

Automatic braking system

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Abstract

Vehicles have been advanced a lot such that its speed is becoming a major mishap. Advanced automatic braking system improves braking technique involved vehicles. It changes complete braking systems and deals with the concept of Automatic Braking System giving the solution to it. The ultrasonic vehicle braking system involves an in front component of an automatic braking vehicle with an ultrasonic sensor generating and emitting the front of the ultrasonic wave at a certain distance in front of the vehicle. Ultrasonic beneficiary likewise molded a vehicle's front area, getting an intelligent ultrasonic wave signal as an impression of the hindrance situated inside the separation determined. The wave was estimated to acquire the separation between the vehicles and the obstructions. On the other hand, arduino is utilized to drive the servo engine based on location data to constrain the brake pedal to irregularly brake the vehicle to consequently brake the vehicle for safe braking.

Introduction

Now a days driving is one of the major concerns, and a compulsory activity. Number of vehicles are increasing day by day. It creates a chances and unavoidable accident circumstances. So, the numbers of accident in current days are so high. An accident might occur any place at any time and cause worst damage, serious injuries and even accidental dead. Most of these accidents occurred due to the delay in the application of brake [1].

The work had an intense study to develop a new system. where driver may not apply the brake but the vehicle will able to stop or divert automatically due to obstacles. For the safety purpose and to avoid such unconditional accidents an automatic control braking system is introduce in the vehicles. Here a ranging sensor is used i.e. ultrasonic sensor which detect through the ultrasonic wave. Whenever a hindrance is recognised by the sensor, the ultrasonic sensor detects and reflect back to divert the route of the vehicles.

In this study the vehicles will automatically divert and apply brake due to obstacle when the sensor senses the obstacle. In this system an automatic braking and diverting system is designed in which the car will automatically reflect after received signal from the sensor [1]. In this study, ultrasonic sensor is used to model the automatic braking system. It enables to move the vehicle with less human driving focus. The interference is detected by the ultrasonic sensor. The servo motor functions as an actuator to process the feedback from the ultrasonic.

Working Methodology

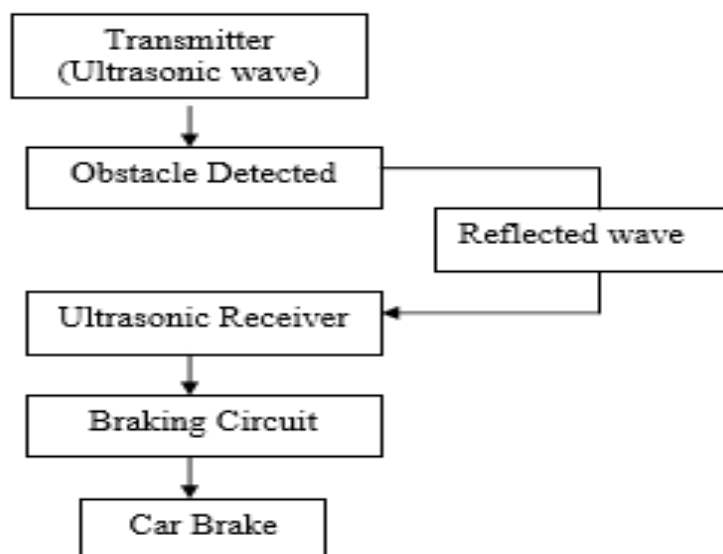


Figure 1: Block Diagram of the System [2]

Principal components of Automatic Braking System

- i. Sensor
- ii. Ultrasonic sensor
- iii. Arduino
- iv. Braking circuit
- v. Electric motor
- vi. Servo motor

ULTRASONIC SENSOR

Ultrasonic exhibit and recognition frameworks utilize high recurrence sound waves called ultrasonic waves to distinguish an article's quality and length. The common scope of human ear frequencies is from 20 Hz to 20,000 Hz. Ultrasonic sound waves are sound waves over the scope of the human ear and have a recurrence of 20,000 Hz. Ultrasonic sensor has a working voltage of 5V and working current is 15 mA with a working frequency of 40 Hz. The maximum working range is 4 m and minimum range is 2 cm with an measuring angle of 15 degree respectively [3].

