ARDUINO BASED OBSTACLE AVOIDING CAR

A PROJECT REPORT

submitted in partial fulfilment of the requirements

for the award of the degree of

BACHELOR OF TECHNOLOGY in ELECTRICAL AND ELECTRONICS ENGINEERING

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APRIL 2022

CERTIFICATE

This is to certify that the project work titled **"ARDUINO BASED OBSTACLE AVOIDING CAR"** submitted by "SUBHAM NANDA, SIDDHANTH RT, PRONIL POLPAKKARA, OJASWA YADAV " is in partial fulfillment of the requirements for the award of the degree of **BACHELOR OF TECHNOLOGY**, is a record of bona fide work done under my guidance. The contents of this project work, in full or in parts, have neither been taken from any other source nor have been submitted to any other Institute or University for award of any degree or diploma and the same is certified

Project Supervisor

ACKNOWLEDGEMENT

We wish to express our sincere thanks and deep sense of gratitude to our project guide, Professor Sriramalakshmi P**,** Associate Professor Senior, School of Electrical and Electronics Engineering, for her consistent encouragement and valuable guidance offered to us in a pleasant manner throughout the course of the project work.

We thank our parents, family, and friends for bearing with us throughout the course of our project and for the opportunity they provided us in undergoing this course in such a prestigious institution.

ARDUINO BASED OBSTACLE AVOIDING CAR

ABSTRACT

The (SR-04) Ultrasonic Range Finder and the Arduino are the main constituents of our project. The required apparatus which will be involved in our project include- BO Motor with pre soldered wire, Arduino Motor shield, Battery Holder with DC jack, SR-04 Ultrasonic Range Finding Sensor,6XAA Battery Holder and LED strip, Original Arduino Uno Board, connecting wires. The required coding is done in the Arduino board to get the following result according to our command. The obstacle avoidance robotic vehicle uses ultrasonic sensors for its movements. The microcontroller of 8051 families is used to achieve the desired operation. The motors are connected through the motor driver IC to the microcontroller. The ultrasonic Sensor is attached in front of the robot. Whenever the robot is going on the desired path the ultrasonic waves continuously from its sensor head. Whenever an obstacle comes ahead of it the ultrasonic waves are reflected from an object and that information is passed to the microcontroller. The microcontroller controls the motors left, right, back, front, based on ultrasonic signals. To control the speed of each motor pulse width modulation is used (PWM).

TABLE OF CONTENT

S.NO	CONTENT
1.	Abstract
2.	Introduction
3.	Objective
4.	Significance
5.	Components Used
6.	Work plan
7.	Methodology
8.	Block diagram and Coding
9.	Tinker’s Cad simulation and Hardware simulation
10.	Literature Review
11.	Conclusion
12.	References
13.	Curriculum Vitae

INTRODUCTION

Problem Addressed

- Need for a robot that can perform trajectory planning effectively.
- Need for a system which can detect obstacles and move in a pre-computed path.
- Need for the detection of obstacles that appear suddenly.
- Need to minimize human risk regarding the upper limit of a human eye.
- Need to assist the physically handicapped by incorporating cutting edge technologies in wheelchairs.
- Need to address the need for upgrade from inaccurate sensors like CCD cameras, CMOS image sensors, laser light pens, global positioning systems, and so on.
- Need for advanced mapping devices during exploration of unknown environment such as interplanetary exploration.

Solutions Offered

- Robot detects obstacles and avoids them in the trajectory.
- Robot uses an Ultrasonic Sensor which is capable of detecting obstacles which may appear suddenly, for instance, an animal in front of a wheelchair.
- Robot can detect every second.
- Robot can detect various terrains.

OBJECTIVE

- The Objective of the project is to setup the Obstacle avoiding car in Hardware form followed by the simulation in tinker's cad**.**

SIGNIFICANCE

Road accident is a major issue in many countries, mostly fast-moving vehicles face collision on Roads.

