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TITLE: Implementation of a four wheel automated car using Arduino Uno

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Implementation of a four wheel automated car using Arduino Uno

Introduction

The car industry has been a force for advancement and financial growth for 125 years. Presently, in the early many years of the 21st century, the speed of advancement is speeding up and the business is near the precarious edge of another innovative transformation: "self-driving" vehicles. The innovation could give answers for a portion of our most obstinate social issues, that is the significant expense of car accidents and transportation infrastructure, more time consumed in traffic jams, and the wasted urban space offered over to parking garages, just to give some examples. But, if self-driving vehicles become a reality, the ramifications would likewise be significantly troublesome for pretty much every partner in the auto environment. The project aims are to design an Arduino bot and write programs into the Arduino microprocessor. The Arduino car contains an Arduino microcontroller with basic mobility features. Arduino programs contain instructions for this Arduino car.

We are an extended approach faraway from having a real self-driving car. By a true self-driving car we have a tendency to mean a car that may be primarily driven in any manner as somebody's driving a car. This is often an implausibly exhausting issue to attain.

Major automobile companies are making an attempt to achieve true autonomous driving the most motivations behind the thought are:

- Safer Roads
- Increase in productivity
- Additional economical
- The movement is more economical
- Additional atmosphere friendly

Literature Review

The development of self-driving vehicles is a task that has the potential of solving many fundamental problems that drivers face when on the road. Self-driving vehicle means one kind of vehicle that can drive from starting point to destination without a driver. The development of self-driving vehicles has progressed in recent years. By using GPS this self-driving vehicle navigates from its current location to its desired destination. It can be very useful in industrial sites to carry the product from one place to another without being human. The main purpose of this system was to control the movement of a vehicle based on the Google map Application Program Interface (API) using GPS location service and to display the route information on Google map and to know the travel time between each node.Users can easily track the vehicle. Self-driving vehicle have many benefits such as Safer Roads,Increase in productivity, Additional economical,the movement are more economical, additional atmosphere friendly.Globally speaking, nearly 1.3 million people die in road crashes each year, on average 3,287

deaths a day.Speeding, talking over phone, drunk driving and breaking traffic rules are the root causes behind these accidents and the statistics are rising day by day which is now becoming a major concern. No matter how hard we try to create awareness regarding traffic rules and safety that has to be followed while driving, accidents are still occurring and aren't showing a sign to stop. Though human errors can never be eliminated, accidents can definitely be stopped. And in this case technology has surely come to our rescue.Many companies throughout the world are making serious and continuous efforts to make driving a safe and risk free process and have started building prototypes for the same. Among these companies are Google, Tesla Mercedes , Kia-Hyundai, Ford, Audi, and Huawei. Vehicle can detect other moving objects around itself, and a front-facing camera helps to detect and recognize objects like cars, trees, driving lanes, humans, traffic signals and other important data. All that information is taken in a real-time environment.Real-time is necessary because the computer needs to react very fast in order keep safe.This is also a cost-effective system as using low cost, off the shelf hardware components.

Methodology and Modeling

A self-driving car can work without any human interactions and take decisions.Usually A number of sensors are combined and are used to identify the pathway and road signal from the surroundings. In this project we have worked on the methods that the car will follow to move around on given instructions. An autonomous car has reduced costs due to less wastage of fuel, increased safety, increased mobility, increased customer satisfaction and that's why it has more advantages than traditional cars.

Working principle and Process of work

Proteus is a simulation software where this circuit will be implemented. First, the Arduino Uno was placed on the circuit board. Then added two motor drivers to control four motors and attached all the drivers with Arduino Uno. Later on we also added four indicators on each wheel of the car to indicate the direction of the car.

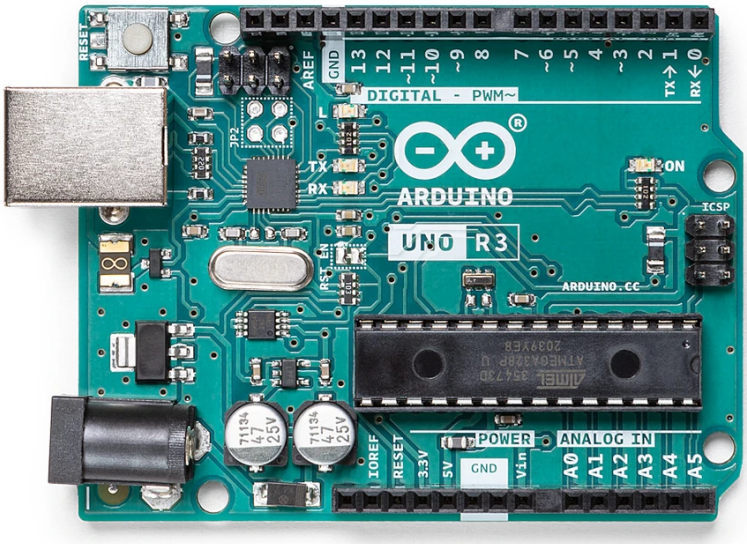
After the full circuit implementation we used Arduino to compile our code. Later on we used the code as the source for the arduino to execute.

