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Automatic Braking System for E-Vehicles

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Abstract-The business strategy for automotive safety systems has been evolving over the last twenty years. Initially, individual passive devices and options like seatbelts, airbags, knee bolsters, crush zones, etc. was developed for saving lives associated minimizing injuries once an accident happens. Later, preventive measures like rising visibility, headlights, screen wipers, tire traction, etc. were deployed to cut back the likelihood of going in associate accident. Currently we have a tendency to area unit at the stage of actively avoiding accidents yet as providing most protection to the vehicle occupants and even pedestrians. Systems that area unit on the edge of being deployed or underneath intense development embody collision turning away systems. During this treatise, advanced concepts like pre-crash sensing, supersonic sensing element is employed to sense the article ahead of the vehicle and provides the signal to the small controller unit. supported the signal received from the supersonic sensing element, the small management unit sends a symbol to the braking unit for applying the brake mechanically as per braking & throttle control logic fed in to the small controller unit. To avoid the collision between the vehicles throughout the amount of running conditions and mechanically applying the brake by means that of actuators,

Distance measure sensors & Electronic management module.

Key Words: automotive safety, pre-crash sensing, controller unit, distance measure sensors.

1.INTRODUCTION

For the better understanding of working model, we have 4 stages which we followed.

(1)Signal transmission stage (stage1.) Here we are sending signal by the ultrasonic sensors which placed in vehicle.

(2)Detection of object.(stage2) in this stage, if the wave return after the collision with object the system capture the wave and send details to the ArduinoUno.

(3)Calculations.(stage3) As per the signal detection the calculation for distance and time will be calculated in this stage.As per the calculation results the safe speed and braking of vehicle decided by the controller.

(4)Regenerative braking (stage4) at last the command given by the controller applied on motor where the speed is reduced or brake is applied automatically. As the result the vehicle will stop and this will avoid any damage to life of peoples

2. SCOPE OF THE PROJECT

Through this project we are introducing new safety system for e vehicle to reduce the losses.

*Safety purpose-

As we are moving towards new technologies we have new challenges associated with it. In automotive industry the major thing is to provide safety or secure system and this project is based on safety of people. By applying automatic brake we can reduce the number of accident.

*Promoting clean energy

Day by day the effect of Gobal warming is increasing, so we have to act now.by promoting e-vehicle with new technologies like automatic braking system, AI system, we can support sustainable development. As it provide better safety and security it will help in different areas like hills and we can also used in others system.

3. BLOCK DIAGRAM

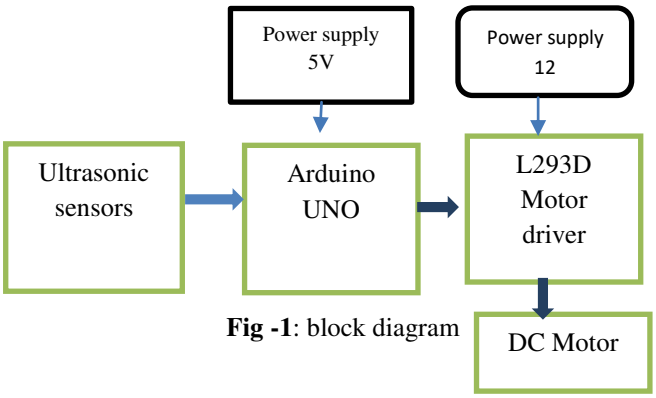

Fig -1: block diagram

4.COMPONANTS

Arduino UNO

Ultrasonic sensors are used to measure the distance between the vehicle and the obstacle. This data is received by the Arduino Uno. According to the distance of obstacle from vehicle, speed will be reduce with the help of motor driver L293D. If the distance measured by ultrasonic sensor is greater than the threshold, then vehicle speed will be reduce zero.

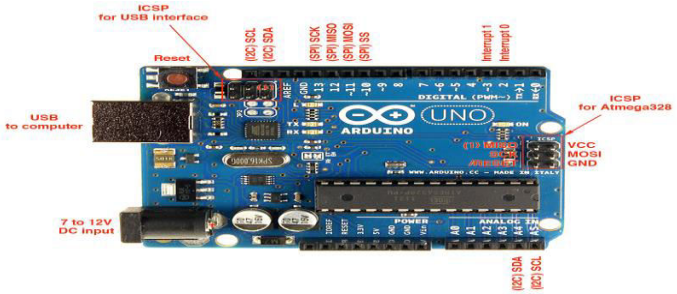

Fig -2: Arduino uno

TECHNICAL SPECS

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by boot loader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
LED_BUILTIN	13
Length	68.6 mm
Width	53.4 mm
Weight	25 g

Power

The Arduino/Genuine Uno board is steam-powered via the USB association or with AN external power provide.

