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Convenient Driving System

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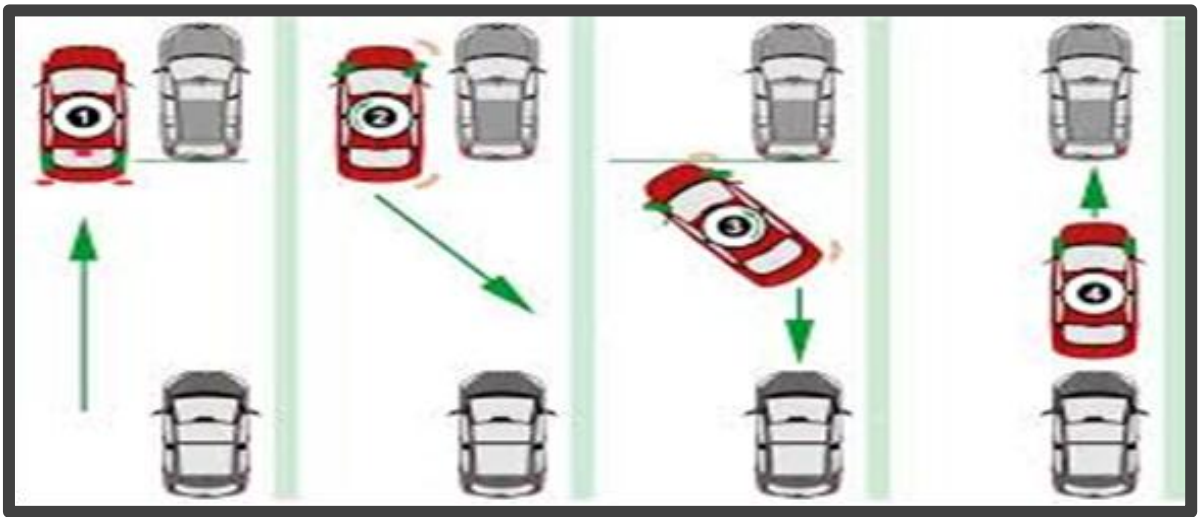
Abstract: The project is based on safety measures of vehicles. It is inspired by the daily observation during a drive related to the accidents caused around us or sometimes even with us. With increase in number of vehicles comes increase in number of road accidents, though the automobile sector have achieved a huge margin on reducing the number of accidents by advancing the safety systems in the vehicles still some sections of the vehicle lack in advancement. This sections include headlight modes, rear view mirror and in some parts parking system, even though parallel parking does not lead to any major accident but it Is observed that people face difficulty in parallel parking and hence end up crashing the vehicle and also parking in 'No Parking' spaces. When it comes to headlight and rear view mirror, during a night drive due to improper use of the headlight modes by the driver many accidents have been observed in the past which even resulted into deaths in many cases. For the rear view mirror, it is observed due to lack of attention of the driver and also due to blind spots many accidents have been observed while overtaking or while changing the lanes. To overcome all these issues a Convenient Driving System has been introduced which will surely contribute in easy drive and reducing the number of casualties during accidents. The circuit, working and need of the system is briefly discussed in this paper.

Keywords: Microcontroller, Servo Motor, DC Motor, Ultrasonic Sensor, Light Dependent Resistor, Bluetooth Module, LED, etc.

I. INTRODUCTION

Dazzling in the eyes of the drivers due to headlights in upper mode is a major disturbance caused during night drive. When a vehicle with its headlight in upper mode is behind another vehicle, this causes reflection of the headlight in the eyes of the driver by the middle mirror of the vehicle. This problem occurs when rear vehicle is close to the vehicle. To avoid this problem, we have developed a function in the project such that whenever any vehicle is behind another vehicle with a distance less than 20 meters, the rear vehicle's headlight will be in dipper mode until this condition discontinues. The number of vehicles of road has increased with increase in development but considering the present scenario one of the major factor is utilization of time. Due to which most people seek to choose the night drive for travelling long distance even though it is not considered safe. There are many reasons for it to be not safe but one major reason is the dazzling or blinding vision of the driver due to the headlight of the other vehicle, causing the blindness for 3 sec to 4 sec which is enough for an accident to take place.