Description of important components

Arduino Uno

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc The board is equipped with sets of digital and Analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.[1] The board has 14 digital I/O pins (six capable of PWM output), 6 Analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It

can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. The Uno board is the first in a series of USB-based Arduino boards; it and version 1.0 of the Arduino IDE were the reference versions of Arduino, which have now evolved to newer releases. The ATmega328 on the board comes pre-programmed with a bootloader that allows uploading new code to it without the use of an external hardware programmer. There are many versions of Arduino boards introduced in the market like Arduino Uno, Arduino Due, Arduino Leonardo, Arduino Mega, however, most common versions are Arduino Uno and Arduino Mega. Here we used Arduino Uno.



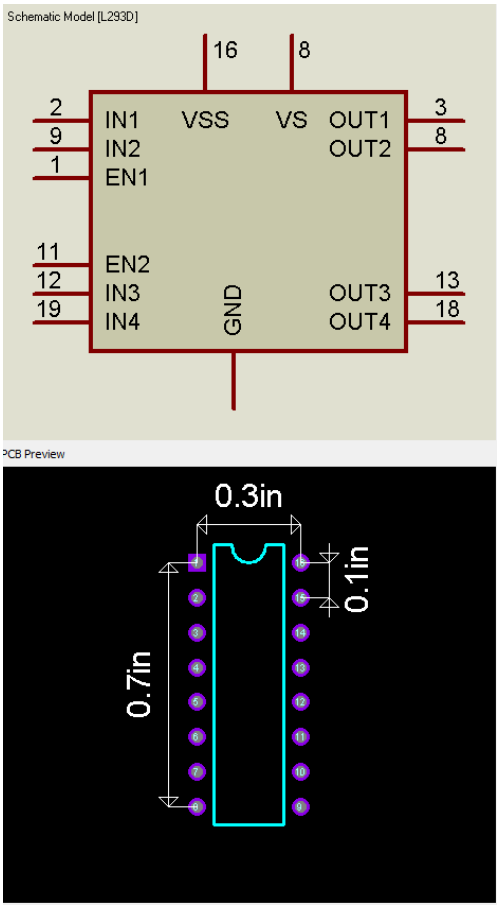
Arduino Uno

Motor Driver Module L293D

The L293 and L293D devices are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, DC and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications.

Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN.

The L293 and L293D are characterized for operation from 0°C to 70°C.



L292D

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. Two 12V DC motors are used in this project.

