Self Protecting Braking System for Electrical Bicycle

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Abstract: Braking is nothing but bringing a moving vehicle or moving body to a stop. Nowadays safety is an important feature in the automotive industry. The intelligent braking system is the next step to automation. Presently cars have the alarm system where the car gets too close to an object, an alarm is triggered which warns the driver about an object close by. But this feature has produced lot of problems and is prone to human error. We have enhanced the facility by using the same system but we have altered it so that the vehicle brakes automatically when an obstacle is close by. The aim is to design and develop a control system based on intelligent electronically controlled automotive braking system is called "INTELLIGENTBRAKING SYSTEM". Sensor Operated Electromagnetic Brake consists of IR transmitter and Receiver circuit, Control Unit, Electromagnetic braking system. The IR sensor is used to detect the obstacle. There is any obstacle in the path, the IR sensor senses the obstacle and giving the control signal to the Breaking system. The pneumatic braking system is used to brake the system. So basically, here the vehicle brakes on its own by determining the distance from the object.

KEYWORDS: E -Bike,Ultrasonic sensor, microcontroller, Automatic braking

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INTRODUCTION

Road accidents are the most unwanted thing whichsometime causes loss of live of road user. These accidentsmainly occur due to human error which includes moreresponse time taken by driver which causes delay inapplying brakes. When the driver finds that the vehicle isgoing to collide, they become nervous and they don't applythe brakes with sufficient braking force that is required andhence get collide with obstacle.The main aim of this paper is to design a special kind of braking system as a part of Collision Avoidance System (CAS)which is able to apply brakes when the time taken for collision becomes less than a specified limit of response timebased on studies so that vehicle can be drive safely in case of less human attention.Aself-protecting braking system includes an ultrasonic wave emitter provided on the front portion of a vehicle producing and emitting ultrasonic waves frontward in a predetermined distance.An ultrasonic receiver is also placed on the front portion of the vehicle operatively receiving a reflective ultrasonicwavesignal.The reflected wave (detected pulse) gives the distance between the obstacle and the vehicle. Then a microcontroller is used to control the speed of the vehicle based on the detection pulse information to push the brake pedal and apply brake for safety purpose.

An electric bicycle, also known as an e-bike, is a bicycle with an integrated electric motor which can be used for propulsion. Many kinds of e-bikes areavailable worldwide, from e-bikes that only have a small motor to assist the rider's pedal- power (i.e., peddles) to somewhat more powerful e-bikes which tend closer to moped-style functionality: all, however, retain the ability to be pedaled by the rider and are therefore not electricmotorcycles.E-bikes use rechargeable batteries and the lighter ones can travel up to 25 to 32 km/h (16 to 20mph), depending on local laws, while the more high-powered varieties can often do in excess of 45km/h (28 mph).

STRUCTURE OF PAPER

The paper is organized as follows: In Section **1,** the introduction of the paper is provided along with the structure, important terms, objectives and overall description. In Section **2** we discuss methodlogy. In Section **3**we discuss technical description. In Section**4** shares the Designing Sketches of self protecting braking system for Electrical Bicycle. In Section **5** tells us about the result.In Section **6** tells us about the conclusion.
In Section **5** tells us about the references

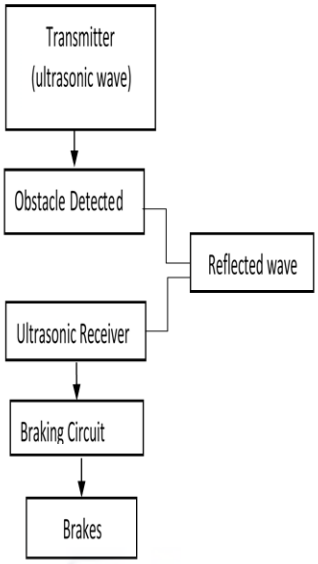
OBJECTIVES

To design and fabricate a hybrid of eddy current braking and intelligent braking.
To implement hybrid braking system on bicycle.
This project aims to avoid the major accidents

METHODOLOGY

A Self protecting braking system includes an ultrasonic wave emitter and receiver provided on

Flow Chart: 2. 1



The front portion of a bicycle emitting and receiving the ultrasonic waves frontward in a predetermined distance. The reflected wave (detected pulse) gives the distance between the obstacle and the vehicle. The microcontroller is used to control the speed of the vehicle based on the detection pulse information to push the brake lever and apply brake to the bicycle stupendously for safety purpose.
The extremely rapid response time provided by the electronic control can be used for crucially shortening the braking distance by introducing advanced control of braking system operation. The control of commercial

vehicle's braking system operation is related not only to vehicle speed but also to lateral acceleration together significantly reducing the possibilities of the vehicle rolling over. Obviously, such a complex task imposed to the control of braking system cannot be based on the driver abilities and need to be done operated independently of the driver.

TECHANICAL DESCRIPTION

3.1 MOTOR

An electric motor, you'll know the basic idea of turning stored electricity into motive power: feed an electric current through tightly coiled wire that sits between the poles of a magnet and the coil spins around making a force that can turn a wheel and drive a machine.

Figure: 3.1 Electric Motor

Most electric-powered vehicles (electric cars, electric bicycles, and wheelchairs) use onboard batteries and a single, fairly ordinary electric motor to power either two or four wheels.