Usually, to avoid the collision and accidents on the road the road breakers and traffic Police wardens are controlling the flow of traffic.

Even if the person is cable of following the traffic rules sometimes the weather conditions Abruptly changes and the driver cannot control the happenings.

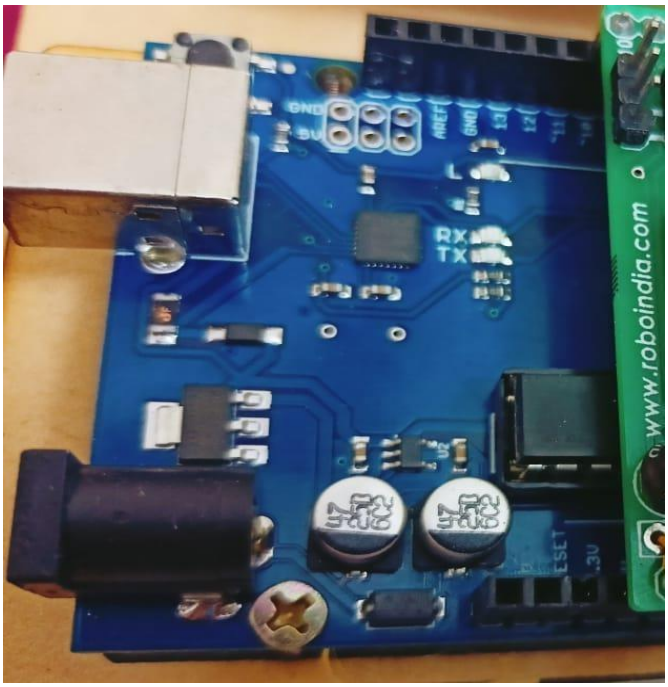
Another issue is the uncontrollable condition that if a person gets sleepy during the driving it can Also cause collisions with nearby objects.

This project will solve the problems describe above in the issue. While the vehicle is moving on the road.

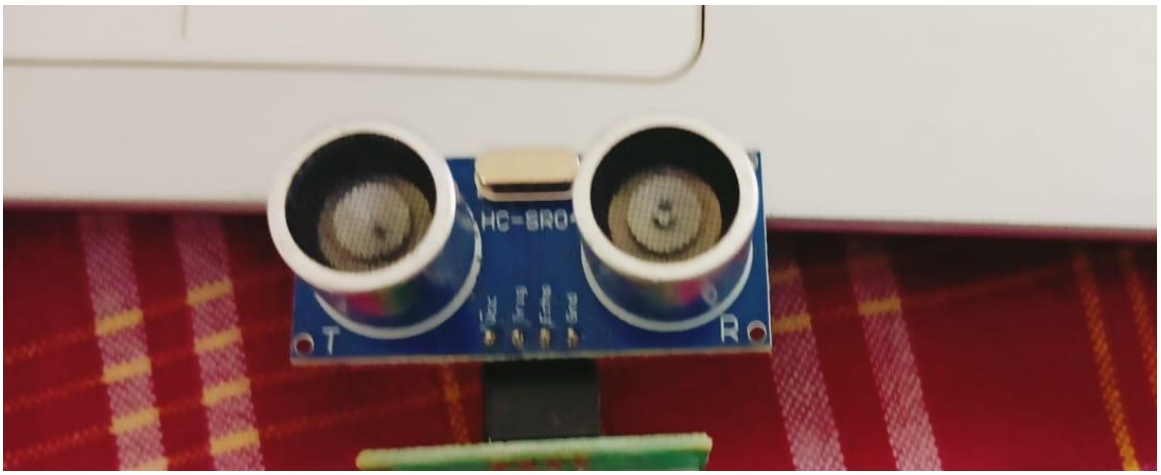
The sensor will be active all the time to detect any obstacle coming in its way.
When obstacle is detected the ultrasonic sensor attached at the front of the car will send the signal to the main board.