LED

Led is used as an indicator light in the car

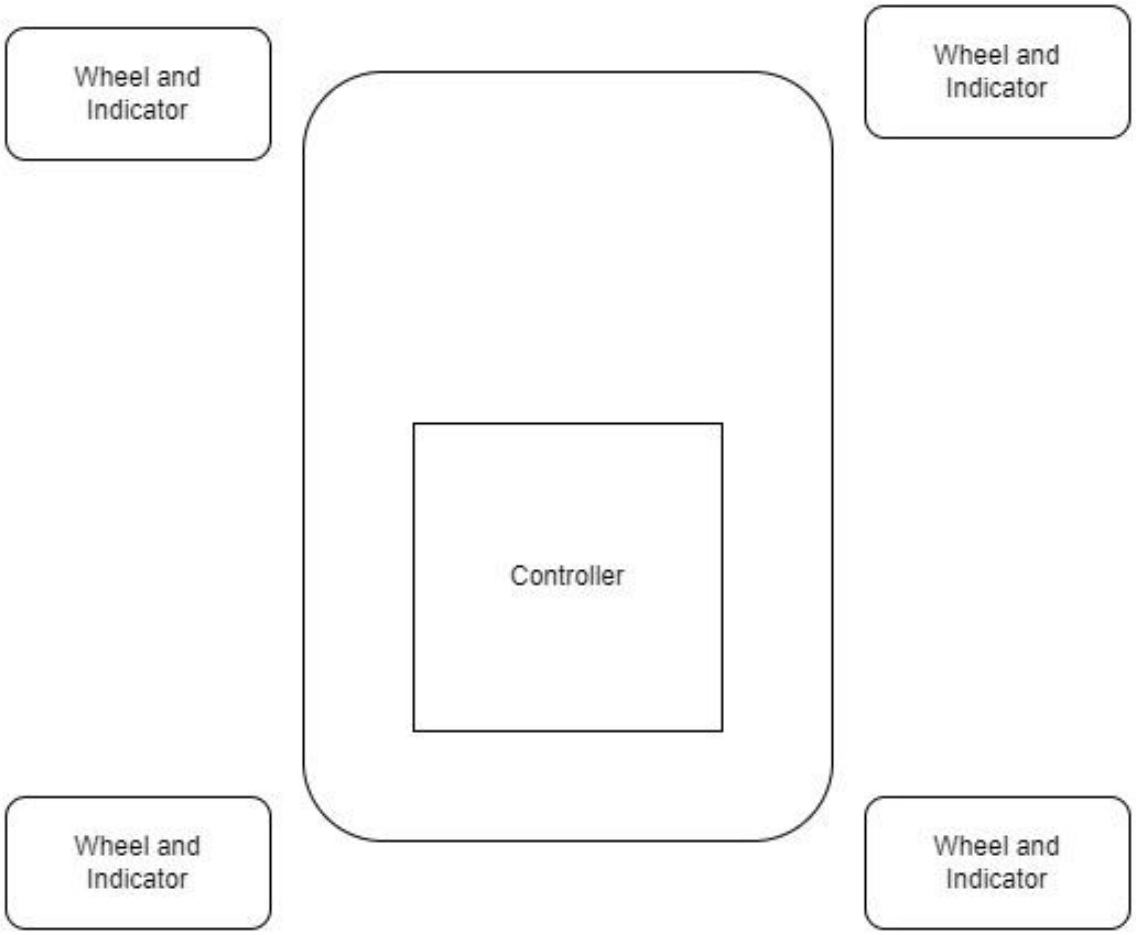
Yellow LED

Cost Analysis

Component	Price (BDT)	Quantity
Arduino Uno	400	1
Motor Driver	410	2
DC Motor	200	2
LED	15	4
Wire	100	1