When it comes to rear view mirror, a lot of accidents have been observed in the past due to lack of attention of the driver and also due to the blind spots created while overtaking or changing the lane on highways. These accidents cause when

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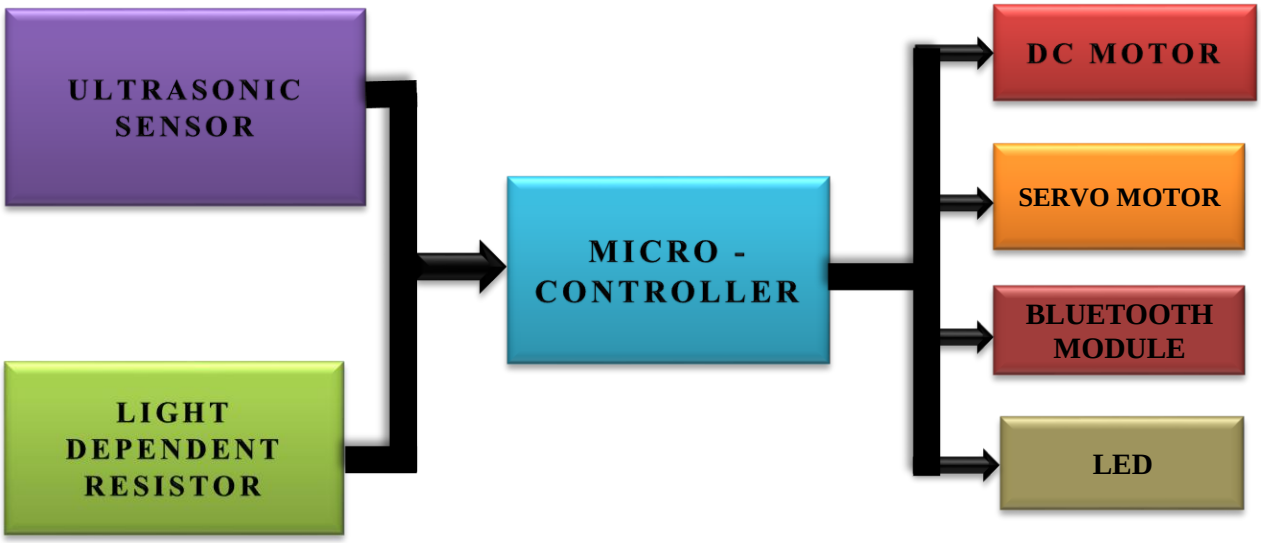
the vehicle at the rear position is approaching and the driver fails to notice and overtakes or change the lane at the same time. These accients can be severe and many causes lead to deaths or major injuries. To avoid this issue we have developed a function which detects the vehicle at the rear side and grabs the driver's attention to the rear view mirror which helps in avoiding the accidents that can be caused during such situations.

The system even consists of a fuction for self parking which is developed for the drivers convenience while parking. In many cases it is observed that people face difficulty while parallel parking which eventually ends up in crashing their vehicle or parking it somewhere else (sometimes even in 'No Parking Spaces'). To overcome the issue the self parking function will detect a parking spot and park the vehicle for the driver on its own, this will contribute in more utilisation of parking spaces and uneven parking of vehicles and also in reducing the number of vehicles getting damaged due to difficulty faced by the driver while parking.

II. PROPOSED SYSTEM

Below shown is the block diagram representation of the "**CONVINIENT DRIVING SYSTEM**".



The system consists of total five blocks, the function of the five blocks are as follows:

1.DC Motor : A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

2.Microcontroller : A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. In this system we are using ARDUINO MEGA as microcontroller. The purpose of choosing this as a microcontroller is due to its compact size and number of input/output pins available (14 digital and 8 analog pins available) which will make future development of the system of the easy and compact alongside.