COMPONENTS USED

Some of the major components used are as follows



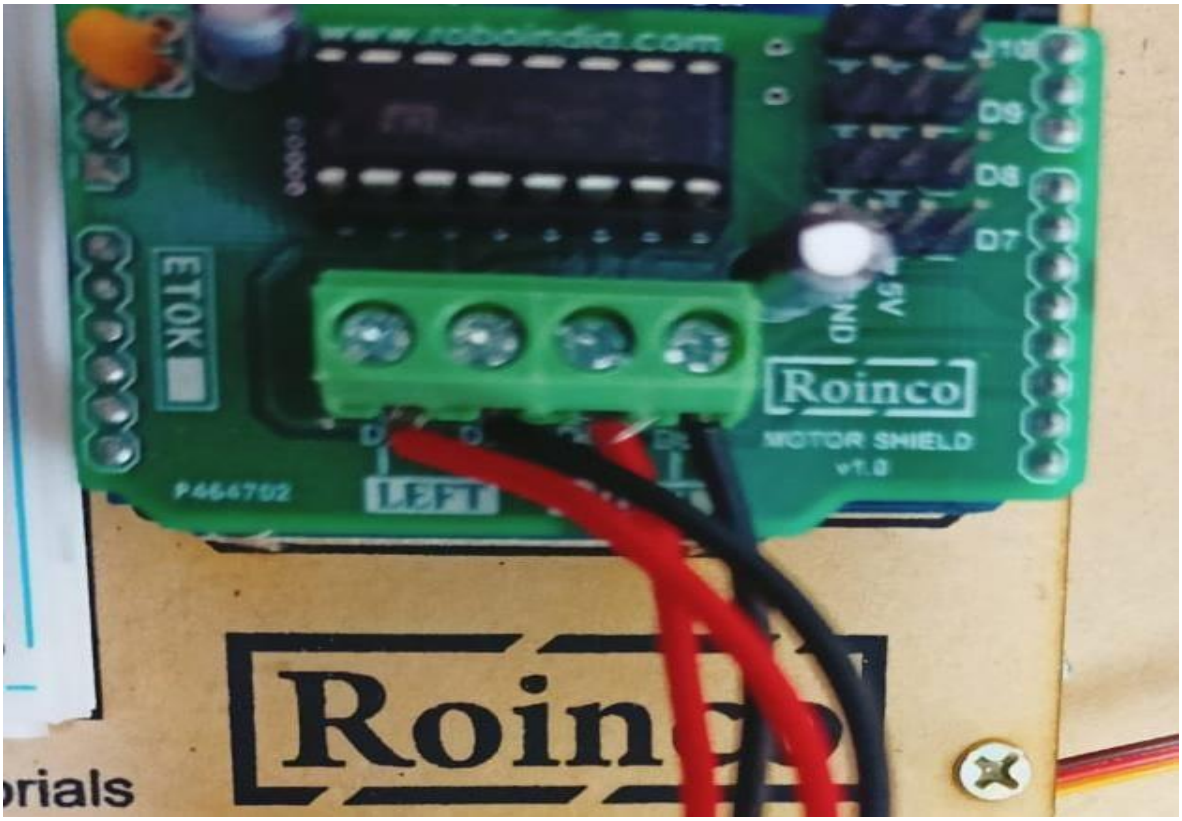
Arduino Uno Micro controller



Ultrasonic Sensor

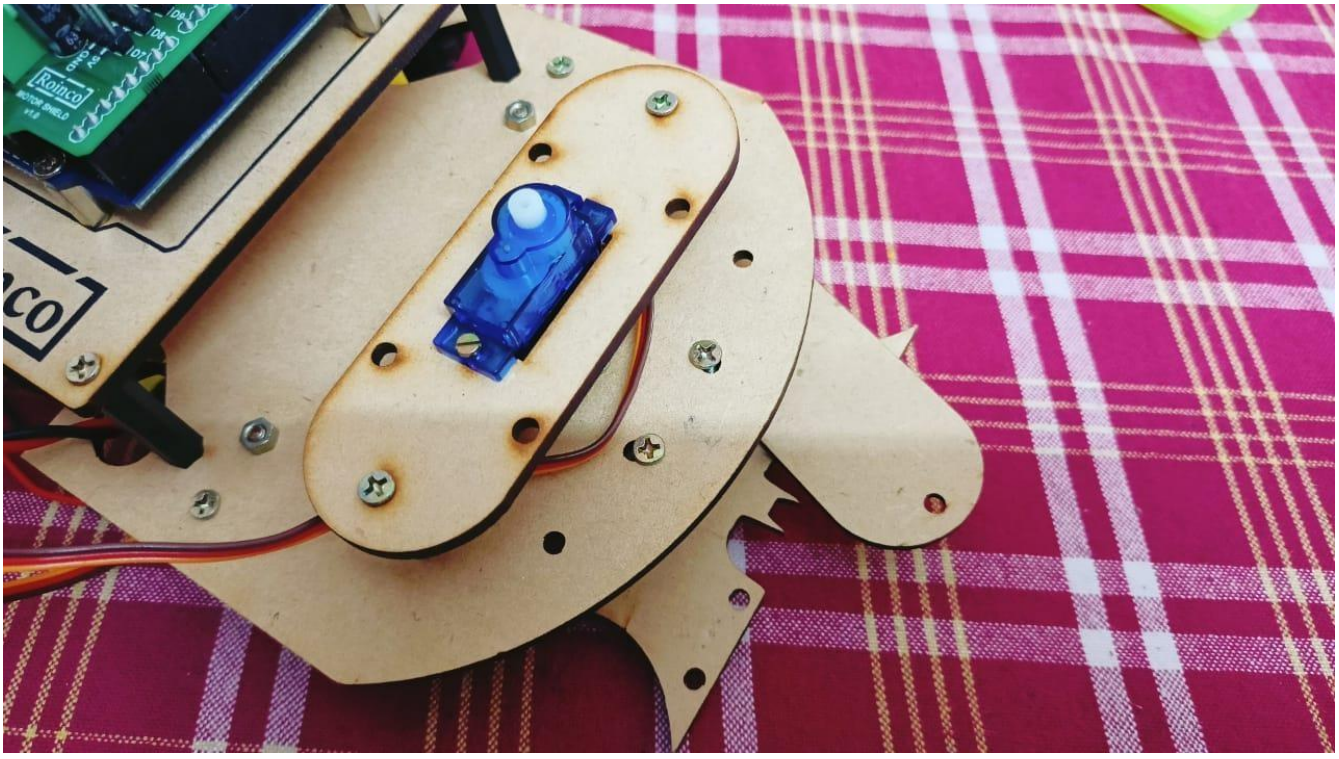
Castor Wheel

Jumper wires

