DESIGNING A TWO WHEELER WITH AUTOBRAKING AND BLIND SPOT MONITORING SYSTEM

Mr. P. LeonDharmadurai[1], Manoj Mythreyan V K[2], Midunavanan K A[3], Musthak Ahamed M[4], Yuvan Raj M[5]

[1]Mr.P.Leon Dharmadurai, Assistant professor, Dept. of Automobile Engineering, SNS College Of Technology
[2] Manoj Mythreyan V K - III B.E Automobile Engineering, SNS College of Technology
[3]Midunavanan K A - III B.E Automobile Engineering, SNS College of Technology
[4]Musthak Ahamed M - III B.E Automobile Engineering, SNS College of Technology
[5]Yuvan Raj M - III B.E Automobile Engineering, SNS College of Technology

---

Abstract - *We come across numerous risky scenarios while riding, such as vehicles driving on the wrong side of the road, front vehicle rapid braking, ditches or potholes, and speed breaker. Every day, many elderly people and women ride scooters. Our objective is to create a smarter scooter.*

Situations occur quickly, and we have less time to respond. if they do not react quickly enough, our scooter or the riders will suffer an accident or crash. Accident rates will be reduced if we deploy an auto braking system employing a microcontroller named Arduino ESP32 in the scooter segment via a blind spot monitoring system. Because accidents occur on the scooter's sides and front.

***Key Words*: Sudden braking1, shorter braking distance2, autobraking3, microcontroller4, blind spot monitoring5**

1.INTRODUCTION

Automation is a term that describes a collection of technologies that reduce the need for people to intervene in processes. Anything from a thermostat that controls your home's boiler to a big industrial control system with tens of thousands of input data and output control signals can be considered automated. The banking industry has likewise embraced automation. Control complexity can range from basic on/off to multi-variable high-level algorithms.

One of the most common causes of bike accidents is the unannounced sight of a barrier while driving. In such a panic situation, driver response time and stopping distance vary quite a bit, potentially resulting in an accident.

This project will aid us in reducing response time by assisting the driver in stopping in a timely manner or minimising the stopping distance in order to avoid an accident.

Ultrasonic sensors can be used to determine the distance between a vehicle or a moving vehicle and an obstruction. We can also install a system that allows vehicles to interact with one another in order to determine how far apart they should be, When approaching automobiles from the front or behind, for example. Additional instructions can be added to assist with driving.

As part of an Autonomous Braking system, an Ultrasonic wave emitter mounted on the front of a bike generates and emits Ultrasonic waves. The bike's front-mounted ultrasonic receiver picks up a reflected Ultrasonic wave signal.

The reflected wave is used to measure the distance between the obstruction and the two-wheeler (detected pulse). A microprocessor is then used to manage the vehicle's speed and apply massive brakes on the bike for safety reasons, based on the measuring pulse data.

In terms of vehicle safety and performance, as well as driver safety, the use of an Arduino microcontroller is a huge step forward.

1.1 COLLISION AVOIDANCE USING SENSORS

In the broadest definition, a sensor is a device, module, machine, or subsystem that detects events or changes in its environment and conveys this information to other electronics, most commonly a computer processor. Other devices are always coupled with sensors. Sensors are used in a wide range of everyday goods, including touch-sensitive elevator buttons (tactile sensor) and lights that fade or shine whenever the ground is touched, among several applications that most people are ignorant of.

Arduino-based bike that can be controlled through a couple of sensors that used for automatic braking feature that stops the bike to avoid a crash. The two wheeler will use an ultrasonic sensor bread board to detect objects in front when the two wheeler is moving forward we are using the motor driver here to drive the geared motors which tightens the brake wire.

2. ESPRESSIF ESP32

Espressif Systems' ESP32 SoC family is a reduced cost, low-power Wi-Fi and double mode Bluetooth system on a chip (SoC) family.. The ESP32 series includes the chips ESP32-D0WDQ6 (and ESP32-D0WD), ESP32-D2WD, ESP32-S0WD, and the SiP ESP32-PICO-D4.

The ESP32 series uses Tensilica Xtensa LX6 dual-core and single-core microprocessors, Tensilica Xtensa LX7 dual-core microprocessors, or single-core RISC-V microprocessors with integrated antenna switches, Power amplifier, low-noise receiver amplifier, filters, and authority modules are even included in the RF balun.