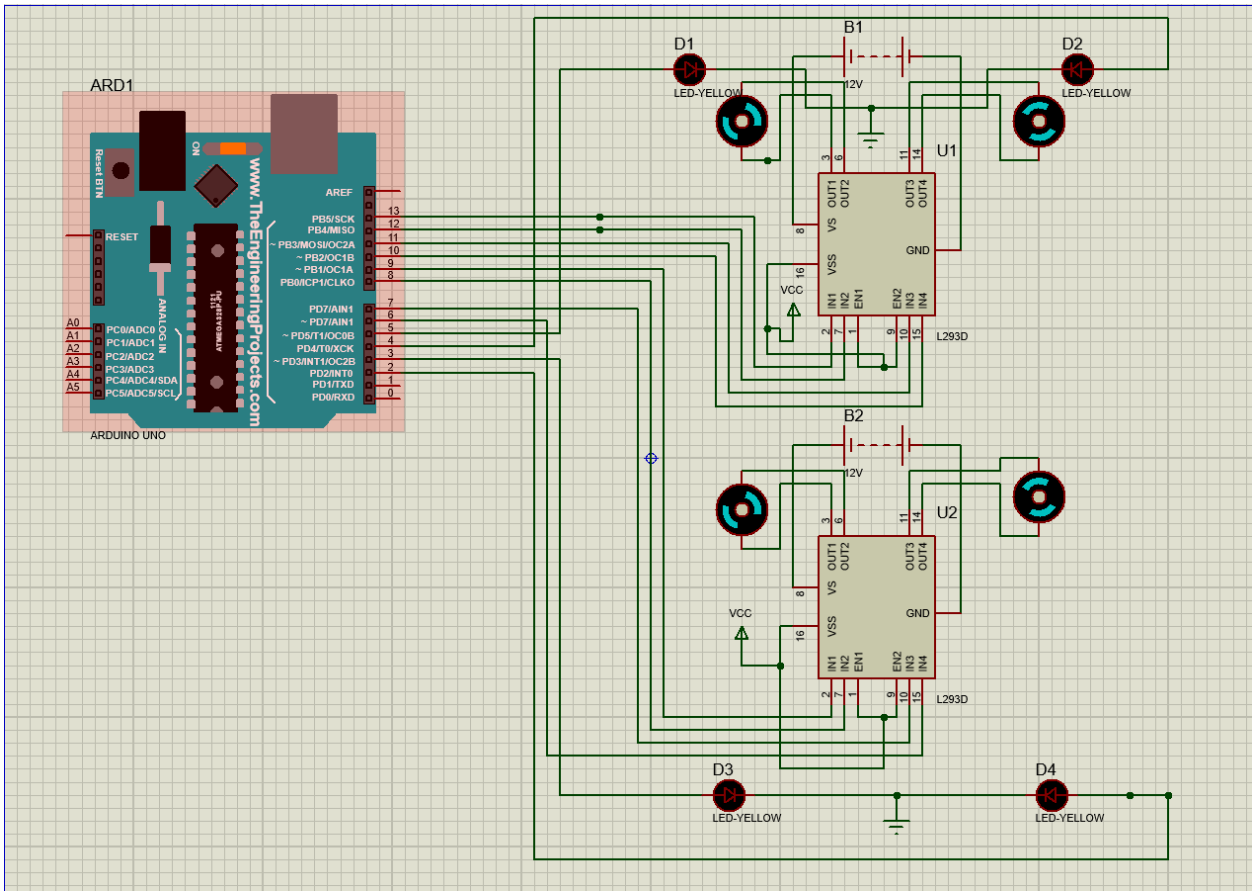
Implementation

In Proteus we implemented the circuit based on this diagram.



Block Diagram

Circuit Implementation



Source Code

```
#include "Arduino.h"
#include <Wire.h>

void setup()  {
for(int i=2 ;i<=13 ; i++)
{
   pinMode(i,OUTPUT);
}
}
void loop ()
{


for(int i=2 ;i<14 ; i++)
{

   digitalWrite(i,LOW);
```

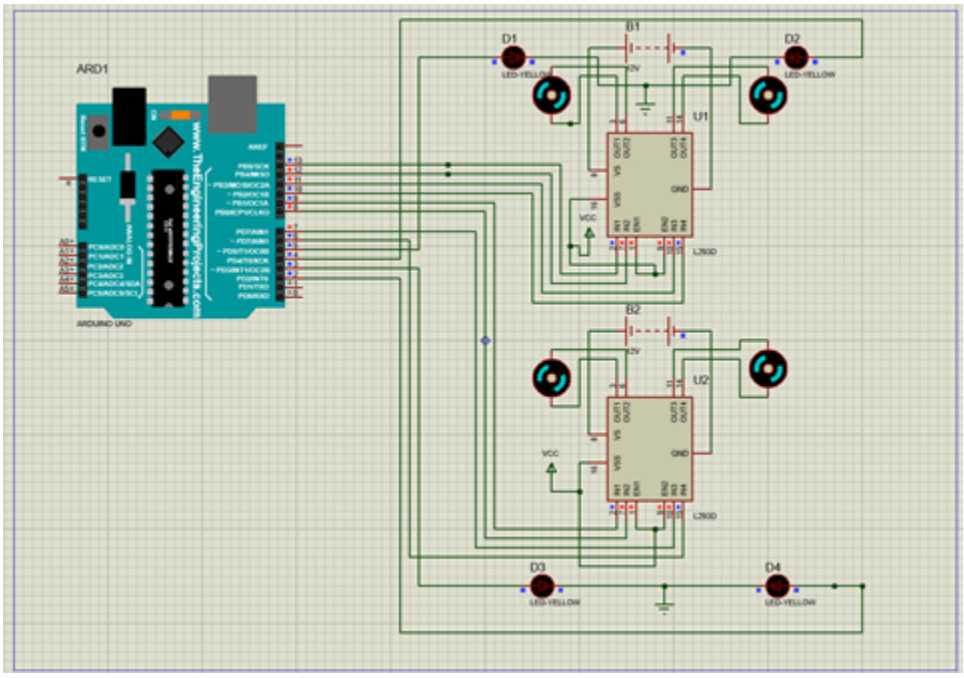
```
}


//forward
digitalWrite(7,HIGH);
digitalWrite(8,HIGH);
digitalWrite(11,HIGH);
digitalWrite(12,HIGH);
digitalWrite(6,LOW);
digitalWrite(9,LOW);
digitalWrite(10,LOW);
digitalWrite(13,LOW);
delay(3000);

for(int i=2 ;i<14 ; i++)
{

   digitalWrite(i,LOW);
}
////// move back

digitalWrite(6,HIGH);
digitalWrite(9,HIGH);
digitalWrite(10,HIGH);
digitalWrite(13,HIGH);
digitalWrite(7,LOW);
digitalWrite(8,LOW);
digitalWrite(11,LOW);
digitalWrite(12,LOW);
//backlight
digitalWrite(3,HIGH);
digitalWrite(2,HIGH);

delay(3000);
for(int i=2 ;i<14 ; i++)
{
   digitalWrite(i,LOW);
}

////turn right
digitalWrite(8,HIGH);
digitalWrite(12,HIGH);
digitalWrite(2,HIGH);
digitalWrite(4,HIGH);
delay(3000);

for(int i=2 ;i<14 ; i++)
{

   digitalWrite(i,LOW);
}
```

```
////turn right
digitalWrite(7,HIGH);
digitalWrite(11,HIGH);
digitalWrite(3,HIGH);
digitalWrite(5,HIGH);
delay(3000);

for(int i=2 ;i<14 ; i++)
{

   digitalWrite(i,LOW);
}
}
```