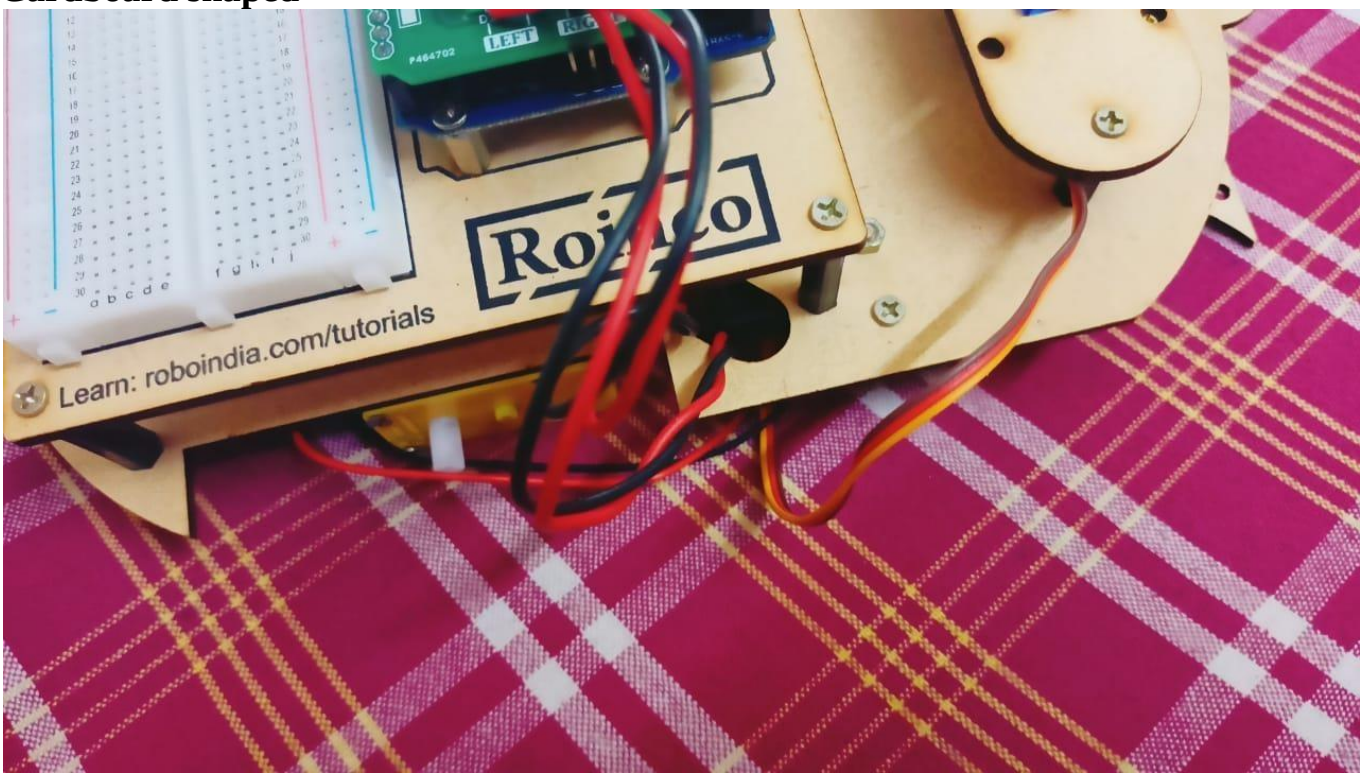


Motor shield

Battery Guard



Cardboard shaped



Connecting wires

Complete setup

WORK PLAN

- Our project deals with the hardware setup using the required apparatus along with coding to get the required task as per our requirements.
- After the correct connection in the motor, an algorithm will be used to take the necessity test.
- The required coding will be in such a way that the car will move in whichever direction it want, based on the required inputs.

