Intelligence Braking System

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Abstract— It is anticipated that a variety of cars with diversified features that include anti-lock braking system (ABS), traction control system (TCS), antiskid Steering, collision warning system (CWS) will be more commercially produced to satis@ the consumer needs in the near future. This is parallel to the trend of current technology of manufacturing smart cars and the & sires of people who always want to have comfortable and safe ride in their vehicles. Mower this type of vehicles can fit much better into the intelligent highway that Malaysian government is planning to have in the near future. Consequently, there is a need to modify the current conventional braking system so as to make it work automatically. This paper considers the use of intelligent controller to achieve the above objective. To ensure high speed of system response, the DSP controller TMS320C24x with - fuzzy algorithm is used in the implementation of this new device. Results of simulation studies using the MATLAB have demonstrated the feasibility of this new system under investigation.

Keywords: Intelligent Braking System, Smart Cars, Neuro-Fuzzy Controller DSP Processor

I. INTRODUCTION

The "Intelligence Braking System" is an automobile safety system design to reduce the severity of accident also known as per crash system forward collision warning system or collision mitigating system, it uses ultrasonic sensor and infrared sensor with microcontroller to detect an imminent crash .Once the detection is done ,these system either provide signal to the driver when there is an imminent collision or take action autonomously without any driver input (by braking).The main concept of the System would be to transfer a small vehicle safely and to reduce the effect of accident on the passengers there would be no chance of accident cause by these particular from and it ensures that at most safety of its passengers. The auto braking system was design and fabricated to keep a distance .it provide pre- crash safety system for intelligent car these model can detect the distance between front vehicle and your vehicle to keep constant distance using a sensor to operate the brake system forcibly if the driver does not decrease the speed of car .The system displays the distance between the two vehicle and the speed of your vehicle. The performance of the system is good.

II. LITERATURE REVIEW

The braking system was designed and applied on a car to make the driving process safety using embedded system design. Most of the accident occurs due to the delay of the driver to hit the brake, so in this project work braking system is developed such that when it is active it can apply brake depending upon the object sensed by the ultrasonic sensor and speed of vehicle. Currently, vehicles are often equipped with active safety systems to reduce the risk of accidents, many of which occur in the urban environments. The most popular include Antilock Braking Systems (ABS), Traction Control and Stability Control. All these systems employ different types of sensors to constantly monitor the conditions of the vehicle, and respond in an emergency situation. An intelligent mechatronic system includes an ultrasonic wave emitter provided on the front portion of a car producing and emitting ultrasonic waves frontward in a predetermined distance. An ultrasonic receiver is also placed on the front portion of the car operatively receiving a reflective ultrasonic wave signal. The reflected wave (detected pulse) gives the distance between the obstacle and the vehicle and RPM counter gives speed of vehicle. The microcontroller is used to control the braking of the vehicle based on the detection pulse information to push the brake pedal and apply brake to the car stupendously for safety purpose. Keywords: Ultrasonic Sensor, Intelligent Mechatronic system, RPM counter, Microcontroller.

III. RESEARCH METHODOLOGY

This Chapter describes about the requirements. It specifies he hardware and software requirements that are in order to run the system properly. The Hardware Requirement MICROCONTROLLER, ULTRASONIC SENSOR, ELECTRONIC RELAY, DC MOTOR, BATTERY.

IV. OVERVIEW

The existing approaches in prevent accident are Honda's idea of IBS (Anti accident braking system with pneumatic bumper) which helps the rider get a hassle free braking experience In muddy and watery surfaces by applying a distributed braking and prevent skidding and wheel locking . Volvo is all set to launch its new XC60 SUV which will sport laser assisted braking which will be capable to sense a collision up to 50 mph and apply brakes automatically. There has been increased interest from the united states (US) Department of transportation to develop and implement an efficient traffic control device .this has in turn resulted in an increase in research focused on and defined as vehicle-to-vehicle communication (v2r) and road to road communication (r2r),The v2v can be categorized into 3 classes based on the technology used . a. Radar Based. b. Camera Based. c. Radio Based System. Radar-based and camera-Based technologies are used to avert collisions in the same lane As a result of line of sight limitation. Radio-based technologies have a broader use for collision independent of either line of sight line of sight or passing lanes. Drawbacks in the existing approaches IBS can only if the rider applies it in the right time manually and maintains the distance IBS has its own braking distance. Moreover many commuter bikes in India don't have the option of ABS because it's very expensive. Volvo's laser assisted braking could not work effectively in rainfall and snowfall season and laser easily affected by atmospheric condition. In our project we are using photoelectric sensor and Microcontroller using which the speed of the vehicle is reduced and voice alarms are given to

the user when it approaches an object by automatically sensing the position of the object/vehicle.