External (non-USB) power will return either from AN AC-to-DC adapter (wall-wart) or battery.The adapter is connected by plugging a two.1mm center-positive plug into the board's power jack.Leads from A battery is inserted within the GND and Vin pin headers of the facility instrumentality.The board will care for AN external provide from six to twenty volts.If furnished but 7V, however, the 5V pin may provide but 5 volts and also the board could become unstable.If victimization over 12V, the transformer could overheat and injury the board.

The counseled vary is seven to twelve volts.

Pin No	Function	Name
1	Supply input pin	INPUT
2	Ground pin	GROUND
3	Voltage output pin	OUTPUT

Ultrasonic sensor

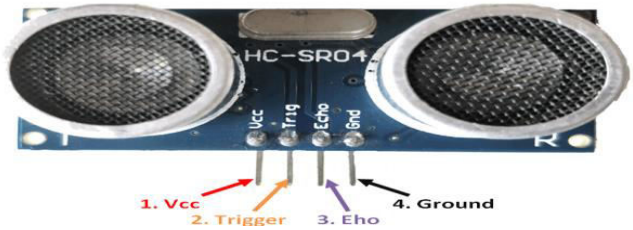

Fig -3: ultrasonic sensor

Pin No	Pin Name	Description
1	Vcc	The Vcc pin powers the sensor, typically with +5V
2	Trigger	Trigger pin is an Input pin. This pin has to be kept high for 10us to initialize measurement by sending US wave.
3	Echo	Echo pin is an Output pin. This pin goes high for a period of time which will be equal to the time taken for the US wave to return back to the sensor.
4	Ground	This pin is connected to the Ground of the system.

HC-SR04 Sensor Features

- Operating voltage: +5V
- Theoretical Measuring Distance: 2cm to 450cm
- Practical Measuring Distance: 2cm to 80cm
- Accuracy: 3mm
- Measuring angle covered: <15°
- Operating Current: <15mA
- Operating Frequency: 40Hz

5.CIRCUIT SIMULATION

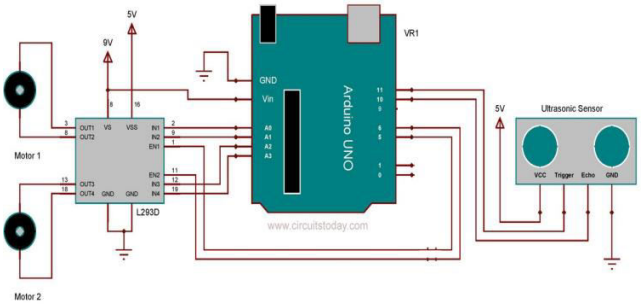

Fig -4: Circuit simulation

6.METHODLOGY

1) Connect the all components as per above fig -4 circuit diagram. By using VCC and ground pins, power the sensor with a regulated +5V supply.
2) While sensor operatingcurrent is less than 15mA so,it can be directly powered by the on board 5V pins.
3) Connect the trigger and Echo pins of sensor with I/O pins of the microcontroller.
4) For the measurement and data, the trigger pin has to be made high for 10uS and then turned off.
5) Resultant itwill send/trigger an ultrasonic wave (40)Hz from the transmitter and the receiver will receive the wave, if obstacle will be detected
6) After getting reflected by any object the Echo pin goes high for of time which will be equal to returning time of wave.
7) The total time taken during when the Echo pin stays high is measured by ArduinoUnoand it gives total timetaken by the wave to the sensor.
8) By above information the distance is measured.
9) Now if the distance is within the threshold limit (400-2)cm then instruction given to the L293D driver for reducing the speed and if greater than the threshold the speed reduced to 0 by applying Regenerative braking.

7.CONCLUSIONS

The Braking system, if implemented can reduce number of accidents and can save invaluable human lives and property. The whole system is widely open and can work with various brakes, various sensors and actuator solutions. It must be mentioned that the different subsystem such as sensors, actuators etc. have found other applications since they were designed. Now, this system is designed as a project work at small level but we can adopted this system at industry level so that we can prevent lots of accidents and human lives. The future of automotive safety is more than just developing new technology for preventing accidents.

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