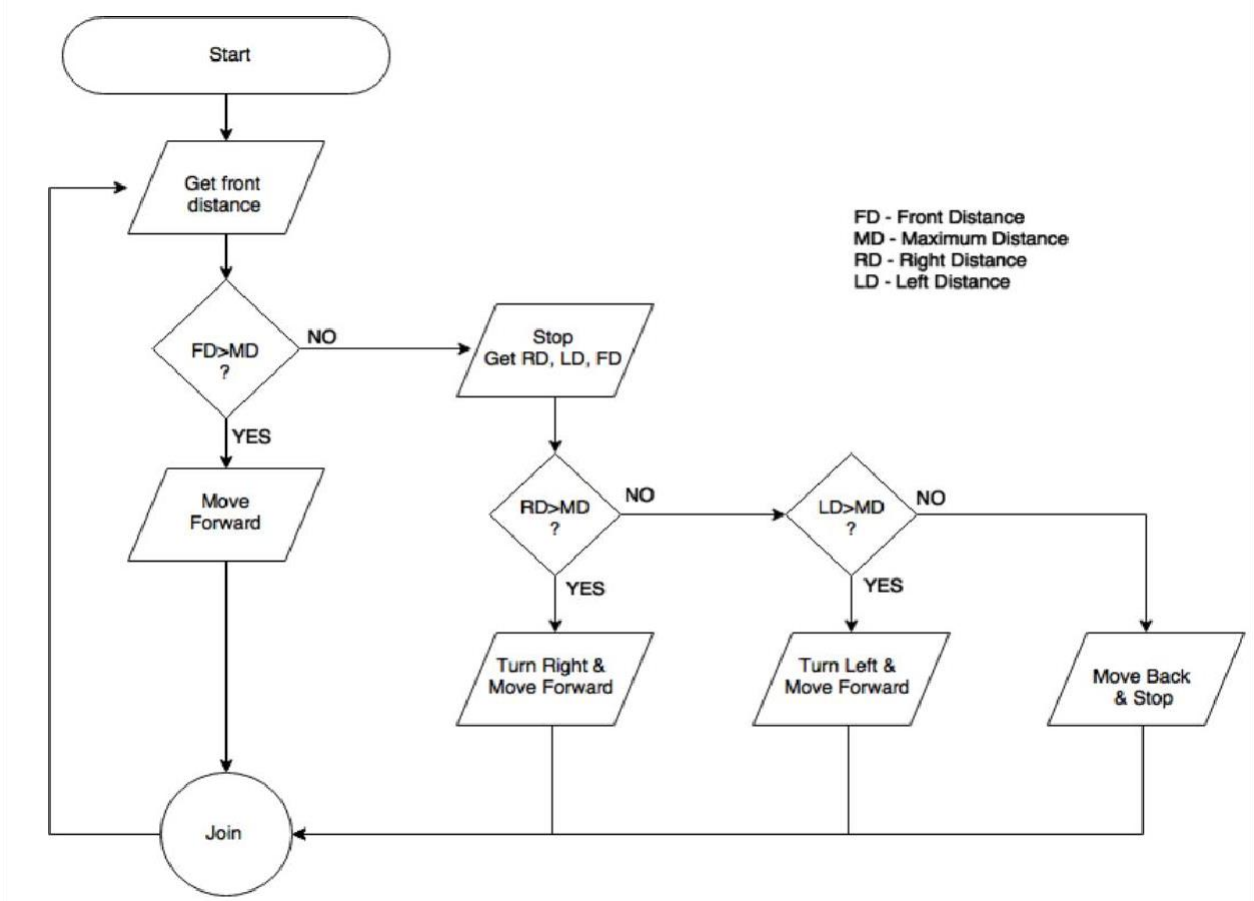
METHODOLOGY

- The obstacle avoidance robotic vehicle uses ultrasonic sensors for its movements. The microcontroller of 8051 families is used to achieve the desired operation.
- The motors are connected through the motor driver IC to the microcontroller. The ultrasonic Sensor is attached in front of the robot.
- Whenever the robot is going on the desired path the ultrasonic waves continuously from its sensor head.
- Whenever an obstacle comes ahead of it the ultrasonic waves are reflected from an object and that information is passed to the microcontroller.
- The microcontroller controls the motors left, right, back, front, based on ultrasonic signals.

- To control the speed of each motor pulse width modulation is used (PWM).

- It has following predefined function for robot motion-
- 1. forward() : forward movement of robot.
- 2. backward() : backward movement of robot.
- 3. turn_left() : for turning left.
- 4. turn_right(): for turning right.
- 5. halt() : for stopping robot.

