rear wheel by means of spoke assembly. The hub motor will be controlled by controller, which allows linear acceleration in start mode and provides normal speed at drive mode. This prevents the risk of losing control over the vehicle during acceleration.

3.2 MICROCONTROLLER

Microcontroller Designed for 48 Volt electric bike up to 500 Watts. Maximum current 20 Amps. Current limiting feature helps prevent controller and motor damage due to over-current conditions. Under voltage protection feature helps prevent over-discharge and extends battery life. When the battery pack falls below a specific Voltage the controller turns the motor off preventing over discharging of the battery pack which extends the battery packs lifespan.

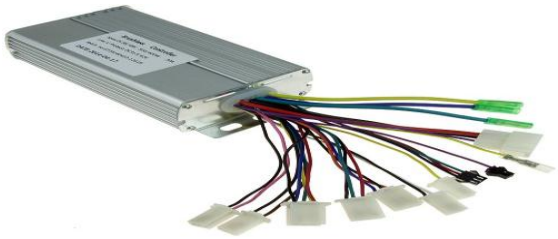

Fig 3 -MICROCONTROLLER

3.3 BATTERY

Here lead acid battery have been used .According to calculation 48v 20a battery is chosen

Fig 4- BATTERY

3.4 SWITCH

Here two switches are use to set and reset the cruisecontrol

Fig 4 – switch

4. WORKING

The working of the project involves controlling the vehicle in required speed for the rider .The Ebike is connected with four lead acid batteries which connected in series. the circuit panel is connected with the separate battery were the discharge of the power must be in constant to the control board. when the acceleration is given the signal from the main accelerator is send to the control board .there are two relay in the circuit board . the first relay receives the signal from main accelerator and it sent to the second relay. The signal is next sent to the regulator which is controlled by the microcontroller in the circuit .the regular motor is connected with a separate acceleration , where the speed of the vehicle is controlled and the signal is sent to the hub motor wheel ,which is presented in the vehicle. there are two switches given in the vehicle which is connected to the circuit board .

the green switch is connected to lock the speed which is required for the rider then the vehicle is moved in the constant speed, incase of any vehicle/object the yellow switch is used to stop the vehicle which is connected near the brake and the vehicle can be stopped .while pressing the yellow switch it sends the signal to the control board and reset the process and stops the vehicle.

5. CALCULATIONS

5.1 Load calculation

The total load applied to the hub motor is calculated based on the following weights of the vehicle and its accessories

Vehicle weight	=75 kg
Battery weight	=10kg
Rider and accessories	=115kg (assumption)
Total load	=200 kg

5.2 FORCE CALCULATION

F= Crr x m x g

F = force in newton.

Crr = co efficient of rolling resistance

Crr = 0.01

G = acceleration due to gravity.

=9.81 m/s^2

M = mass of the vehicle (total load).

F = 0.001 x 200 x 9.81
F = 19.62 N

Power calculation

The maximum speed of the electric bike is 45 km/hr. assuming the maximum velocity of 45km/hr the power required to pull the rated load is calculated by using the formula

$$P = F * (\frac{V}{3600})$$

P = Power in watts

V = Velocity

= 45 Km/h = 45000 m/h

$p = 19.62 * (45000/3600)$

$P = 245.25\ watts$

5.3 SELECTION OF BATTERY

The watt hour of the battery is given by

$Ah\ X\ V = wh$

Where

Ah =Ampere hour

V = Voltage

Wh = Watt hour

(i). 48V 20Ah battery

$= 48\ X\ 20 = 960wh$

Since the battery produces 960 watts, which is higher than our required watt hour we can use this battery.

5.4 DISTANCE CALCULATION

The distance that can be travelled using this battery is given by

$d = wh/F$

$$= \frac{960}{19.62}$$

$= 48.92\ kms$

5.5 CHARGING TIME CALCULATION

The charging time of a lithium ion battery varies depending upon the charger used for it. The charging time of the lead acid battery is given by

$$T = \frac{Ah}{A}$$

Where

Ah= ampere hour of the battery

A = Current in amps(charger)

$$T = \frac{20}{5}$$

$$= 4\ hours$$

So, it will take 4 hours and 48 amps current to charge the battery. With this charge the vehicle can be operated up to 48.92 kms

5.6 CURRENT CONSUMPTION CALCULATION

For charging all the four batteries fully it takes 4 hours and 20 amps current

$$1\ amps = 1.4\ kvah = \frac{20}{1.4}$$

$$= 14.28 \text{ Kvah}$$

The electricity is charged based on Kilowatts. So we can convert Kvah to KW.

6. CONCLUSIONS

Following are the result obtained while we attached the LPG system over the gasoline.

- The consumption of fuel is less due to best vaporization of the LPG gas when compared to petrol.
- The pollution of the LPG bike is less when compared to gasoline.
- The cost of LPG is very cheap when compared to gasoline.
- The efficiency of the LPG bike is more when compared to gasoline.
- The wear of the engine running in LPG is less when compared to gasoline powered engine.
- The maintenance cost of the bike also decreases when compared to gasoline bike.
- The operating cost of bike is gradually decreases when compared To gasoline powered bike.

7. FUTURE SCOPE

In this modern period the technology is developing day by day. Now a day the fuel-injection bikes comes to market which gives proper air-fuel ratio and good throttle response whenever required without wasting the fuel. By using those technology in this project can be more efficient without loss of engine power output.

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