Espressif Systems, a Shanghai-based Chinese firm, designed and developed the ESP32, which is produced by TSMC using their 40 nm technology. The ESP8266 microcontroller can be replaced with it.

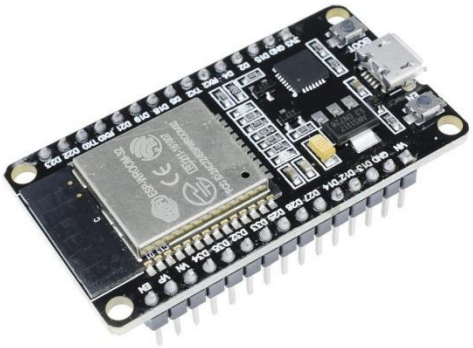

Fig-1: ESP32 Dual Core

3. ULTRASONIC SENSORS

An ultrasonic sensor is an electronic device that uses ultrasonic sound waves to detect the distance between a target item and converts the reflected sound into an electrical signal.

Ultrasonic waves travel quicker than audible sound waves (i.e. the sound that humans can hear). The transmitter (which generates sound using piezoelectric crystals) and the receiver are the two primary components sensors that Make use of ultrasonic waves (which triggers the waves after it has traveled to and from the objects).

The sensor measures the time between the transmitter's sound emission and its contact with the receiver in order to compute the distance between the sensor and the item.

Fig -2: HCSR04 Ultrasonic Sensor

The most typical application of ultrasonic sensors is as proximity sensors. They're used in self-parking and anti-collision safety systems in automobiles. Industrial technologies and robotic obstacle detection systems both use ultrasonic sensors.

4. WORKING

First ESP32 is connected with jumper wires with the GPIO pins to send and receive signals from sensor to ESP32. Connect the motor to the 9V HW battery at this point.. 1st Ultrasonic sensor is connected with pin 19 and echo pin to 15 GPIO, pin D0 Trig and pin clk Echo and accordingly. The ultrasonic sensors serial monitor is triggered and the car brake wire is pulled when the vehicle in front immediately stops. The HC-SR04 has four configuration pins: VCC (1), TRIG (2), ECHO (3), and GND (4). The TRIG and ECHO pins can be connected to any Digital I/O on your Arduino board because VCC provides a +5V supply voltage.

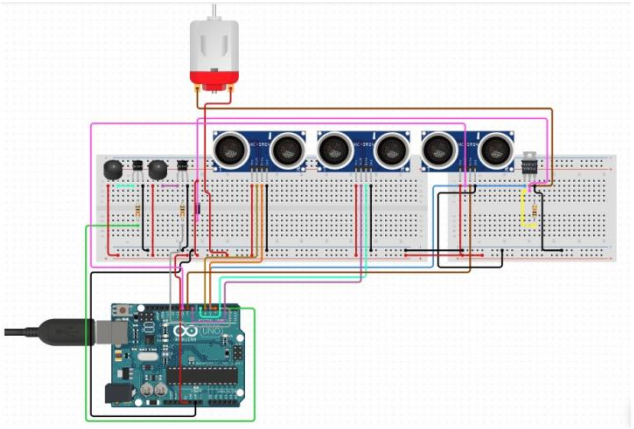

Fig-3: Schematics of the safety system

The VCC is powered by a +5V supply, and the TRIG and ECHO pins can be connected to any of the board's Digital I/O.

Arduino 35 Board We must put the Trigger Pin to a High State for 10 seconds in order to generate the ultrasonography.

This should generate an 8-cycle sonic boom that will travel at the speed of sounds to the Echo Pin. The Echo Pin would display the time required for the sonic boom to travel in µs.

We must first define the Arduino board's Trigger Pin and Echo Pin before we can begin writing the programming code. In this project, the Echo Pin is connected to D2 and the Trig Pin to D3. Following that, the variables for distance (int) and duration (duration) are defined (long).

We must only set the trig Pin to a LOW State for 2 seconds in the loop to ensure that it is clear.