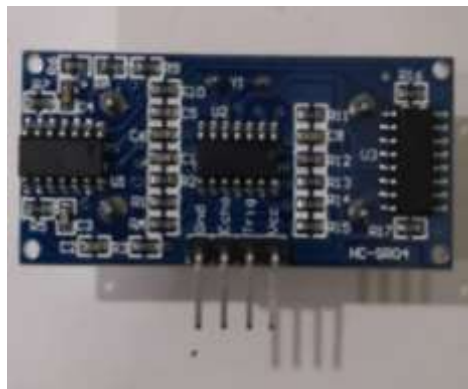


Figure: 2 Ultrasonic sensor back view



Figure: 3 Ultrasonic sensor front view

Ultrasonic Transmitter

There is an ultrasonic wave generator component that acts to produce the ultrasonic wave before the ultrasonic wave is transmitted. Timing instruction means are available in this part to generate an instruction signal for the intermediate delivery of ultrasonic waves. The sign will be sent to a ultrasonic wave generator dependent on the planning directions to produce ultrasonic waves.[2, 4]

Ultrasonic Receiver

On the off chance that the obstruction is identified by the ultrasonic wave, a reflected wave will be produced. A ultrasonic detecting beneficiary is utilized to transmitted the ultrasonic waves that are transmitted from street surface to deliver a transmission signals. The Ultrasonic transducer that profits electrical vitality to the sound wave. An enhancer intensified this sign. The intensified sign is like the reference signal [2].

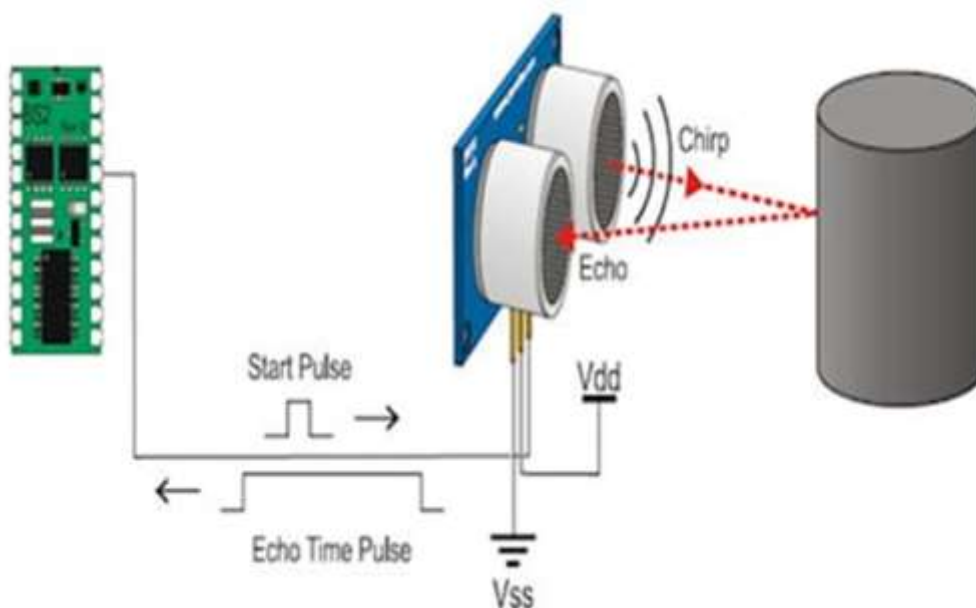


Figure: 4 Sense of ultrasonic sensor [5]

Ultrasonic Braking System

The ultrasonic recipient corresponding to the transmitter gets the ultrasonic signs that the impediment speaks to. At that point the Arduino will explore certain reflected waves (or) signals in the wake of testing whether the separation to the objective is going ahead or whether the vehicle needs a brake. In the event that the separation is underneath the wellbeing range, the slowing mechanism will be turned on.

Arduino Relay Module Interface

Right now, Arduino changes from an edge of 45 degrees to 0 degrees on the servo engine. At that point utilize the hand-off simultaneously to expel the stockpile of the engine. The servo arm is mounted precisely to brake the vehicle's pole. Contrasted with the setup of the plate brake, callipers are utilized to press the cushion against the circle joined to the hub. Once before the sensor the obstruction.

At that point the servo comes back to the typical shut situation at 45 degrees and the transfer. The vehicle can drive forward in ordinary condition with no framework unsettling influence.

The braking should be possible electrically and furthermore by shortening the engine terminals to brake mode with no mechanical courses of action. A pneumatic slowing mechanism is additionally utilized for particular task applications.

Ultrasonic braking with unit HC-SR04 module [4]

The framework can be worked with a ultrasonic HC-SR04 module over the ultrasonic slowing mechanism utilized with a couple of transducer modules with intensifier circuits, which is simpler to utilize and gives a superior breaking framework.