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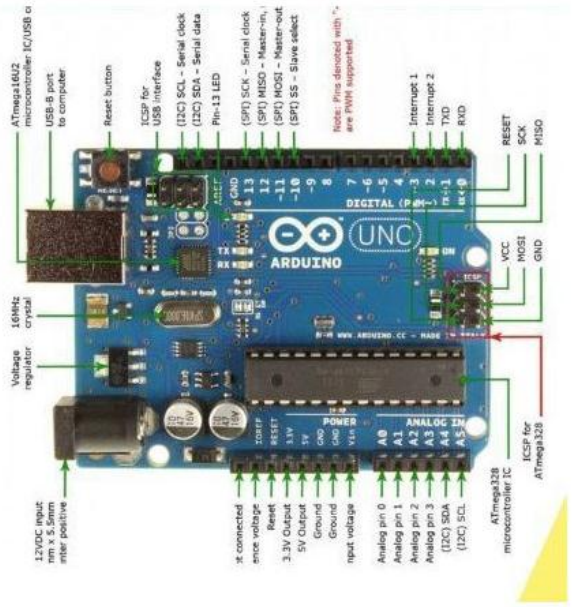
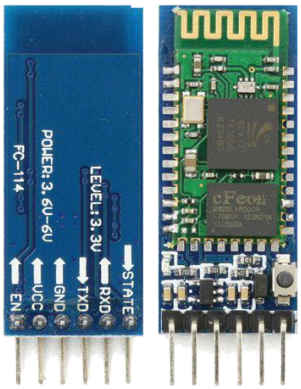
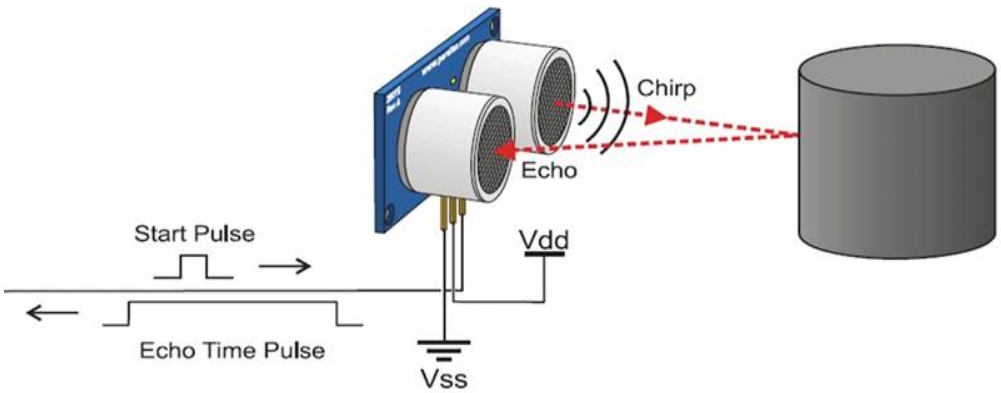


3.Bluetooth Module: HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration. HC-05 has red LED which indicates connection status, whether the Bluetooth is connected or not. Before connecting to HC-05 module this red LED blinks continuously in a periodic manner. When it gets connected to any other Bluetooth device, its blinking slows down to two seconds.



4.Ultrasonic Sensor: An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). In this system the purpose of the sensor is to detect the presence of any object within 50 meters of range and send the corresponding signal to the microcontroller. Below shown is a working diagram of an ultrasonic sensor.



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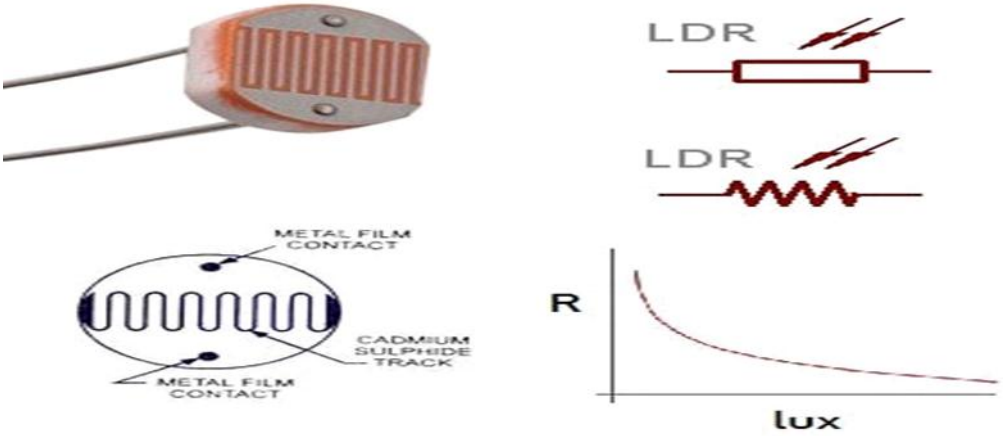
5.LDR Sensor: A Light Dependent Resistor (LDR) is also called a photo resistor or a cadmium sulfide (CdS) cell. It is also called a photoconductor. It is basically a photocell that works on the principle of photoconductivity. The passive component is basically a resistor whose resistance value decreases when the intensity of light decreases. In this system the purpose of the sensor is to detect the light approaching from the vehicle in front and send the corresponding signal to the microcontroller .Below shown is a working diagram of LDR sensor for better understanding.