Table: 3.1 Electric Motor Characteristics

MODEL	MY 1016
STANDARD	250W 24V/36V
NO-LOAD CURRENCY/A	≤1.6/1.2
NO -LOAD RATE SPEED/RPM	3350
RATING TORQUE/N	0.90
RATING TORQUE/N	2750
RATING TORQUE/N	≤13.4/8.9
RATING TORQUE/N	≥78

3.2 CONTROLLER

Designed this controller for my Crystallite Sparrow 24V electric bicycle motor. The core function of a DC motor controller is to periodically read the throttle setting and adjust the current being supplied to the motor. It does this with a technique called pulse-width modulation or PWM (more on thislater).

Figure: 3.2 Control connections

Other functions of the controller include:

1) Low- voltage cut off. Monitor the battery voltage and shut down the motor if the battery voltage is too low. Protects the battery fromover-discharge.
2) Over-temperature cut off. Monitor the temperature of the FET power transistors and shut down the motor if they become too hot. This protects the FET powertransistors.
3) Over-current cut off. Reduce the current to the motor if too much current is being supplied. This protects both the motor and the FET powertransistors.
4) Brake cut off shut down the motor when the brake is applied. This is a safety feature if the user applies brake and throttle, the brakeswin.

3.3 ULTRASONIC SENSOR

An ultrasonic sensor is as sensor, which measures the distance of respective object by sending the sound wave of specific frequency.This sound wave is reflected after the collision with respective object and the ultra-sonic receiver receives this wave. Distance ismeasured by calculating sending and receiving time of this sound wave.

Figure: 3.3 Ultrasonic Sensors

3.4 MICRO PROCESSOR

Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button.

It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions.

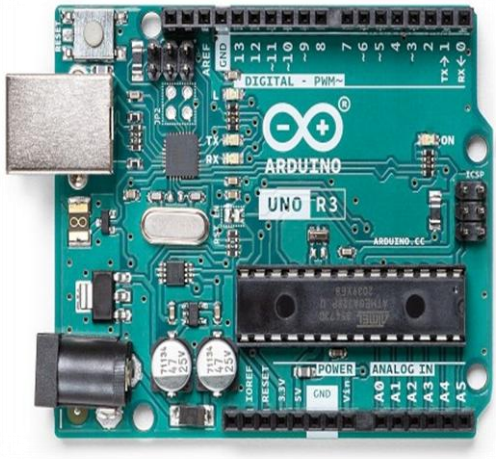


Figure: 3.4 Micro Processor

3.5 BATTERY

Lead acid batteries are much larger and heavier than lithium batteries, limiting their placement on e-bicycle.Generally speaking, you want to mount your batteries as low as possible to keep the center of gravity of the e-bike lower towards the ground.

Figure: 3.5 Battery

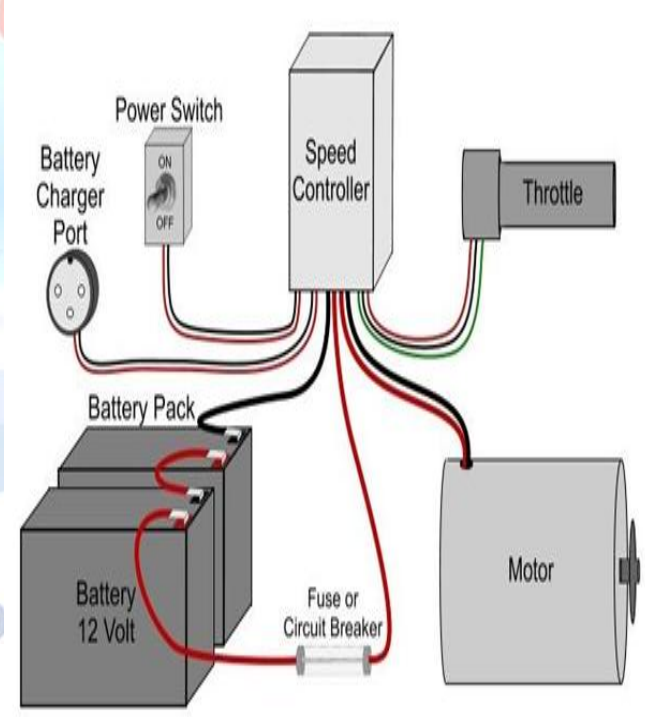


Figure: 3.6 Line Diagram of

DRAWING MODELLINGS

Figure: 4.1 Cad Diagrams of Self Protecting Electzric Bicycle

RESULT

Finally the fabrication of**"Self-Protecting E-Bicycle"**has done, the outlook of the vehicle is similar to the bicycle. It has taken approximately 45 days for the fabrication and this electrical bicycle can carry single person up to 18 km for one complete charge.

Figure: 5.1 Self Protecting Braking System of Electric Bicycle

CONCLUSION

Behind the designing of this system, our main aim is to improve the prevention technique of accidents and also reducing the hazard from accidents like damage of vehicle, injury of humans, etc. We observed that our work is able to achieve all the objectives which are necessary. Thus, we have developed a "**SELF PROTECTING BRAKING SYSTEM**" which helps to know how to achieve low-cost automation. The operating procedure of this system is very simple, so any person can operate. By using more techniques, they can be modified and developed according to the applications. As far the commercial aspects of this product are concerned, if this product can be fully automated and produced at a lower cost the acceptance will be unimaginable.

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