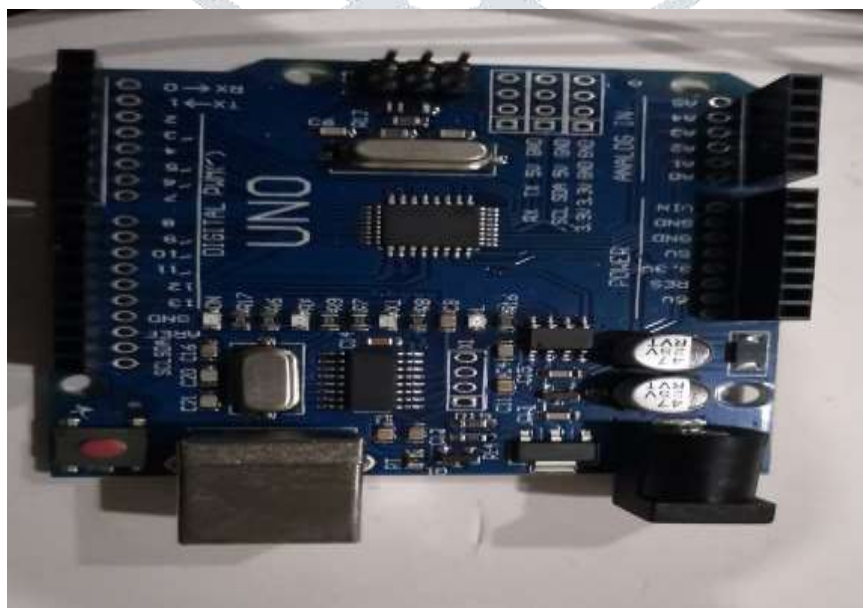


Figure: 5 Arduino

WORKING

The Ultrasonic braking is a framework strategy that can brake a vehicle consequently before an article sway. What's more, at whatever point there is an obstruction before the vehicle, the unit all the while separates the exchange of vitality to the haggles the braking. Programmed Arduino slowing mechanism.

The framework takes a shot at the strategy of ultrasonic range that is a type of ultrasonic separation estimation without contact. The framework comprises of a get together, control unit and braking instrument for ultrasonic transducer. The sensor unit comprises of a ultrasonic transducer pair, a transmitter, and a recipient.

The ultrasonic transmitter at the front of a vehicle will transmit the ultrasonic waves in a foreordained range consistently. It transduces the fueled by an arduino-produced square wave yield. The transducer is intensified and provided with the yield signals. Ultrasonic waves are delivered from an electrical sign of 40 kHz.

The DC gear engine turns consistently at a given rpm and lessens speed through the servo engine The DC gear engine turns consistently at a given rpm and lessens speed through the servo engine braking instrument while naturally braking the framework [6].