6.

7.Servo Motor: A **servomotor** is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable **motor** coupled to a sensor for position feedback.

III. NEED OF THE SYSTEM

The need for the system can be explained by dividing the system into its functions and the need of the functions. Below given are the need of functions of the system,

- Automated Headlight mode shifting:

A study of 3,200 vehicles on 2,500km of single carriageway stretches of national and states highways in Punjab and Haryana has found that vehicle drivers do not care if their headlights are blinding those coming from the opposite direction. Only 26.15% of car/SUV drivers used dipper correctly while a staggering 73.83% either continued on high beam (48.3%) or dipped the light for a few seconds and then back on the high beam (25.53%), says a survey conducted by road safety NGO ArriveSafe.Every day road accidents snuff out 400 lives giving India the dubious distinction of having the highest road crash fatalities in the world. We have seen 'use dipper at night' at the back on nearly every truck but most do not follow it. The visibility is substantially reduced at night and is further reduced due to fog. Correct use of dipper (low beam) is crucial to drive safe at night. Hence, all these boils down to one solution that if the driver is not using the headlight modes right why not automate it and contribute in reducing the number of accidents and making night driving a bit safe. This project is based on safety measures of vehicles. It is inspired by the daily observations while driving at night related to the headlight conditions of the rear vehicle which causes dazzling in the eyes of the driver in the front vehicle.

- Rear view alert :

The intention of this project is to avoid accidents during lane changing and overtaking. These accidents are majorly caused due to lack of attention of driver and the blind spots created, which hides the vehicle at the rear position.

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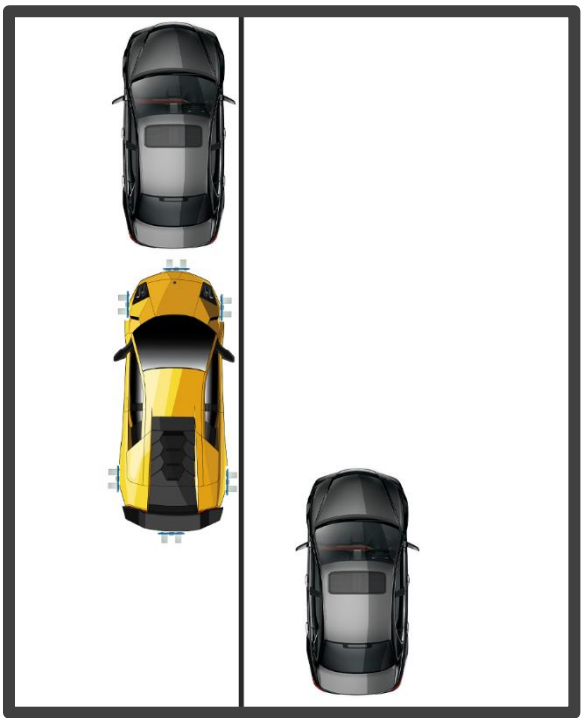


