

# DISTANCE BASED COLLISION AVOIDANCE WITH AUTOMATIC ACCELERATION & STOPPING IN AUTOMOBILES

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**Abstract:** This project builds the break and acceleration automatically in a vehicle which can be sensed by IR sensors, which are installed in a vehicle, this initially requires a voice command move forward and backward which acts as driver of the vehicle, when the obstacle is detected while moving forward the vehicle automatically applies break, like wise the obstacle is detected the vehicle automatically accelerates. Automatic breaking and acceleration system that based on time controlled Arduino operates based on the coding. Coding is written and designed to accelerates and apply the break, it stops and move as per the circuit.

**Keywords:** IR sensors, Arduino uno, Accelerates, Breaking

## I. INTRODUCTION

Sensors used with electronic devices have been used in many areas to facilitate life. Sensors are devices that convert energy forms into electrical energy. The sensors serve as a bridge connecting the environment and various electronic devices. IR sensor, which stands for Infrared sensor. IR sensors are typically utilized for short-range detection, complementing other sensor technologies such as radar and cameras. They operate by emitting infrared light and measuring the reflection or the absence of reflection from nearby objects. The sensor emits infrared light pulses and analyses the reflected signals to determine the presence and distance of objects in the vehicle's path. the system can analyse the reflected signals and calculate the time it takes for the light to travel to the object and back. Once an obstacle is detected within the predefined distance range, the system can provide various warnings or interventions to prevent a collision. This refers to automatic breaking and acceleration when the obstacle is detected.

## II. LITERATURE SURVEY

Once an obstacle is detected within the predefined distance range, the system can provide various warnings or interventions to prevent a collision. This may include visual or audible alerts to the driver, activation of braking systems, or steering assistance to avoid the obstacle. This survey explores the existing literature, highlighting the key concepts, methodologies, and technological advancements in this field. The survey also identifies the challenges, limitations, and potential future directions for research and development in distance-based collision avoidance system.

The first paper we referred was "A DEEP REVIEW AND ANALYSIS OF DATA EXCHANGE IN VEHICLE TO VEHICLE COMMUNICATIONS SYSTEMS" the author is Hussein Ali, he defined that

- comprehensive review and analysis of data exchange in vehicle-to-vehicle (V2V) communication systems.
- It establishes a coherent taxonomy, highlights challenges, motivations, and recommendations, while offering substantial analysis.
- The paper also outlines future directions for V2V communication

The second paper we referred is "ARDUINO BASED FORWARD COLLISION DETECTION WARNING SYSTEM" is the author the Orji. E.Z , he defined that

- The system detects potential collisions in real-time and alerts the driver through warnings.



- The experimental results demonstrate the effectiveness of the system in enhancing road safety.
- This research offers a promising solution for implementing a cost-effective collision detection system using Arduino.

The third paper we referred was “DEVELOPMENT OF AN ARDUNIO-BASED OBSTACLE AVOIDANCE ROBOTIC SYSTEM FOR AN UNMANNED VEHICLE” the author is Kolapo Sulaimon Alli, he defined that

- The system successfully detects and avoids obstacles using a combination of sensors and algorithms.
- This cost-effective solution shows promising potential for various applications in the field of autonomous robotics.

The fourth paper we referred is “REMOTE AND AUTONOMOUS CONTROLLED ROBOTIC CAR BASED ON ARDUNIO WITH REAL TIME OBSTACLE DECTION AND AVOIDEKNCE” the author is Esra Yilmaz, he defined that

- System that enables remote and autonomous control of a robotic car.
- Using Arduino, the system incorporates real-time obstacle detection and avoidance capabilities.

### III. COMPONENTS

Component	Quantity	value
Arduino uno	1	
IR Sensors	2	
Motor driver	1	L293D
Bluetooth module	1	Hc05
4 Wheel robot chassis kit	1	
Batteries	6	1.5V DC

### IV. METHODOLOGY

#### 1.Arduino Uno

Arduino uno is a micro controller board based on the ATmega328P and It has 14 digital ip/op pins. It also has 6 analog inputs, a 16 MHz quartz crystal, a USB connection, power jack, and a reset button. It is the most widely used and user-friendly micro controller. Simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get connection.

#### 2.IR Sensor

Sensor emits infrared light, which bounces off objects and returns to sensor. If an object is within detection range, the reflected infrared light will be detected by sensor.