Figure: 6 Dc gear motor

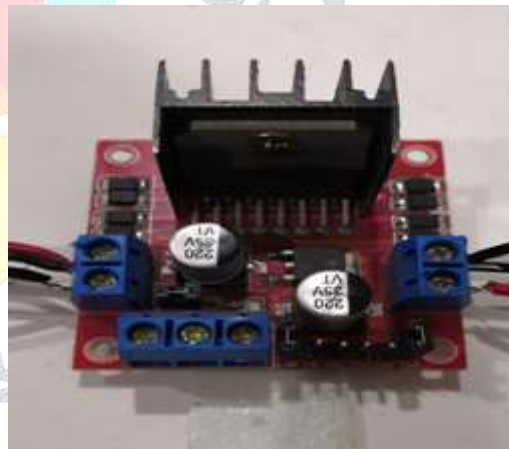


Figure: 7 L293D motor driver module

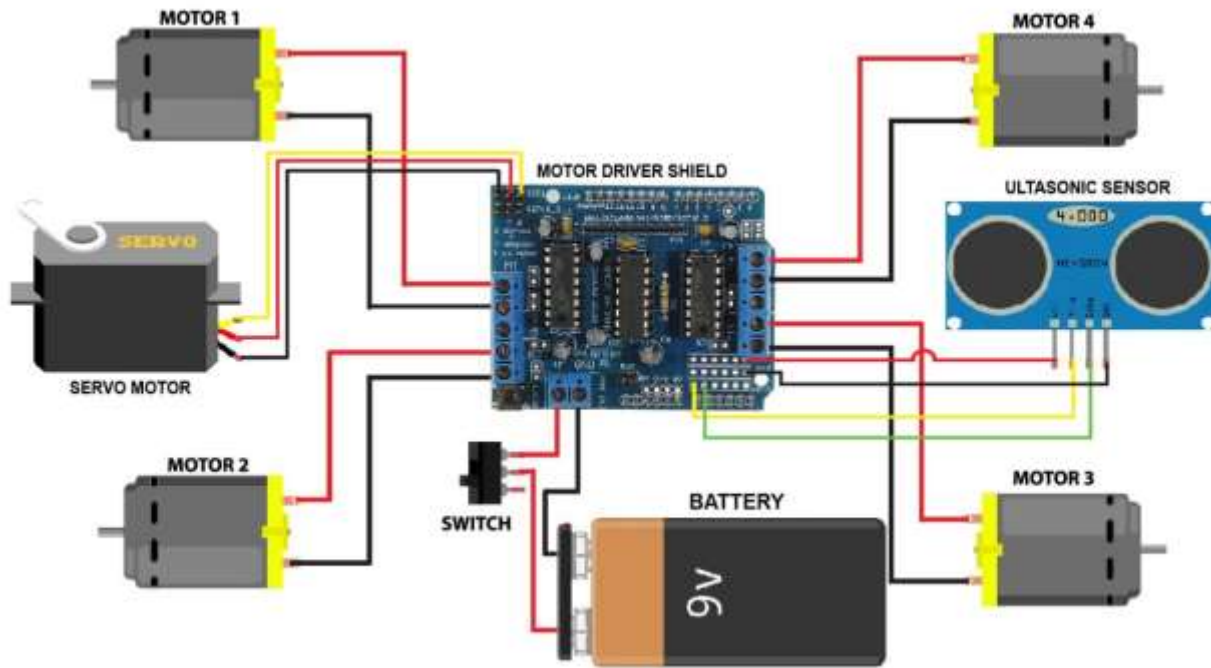


Fig: 8 Block diagram of braking system[1]

Result and discussion

As a result of this automatic braking system project, every part is working well and the braking system project is running successfully. When an obstacle is detected the safety measuring take place apply a brake. The prototype system ranges from 2cm to 1cm.

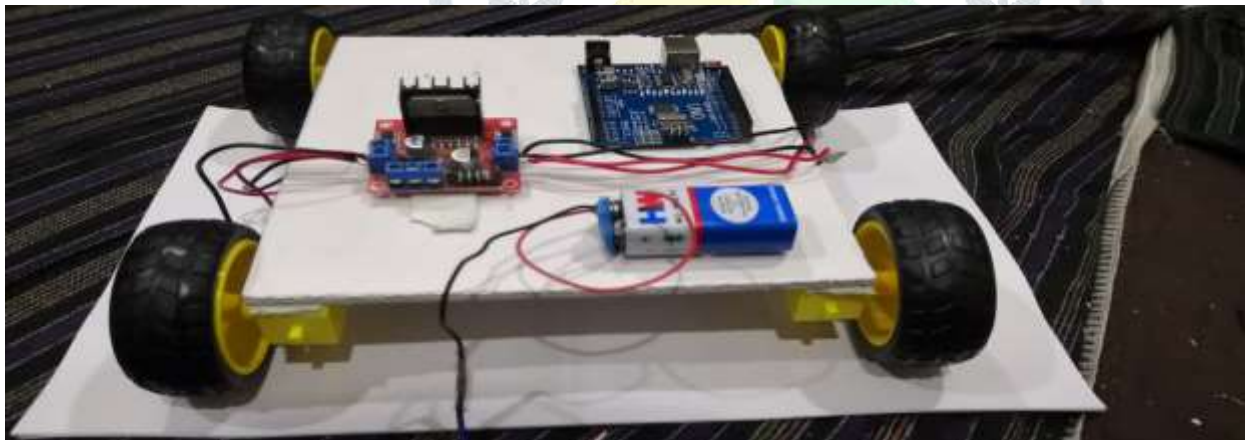


Figure:9 Assembled pic of components

Assembled all the components on the chassis and fix the motors with using L293D motor drive all the components are connected to the Arduino which is programmed. Ultrasonic sensor is fixed in front of chassis to sense the distance of an obstacle. This is the prototype of an automatic braking system.

It is associated with batteries, and DC gear engine and servomotor control the slowing mechanism. It assessed the framework's work by putting diverse deterrent articles. The framework reacts by decreasing the vehicle speed when the impediment is set at various good ways from the vehicle. It additionally naturally halted in limited territories.

CONCLUSION

We have finished the model of the programmed slowing mechanism plan and the execution of a programmed stopping mechanism for forward mishap shirking, which is proposed to be utilized in vehicles where the driver may not physically break however the vehicle speed might be consequently decreased because of the detecting of deterrents. This lessens the pace of wounds and spares numerous individuals' lives. Through this task we picked up information about working of programmed slowing mechanism. Henceforth we put stock in that fuse of all segments in slowing mechanism will augment security.

FUTURE SCOPE

In the future, a control system based on an automotive braking system will be designed and developed. The Automatic Braking System with an ultrasonic sensor will warn the driver if the distance between the vehicle and the obstacle is within the range of the sensor, then the brakes are used. In this experimental model, it is a new feature that could be used for all vehicles. This program would improve the safety of automobiles and prevent accidents. It can also be used for heavy-duty equipment such as buses, cranes, trucks, tractors, etc. Depending on the vehicle circumstances, we will definitely get the details about the sense of obstacle detection. It is very useful to both the public sector and consumers, as well as avoiding incidents in metropolitan cities.

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