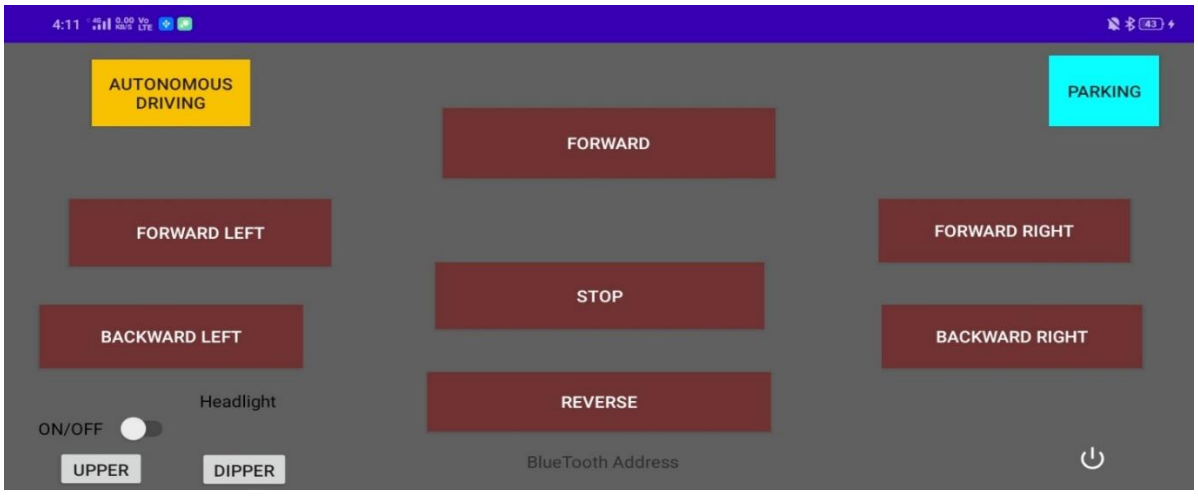
❖ In First situation, the vehicle located between the two vehicles is trying to overtake and there is another vehicle at the rear wheel. Sudden overtaking without checking the blind spots can lead to accident.
❖ In Second situation, the vehicle is trying to change lane. And there is another vehicle at the rear wheel. Sudden changing of lane without checking the blind spot can lead to accident.
❖ In Third situation, the condition is set to check the present speed of the vehicle. In case the vehicle is at halt or the driver has stopped at signal or in traffic, the buzzer will be activated unnecessarily. It will be irritating for everyone. So, to avoid this the present bike speed will be taken as input and checked if the vehicle is at halt or not.

- Self-parking:

In a recent survey of 1000 drivers, all admitted accidentally damaging another car. Of those who 'dented and ran', more than a third said they didn't feel guilty about it. And more than a quarter admitted doing damage, such as creating a visible dent in the other car. To avoid the such incidents self-parking function is introduced which will detect a perfect parking spot and part the vehicle for the driver.

IV. WORKING

Android Application developed in Android Studio to control this project.



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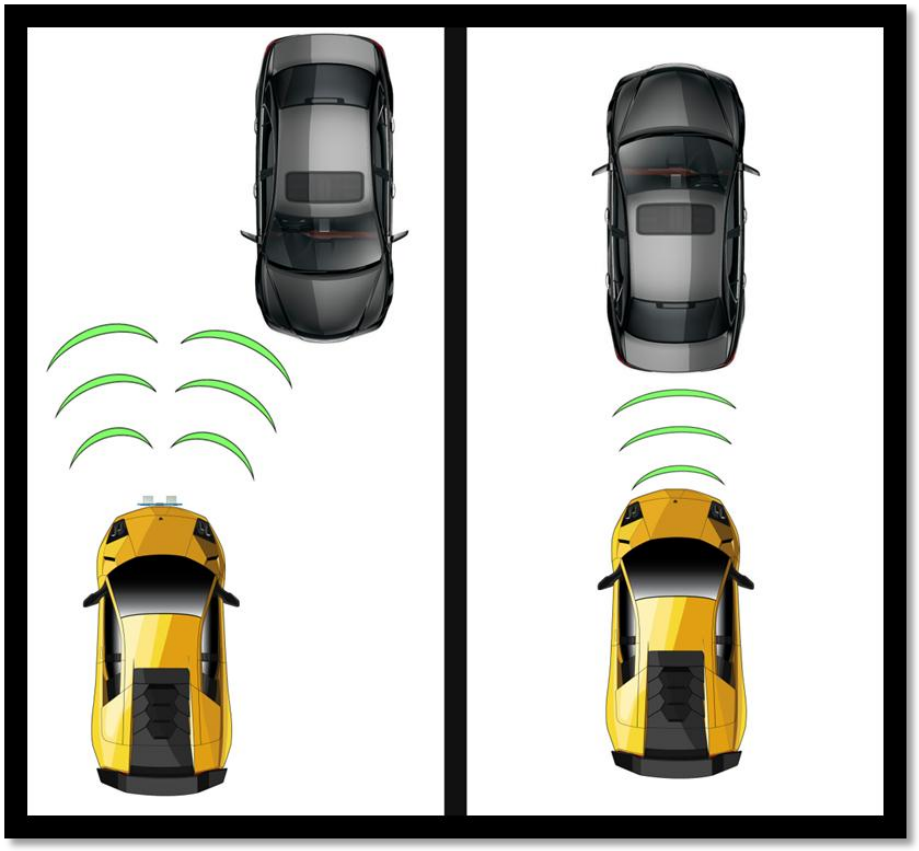
There are four applications in this project:

[1]. The first Application of this project is related to Automatic Headlight Mode System. In this , the headlight mode of the vehicle will be automatically changed while driving at night. Light Dependent Resistor will give the data if it is day or night to the microcontroller .The present headlight mode will be checked and if it is in upper mode , the front Ultrasonic sensor reading will be processed by the microcontroller. If there is a situation, where there is an approaching vehicle in range of twenty metres and present headlight mode is upper, then the headlight mode will be turned to dipper till the approaching vehicle passes away. The second situation can happen while waiting for traffic signal. When a vehicle is waiting behind another vehicle and the rear vehicle's headlight mode is Upper, then the reflection of the rear vehicle's headlight falls on the front vehicle's middle mirror. This light will reflect in the eyes of front vehicle's driver. This causes disturbance to the drivers and causes dizziness in the eyes may result in accidents.



[2]. The second Application of this project is controlling the vehicle manually. The Buttons in the Application will control the vehicle manually . This will be work as wireless remote controlled vehicle. Instead of using buttons, we can use device's accelerometer sensor to control the vehicle by tilting the device.

[3]. The Third Application of this project is Vehicle Self Parking System. After pushing the Parking button, the Ultrasonic sensor readings will be given as input to the microcontroller. The microcontroller will process the readings and park the vehicle accordingly.

The steps for Self Parking include,

- The Front Left Ultrasonic Sensor readings will be given to the microcontroller. When this reading will be greater than the width of the vehicle, the vehicle will stop. This situation is shown in Figure below.

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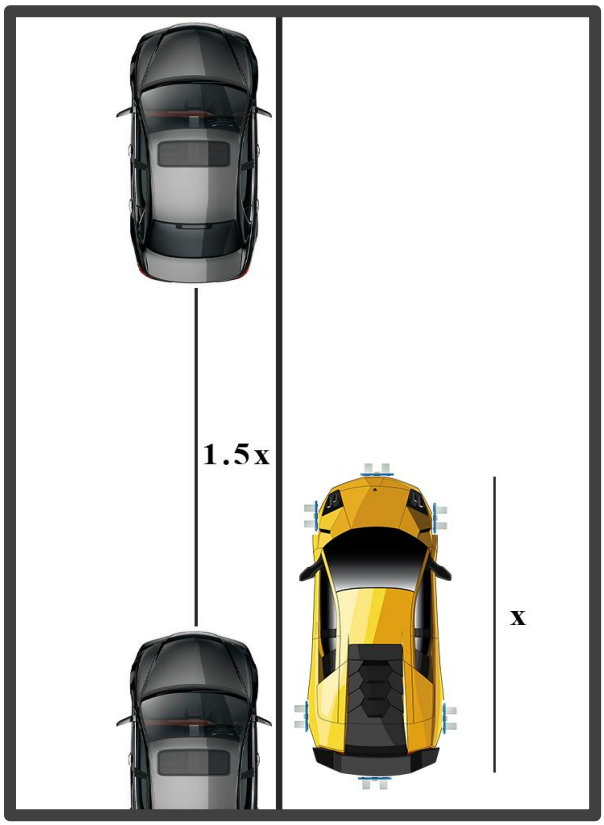

- Then the vehicle will start moving and will stop when the Rear Left Ultrasonic reading will reduce rapidly. During this process, the parking space length will be compared with the length of the vehicle. If the parking space length is less than 1.5 times the length of the vehicle, then it is not possible to park the vehicle in that space and then the vehicle will continue moving forward to find next parking space.