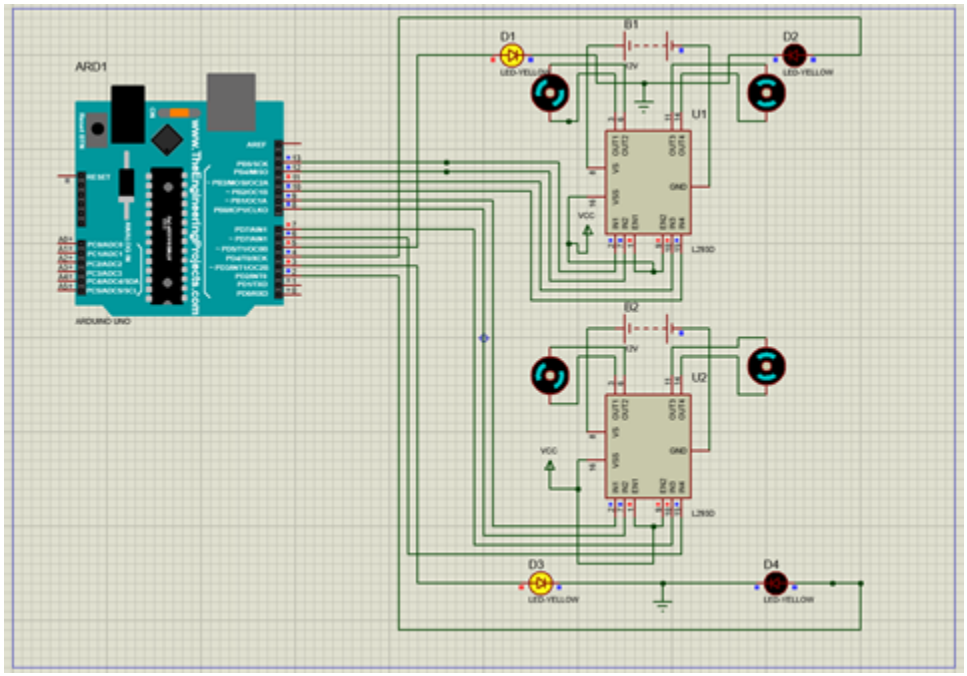
Result and Discussion

After implementing the circuit and building the required codes we ran the simulation and found the following results.