#### 3.Motor Driver L293D

Motor driver L293D circuit has a quadruple high current half-H driver, Wide Supply-Voltage Range: 4.5V to 36V, High-Noise-Immunity Inputs. And Output Current is 600mA Per Channel Peak Output Current is 1.2A Per Channel.

#### 4.Bluetooth Module HC05

Bluetooth module HC-05 is a typical -80dBm sensitivity and up to +4dBm Radio frequency transmit power. And It has a PIO control, UART interface with programmable baud rate, integrated antenna and an edge connector. It also having a auto-pairing pin is called ”1234” as default code or pin and it auto-reconnect with in 30minutes.

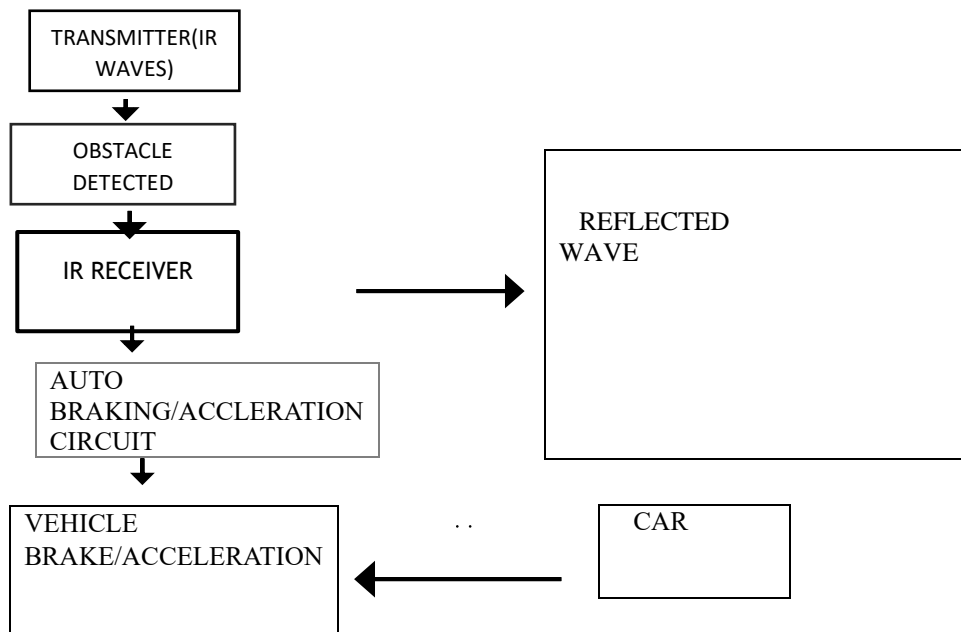
### 5. Wheel robot chassis kit

A 4-wheel chassis kit is a set of mechanical components designed to build a vehicle or robot with four wheels. It typically includes a chassis frame, wheels, motors, and other necessary hardware.

### 6. Batteries

1.5 Volts alkaline battery gives power to 4 wheel chassis kit to work on the circuit.

## V. BLOCK DIAGRAM



## VI. IMPLEMENTATION

In this proposed system actual break and acceleration need not to be applied, to stop or move the vehicle. In this project an android application is used to recognize and process human voice which is further converted into text (using of google speech to text converter). Using the in-built microphone in android smartphones and text is received by the car using Bluetooth. This text is further processed by the Arduino microcontroller to control the robot wheels accordingly the program or coding. Further acceleration/breaking is performed according to the circuit and program.

### 3.1 Algorithm

The voice commands ( which acts as driver in our project ) are trained to the communication module

- The stored speech or voice commands are represented in the form of binary value.
- The binary values are transmitted then received by another Bluetooth module which is present on the receiver side.
- If the obstacle is detected in front of the vehicle, then the vehicles automatically applies break and stops till the obstacle or object is cleared, then the vehicle move as initial.
- If the obstacle or the object is detected in back side of the vehicle, then the vehicle accelerates automatically.

## VII. CONCLUSION

The system that enables remote and autonomous control of a robotic car. Using Arduino, the system incorporates real-time obstacle detection and avoidance capabilities. They significantly reduce the risk of collisions by detecting and responding to potential hazards in real time. Automatic acceleration and braking systems ensure smoother and more controlled driving experiences. These systems are particularly effective in congested traffic conditions, where sudden stops and starts are common. They enhance overall driving comfort and convenience by reducing the need for constant speed adjustments. They have a profound impact on road safety, making driving safer and more efficient.



This project reduces the risk of collision and the work of the driver, where the driver can not able to see the obstacle or the object coming near to the vehicle. This system can be applied to all automobiles.

## REFERENCES

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