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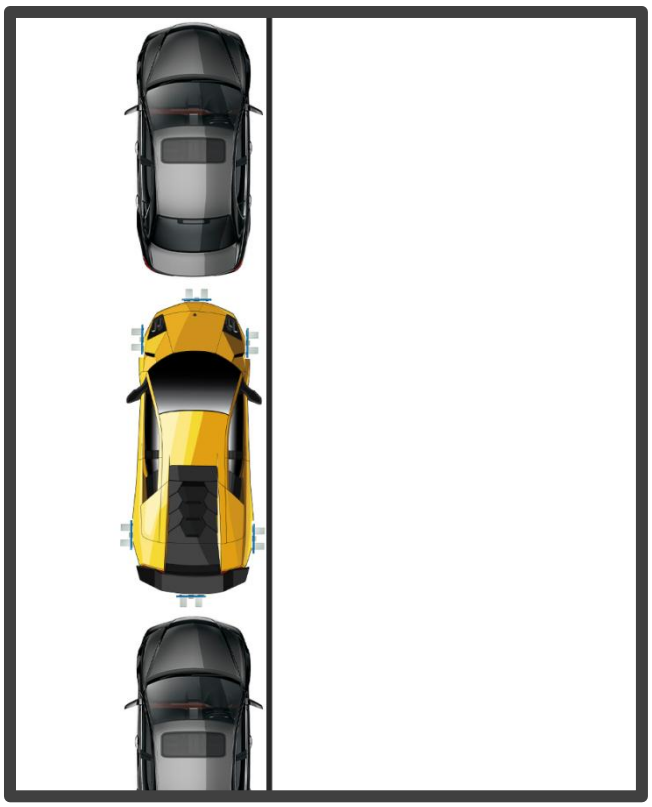
- If the parking distance space is greater than the length of the vehicle, then the vehicle will reverse on the left side. The Rear Left Ultrasonic Sensor reading will be given as input to the microcontroller. The situation is shown below.

- With the Rear and Rear Left Ultrasonic Sensor, the direction of the wheels will be set accordingly. The vehicle will be parked properly.



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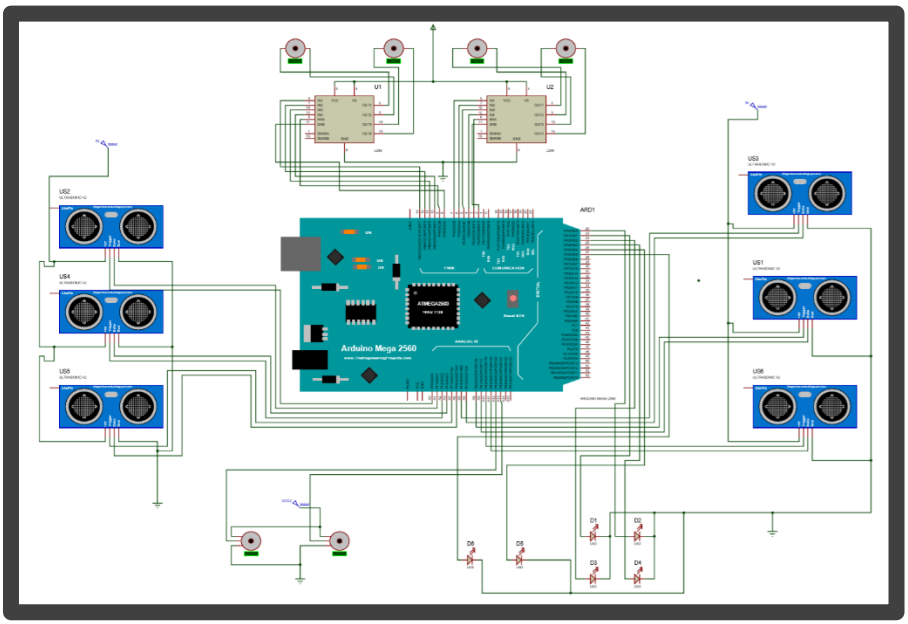
V. CIRCUIT DIAGRAM



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