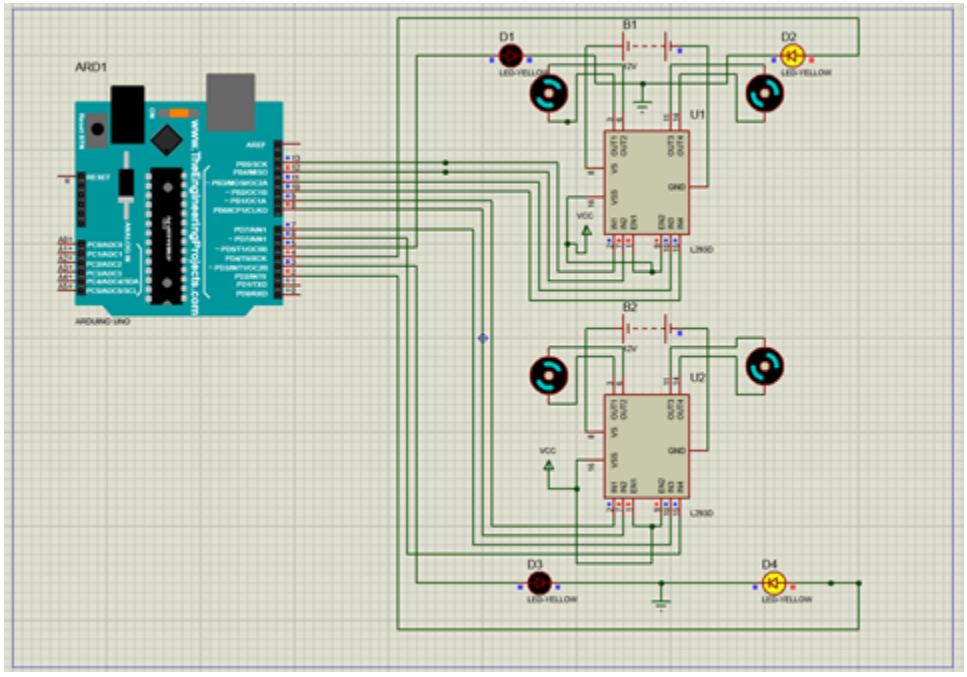
Simulation Snapshots



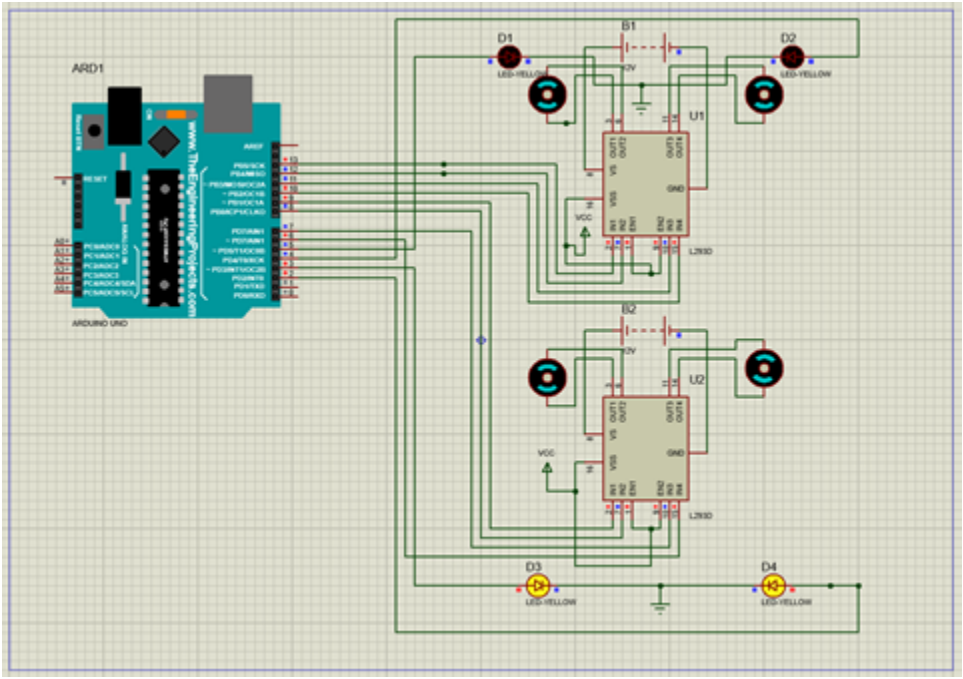
Forward Direction



Turn Right with Indicator



Turn Left with Indicator



Reverse Backward with Indicator

Result Analysis

Instruction	Duration	Result Motor
Forward	3 second	OK
Reverse	3 second	OK
Right	3 second	OK
Left	3 second	OK

Conclusion

To us the need of the internet and the things which are internet based are very much important nowadays. IOT or the internet of things is a very important part in both computers and our daily lives. The above model describes how the arduino programs the car motor module and by IoT we actually rotate the wheels and give direction to the car. IoT gives us the opportunity to work with different platforms and it helps us to create various interesting modules to work on. We also tested the applications used to drive the car. Due to the new concept of Wireless Controlled Car using Bluetooth, Wifi and IOT, we were able to come up with various possibilities that can take place and this project can improve in many ways.

References

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5. Ciuciu, C., Bărbuţă, D., Săsăujan, S., & Şipoş, E. (2017). AUTONOMOUS SCALE MODEL CAR WITH ULTRASONIC SENSORS AND ARDUINO BOARD. *Acta Technica Napocensis*, *58*(4), 6-11.