V. PROJECT DEFINITION

The main target this project is cars can run automatic braking due to obstacles when the sensor senses the obstacles. The braking circuit function is to brake the car automatically after received signal from the sensor. The primary objective is to develop a safety cars braking system using ultrasonic sensor and to design a vehicle with less human attention to the driving ultrasonic sensor. The system also cut of the power supply of driving motor to avoid further damage to the vehicle.

VI. SCOPE OF PROJECT

Fig. 1: Collision Warning

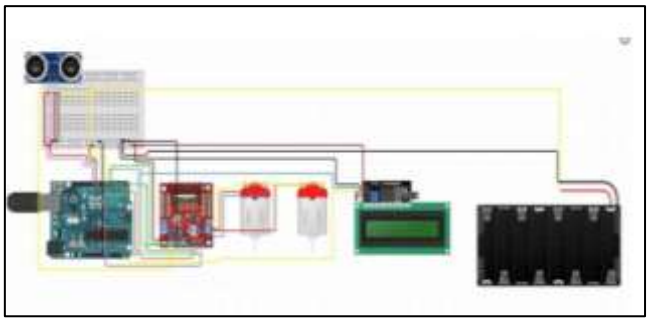
The scope of project is nothing but successfully and use of the project in future. The project scope for different field is: Small cars SUV and heavy duty transport vehicles. Medium to heavy duty transport vehicles. Cargo trucks and public transport vehicle etc. Hospitals and other medical facilities. Malls and retails transport.

VII. PRINCIPLE

The intelligent breaking system for safety transportation mainly focuses on the elimination of traditional bugs in safety and ensures the complete utilization of the available resources. The automobile that is cars design based on the concept on intelligence system for safety transportation utilizes the executing system and added to it advance features are also included the car theft rate is increasing persistently and so are the accident in intelligent braking system for safety transportation.

VIII. CONSTRUCTION

The system consisting of 1 ultrasonic sensors. These sensors are connected to the microcontroller, the power supply is provided to the microcontroller by the 12 v battery. the shoe brake system is provided for the normal braking the wheels are mounted on the frame and rotated by the motor drive through the 12 v motor. when the ultrasonic sensor senses the obstacle then sends the signal to the micro controller and then microcontroller cut of the power supply of motor and vehicle is stopped. when the obstacle is removed then microcontroller resupply the current to the system and vehicle is moving forward.

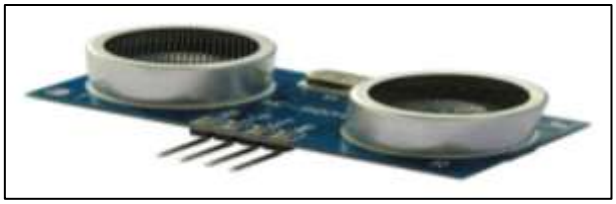


IX. CONSTRUCTIONAL DETAILS

A. Microcontroller

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available. The word "uno" means "one" in Italian and was chosen to mark the initial release of Arduino Software. The Uno board is the first in a series of USB-based Arduino boards. it and version 1.0 of the Arduino IDE were the reference versions of Arduino, which have now evolved to newer releases. The ATmega328 on the board comes preprogrammed with a boot loader that allows uploading new code to it without the use of an external hardware programmer.

B. Ultrasonic Sensor



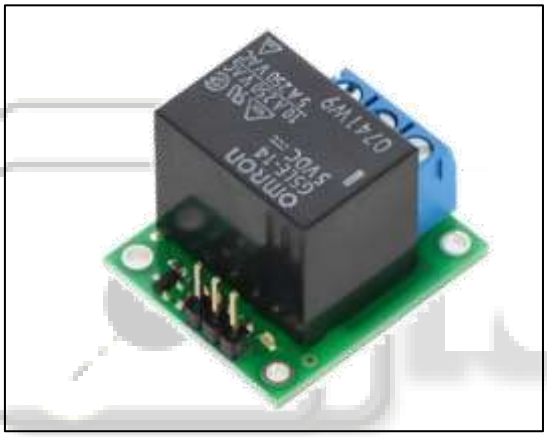
An ultrasonic sensor transmit ultrasonic waves into the air and detects reflected waves from an object Ultrasonic waves

are sounds which cannot be heard by humans and are normally, frequencies of above 20kHz. Velocity of wave propagation is expressed by multiplication of frequency and wavelength. The velocity of an electromagnetic wave is 3×108m/s, but the velocity of sound wave propagation in air is as slow as about 344m/s (at 20°C). In order to detect the presence of an object, ultrasonic waves are reflected on objects. Because metal, wood, concrete, glass, rubber and papered, reflect approximately 100% of ultrasonic waves, these objects can be easily detected. Cloth, cotton, wool, etc. are difficult to detect because they absorb ultrasonic waves. It may often be difficult, also, to detect objects having large surface undulation, because of irregular reflection.