BLOCK DIAGRAM

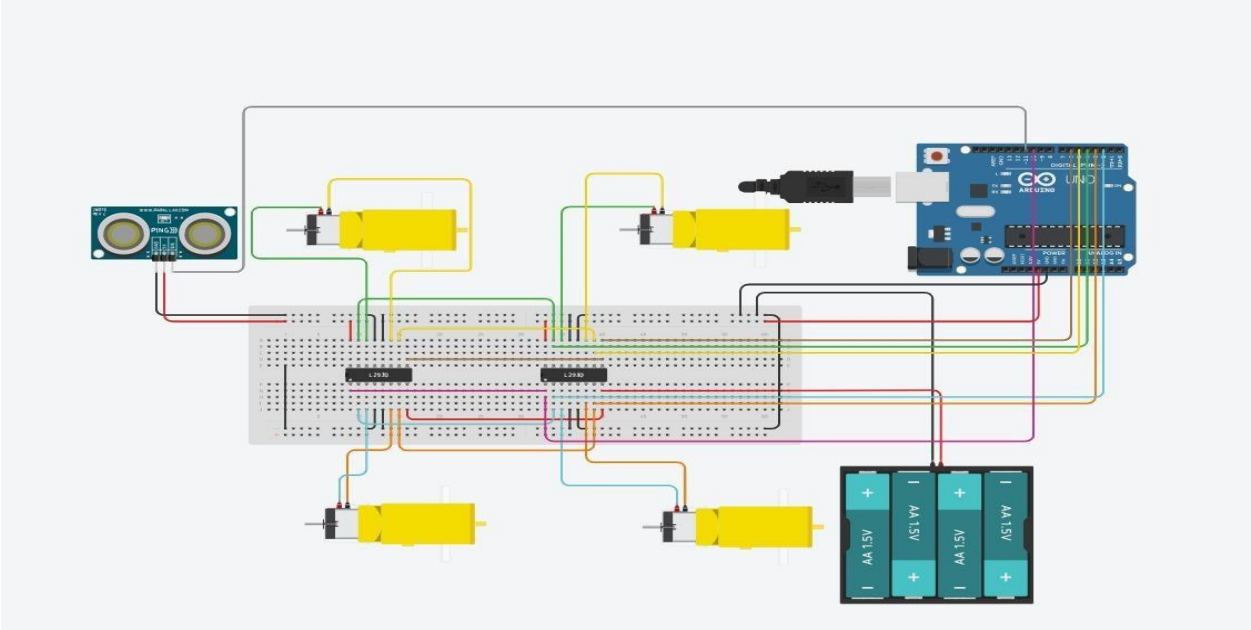


CODING

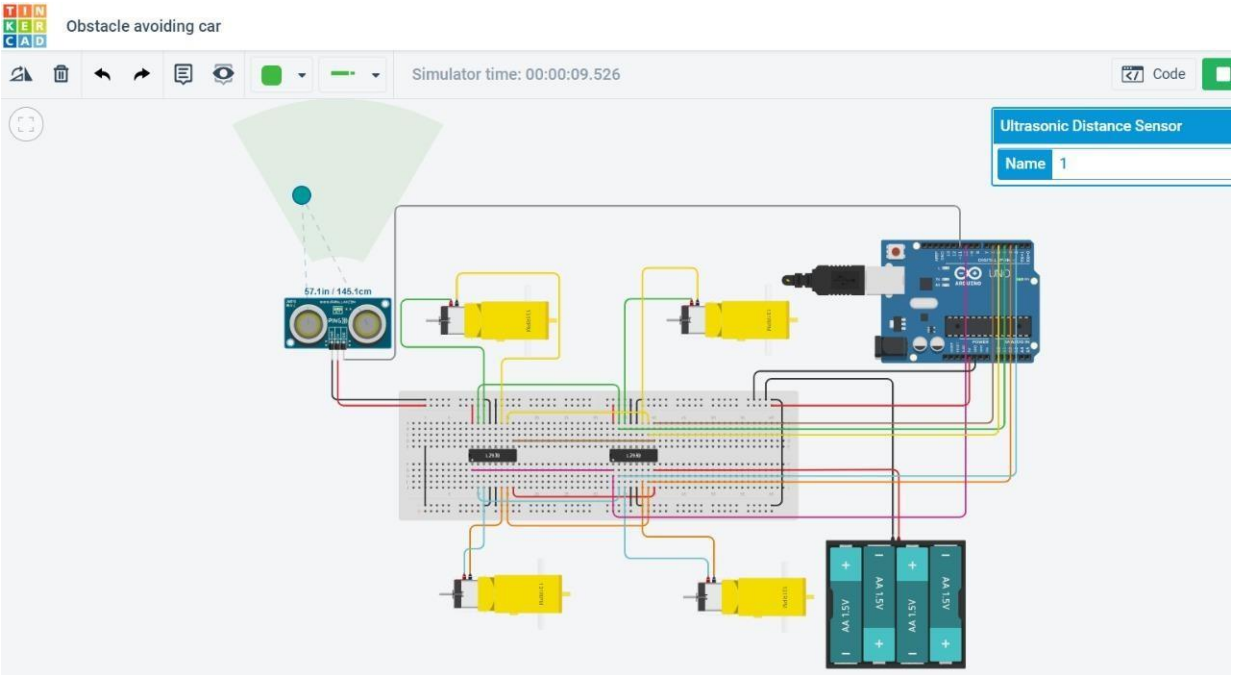
```
int distance = 0;
int i = 0;
long readUltrasonicDistance(int triggerPin, int echoPin){
pinMode(triggerPin, OUTPUT);  //
 Clear the trigger
digitalWrite(triggerPin, LOW);
delayMicroseconds(2);
// Sets the trigger pin to HIGH state for 10 microseconds
digitalWrite(triggerPin, HIGH);
delayMicroseconds(10);
digitalWrite(triggerPin, LOW);
pinMode(echoPin, INPUT);
// Reads the echo pin, and returns the sound wave travel time in microseconds
return pulseIn(echoPin, HIGH);
}
void setup(){
pinMode(5, OUTPUT);
pinMode(4, OUTPUT);
pinMode(3, OUTPUT);
pinMode(2, OUTPUT); pinMode(6, OUTPUT);
pinMode(10, OUTPUT);
}
void loop(){
distance = 0.01723 *
readUltrasonicDistance(11, 11);
distance = (distance / 2.54);
if (distance > 15) {
 // MoveForward
digitalWrite(5, LOW);
digitalWrite(4, HIGH);
digitalWrite(3, LOW);
digitalWrite(2, HIGH);
analogWrite(6, 255);
analogWrite(10, 255);
}else{
      // TurnRight
     digitalWrite(5, HIGH);
     digitalWrite(4, LOW);
     digitalWrite(3, LOW);
     digitalWrite(2, HIGH);
     analogWrite(6, 80);
     analogWrite(10, 80);
}
delay(10); // Delay a little bit to improve simulation performance
}
```

TINKER'S CAD SIMULATION

CIRCUIT DESIGN



SIMULATED MODEL



HARDWARE SIMULATION

Live Recorded Video of the model is

- **https://drive.google.com/file/d/1rlMmXniqgV6TWE9bM-LLBz_MGU34GzE5/view?usp=sharing**

LITERATURE REVIEW

- This paper will help you design and build small obstacles that prevent a car from using ultrasonic sensors to detect the distance of an object in front and determine its trajectory. When approaching a certain distance, the Arduino sends a signal and turns the car into a motor to avoid obstacles.(Author- Minguel Molina and Angelo Vera)

- This article will help you determine the trajectory of your vehicle while avoiding obstacles. Feedback linearization control using the desired trajectory generated by the virtual force of the potential function can help to achieve this goal. It shows that the car shown in Tinker cad can reach the target point and avoid moving obstacles at the same time. This could be realized in the near future.(Author- Sittichai Boonyarak , Pradya)

- This article will help Sensor develop vehicle tracking and obstacle avoidance systems. It demonstrates the schematic of the obstacle avoidance and tracking system, and mainly demonstrates the detection system and engine operation in detail. Finally, after the software and hardware design is complete, the system is tested, which mainly involves the application of test methods and analysis of the results.(Author- Jiangping Nan)

CONCLUSION

The above Hardware setup along with the simulation was successfully done as per the objective of the project.

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