Set the trig Pin to HIGH Condition for 10 seconds to produce a sound waves. You must read the trip time using the pulseIn() function and store it in the duration variable. The first parameter is the function's name. The second argument is the content of the function's name. The first parameter is the echo pin's identification, while the second portion is either HIGH or LOW. The pulseIn() method will begin timing when the pin goes HIGH owing to the rebounded transmitted signal, and will stop measuring when the pin goes LOW after the blast wave finishes.

At the conclusion of the program, the pulse length in msec is provided. To get the distance, increase the period by 0.034 and divide it by 2, as shown in the previous result. Then, we'll print the distance value on the Serial Monitor.

5. CONCLUSIONS

As a result, the Arduino circuit is built and operated for testing. The safety of the vehicle's driver and passengers is extremely effectively safeguarded. For safety, the sesnsor connection from the Arduino board is chosen for a specific purpose.

Motorcycle accidents are dramatically reduced when this safety device is used. The scooter/motorcycle comes to a complete stop during the test, with no system faults.

If we utilise this strategy, we might be able to avoid many of the accidents caused by the following system. Ultrasonic sensor, LCD, and LEDs are only a few of the low-cost components in the system.

This technology may have a number of benefits, including the estimating the distance between two vehicles. We will reduce the speed of one car in the future based on the following distance of another vehicle. We may be able to prevent many accidents with this technology, and INDIA will become an accident-free country.

ACKNOWLEDGEMENT

We extend our heart-felt gratitude to the management of our college, for providing us with sorts of supports in completion of this project.

We record our indebtedness to our Principal **Dr.S.ChenthurPandian** for their guidance and sustained encouragement for the successful completion of this project.

We are highly grateful to **Dr.K.Senthilkumar**, Professor & Head, Department of Automobile Engineering, for his valuable suggestions and guidance throughout the course of this project.

We take immense pleasure in expressing our humble note of gratitude to our project guide **Mr.P.LeonDharmadurai**, Assistant professor, Department of Automobile Engineering, for his remarkable guidance in doing this project.

We express our sincere and deep gratitude to our beloved staff members for extending their kind co-operation, moral support, and encouragement for completing this work.

We express our sincere thanks to all those who have helped us directly and indirectly in the successful of this project work.

We are extremely thankful to our parents, relatives and friends for their continuous encouragement for carrying out this project.

REFERENCES

[1] P.Bhaskara, Eriki Ananda. K, Venkataramana. V " Arduino Based Automated Braking Control System to Enhance the Safety at Low Light and Long Stressed Drive Conditions" Department of Mechanical Engineering, VEMU Institute of Technology, Kothakota-517112, AP, India, 2019

[2] P.Kisan Rajendra , Talwadkar Sarthak Uday , Pirjade Sahil Noormohamad, Jugal Jagtap, Mayekar Prathamesh Gajendra, Ameya "Autonomous Braking System That Can Be Used For All Vehicle With Little Modification" May 2021

[3] Rupesh Kumar Sinha, C. Ashmita, Shruti Uikey, Rahul Makoto Singh, "Anti-Lock And Automatic Braking Systems" , Department of Electronics and Communication Engineering, Birla Institute of Technology, Mesra, Ranchi, Jharkhand, Mar 2017

[4] Bhaskara. P, Eriki Ananda. K, Venkataramana. V "Arduino Based Automated Braking Control System to Enhance the Safety at Low Light and Long Stressed Drive Conditions" Department of Mechanical Engineering, VEMU Institute of Technology, Kothakota-517112, AP, India – 2018

[5] Ridwan Mustofa, Joyanta Das "Project Presentation on Automatic braking system" Khulna University of Engineering and Technology, June 2019

[6] Nazrul Islam , Atefeh D.Nayyeri, Wlodek J Kulesza "Motorbike Crash Avoidance System with Ultrasonic Sensor and Android Application", Mawlna Bhashani Science and Technology University, Blekinge Institue of Technology, April 2013

BIOGRAPHES

MANOJ MYTHREYAN V K - B.E Automobile Engineering, SNS College of Technology, Coimbatore.

MUSTHAK AHAMED M - B.E Automobile Engineering, SNS College of Technology, Coimbatore.

MIDUNAVANAN K A - B.E Automobile Engineering, SNS College of Technology, Coimbatore.

YUVAN RAJ M - B.E Automobile Engineering, SNS College of Technology, Coimbatore.