1) Specification

Construction	Open structure type
Using method	Receive And Transmitter type
Frequency	40 Hz
Voltage	5 v
Range	2-2000mm
Sensor angle	< 150

C. Electronic Relay



A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and retransmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

D. DC Motor

A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line. A simple DC motor has a stationary set of magnets in the stator and an armature with one more windings of insulated wire wrapped around a soft iron core that concentrates the magnetic field. The windings usually have multiple turns around the core, and in large motors there can be several parallel current paths. The ends of the wire winding are connected to a commutator. The commutator allows each armature coil to be energized in turn and connects the rotating coils with the external power supply through brushes. (Brushless DC motors have electronics that switch the DC current to each coil on and off and have no brushes

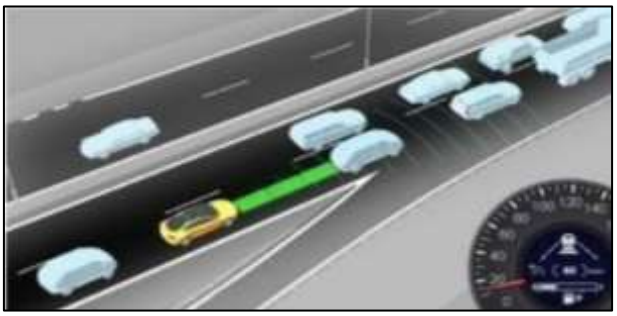
1) Specification

Type	DC gear Motor
Voltage	12 voltage
Nominal torque	5kg
Noise	Less than 55 db
Weight	Approx-0.5 kg
Speed(rpm)	35 rpm

E. Battery

We are using 12 V 8ah battery for our project. An automotive battery is a type of rechargeable battery that supplies electric energy to an automobile. An automotive SLI battery (starting, lighting, and ignition) powers the starter motor, the lights, and the ignition system of a vehicle's engine. Automotive SLI batteries are usually lead-acid type, and are made of six galvanic cells in series to provide a 12-volt system. Each cell provides 2.1 volts for a total of 12.6 volts at full charge. Heavy vehicles, such as highway trucks or tractors, often equipped with diesel engines, may have two batteries in series for a 24- volt system or may have parallel strings of batteries. Lead-acid batteries are made up of plates of lead and separate plates of lead dioxide, which are submerged into an electrolyte solution of about 38% sulfuric acid and 62% water.[2] This causes a chemical reaction that releases electrons, allowing them to flow through conductors to produce electricity. As the battery discharges, the acid of the electrolyte reacts with the materials of the plates, changing their surface to lead sulfate. When the battery is recharged, the chemical reaction is reversed: the lead sulfate reforms into lead dioxide and lead. With the plates restored to their original condition, the process may now be repeated.

F. Working



1) Switch on the power supply 12v dc
2) Microcontroller and sensors are activates
3) When any obstacle comes in front of vehicle within 7 feet
4) Ultrasonic sensor senses the obstacle distance and send the command to microcontroller to operate
5) Cut off the power supply of motor. and due to that vehicle is stopped.
6) When the obstacle is removed then power supply is again turn on and vehicle is moves forward.

1) Sequential Operation:-

Sr No	Sensor 1 ULTRASONIC	Solenoid valve	Operation
1	OBSTALE	ON	braking
2	NO OBSTACLE	OFF	No Braking

X. ADVANTAGES, DISADVANTAGES & APPLICATIONS

A. Advantages: -

1) The system eliminates the possibility of collision within given permissible speed Limit.
2) Ensures safety of the driver and or passengers as automatically speed is reduced,
3) Reduces brake wear and tear as no need of excessive braking force to keep vehicle Speed in control.
4) System components involve simple and cost effective component hence simple production.
5) Low system cost as low level electronics is used.
6) Can be easily implemented in both commercial LCV/MCV/HCV.
7) Minimum space requirements.
8) Reduced further increases the adaptability of system
9) Visual indication in the form of indication lamp.
10) Can install Audio indication in the form of hooter…increases operator vigilance and safety.

B. Disadvantages: -

1) System fails if battery power supply cut off.
2) Response time is slightly more.

C. Applications:-

1) Small Cars
2) SUV and commercial cars
3) Medium to heavy duty transport vehicles
4) Cargo trucks and Public transport vehicles etc.,

XI. RESULT

1) Severity off accidents are reduced due to advance micro controlling action
2) Reaction time of the system is less than 1 sec.
3) Provides safety to the vehicle as well as passengers.
4) Good accuracy of the system.

XII. CONCLUSION:

Sensor is a reliable for detecting human or animals and this technique certainly can save lots of life. Human lives are most valuable. Pre-crash detection system must be equipped with combination of different sensor. Detection human or animals including obstacles will certainly give us a better solution to reduce the death of humans in road crash.

XIII. FUTURE SCOPE OF PROJECT

1) Instead of using IR sensor we can use other type of sensor.
2) We can install synthetic air bags to front side to absorb shock if system fails.
3) We can use these concept two wheeler vehicles.
4) Delay can be minimized by installing the timer IC.

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