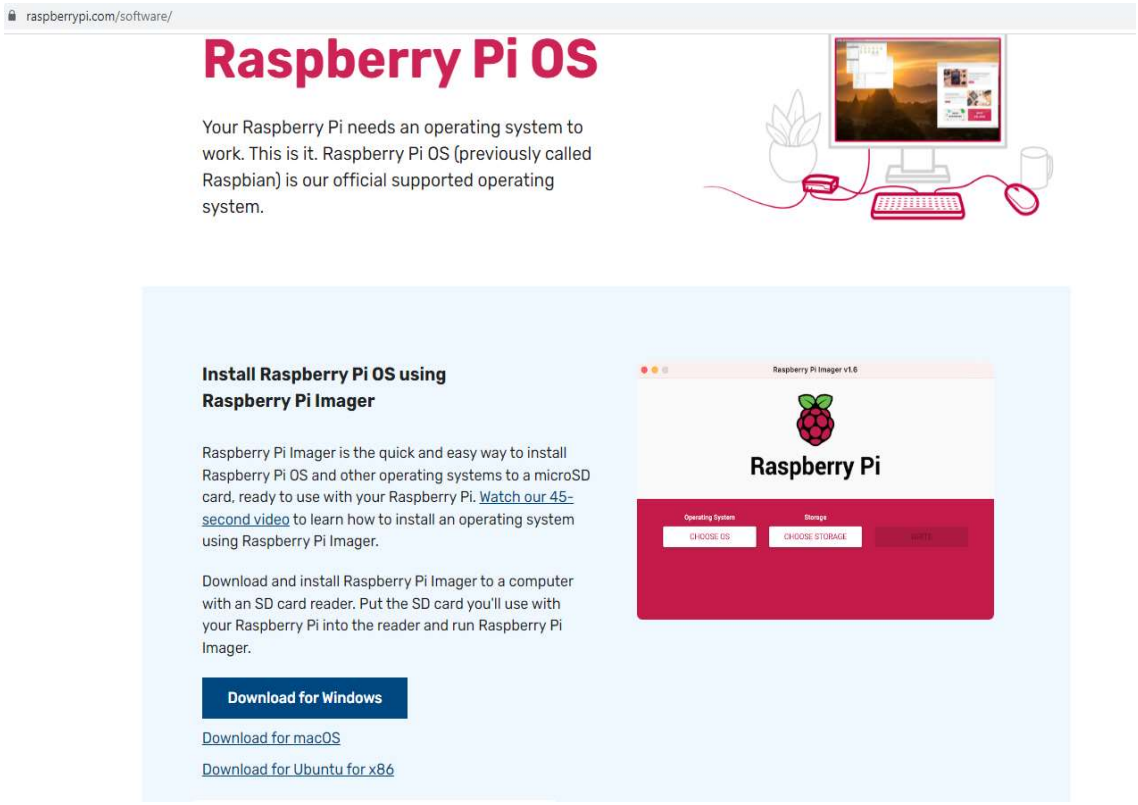
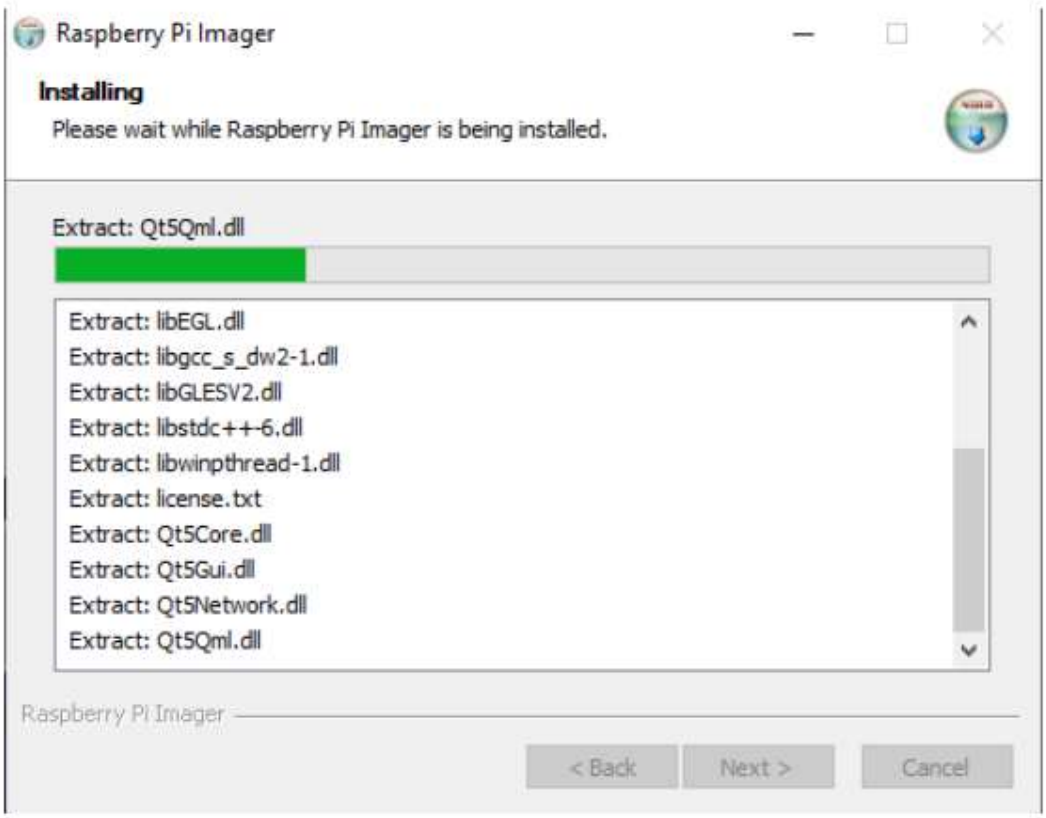
# practical 1

**Aim:** Making a Raspberry Pi headless, and reaching it from the network using WiFi and SSH.

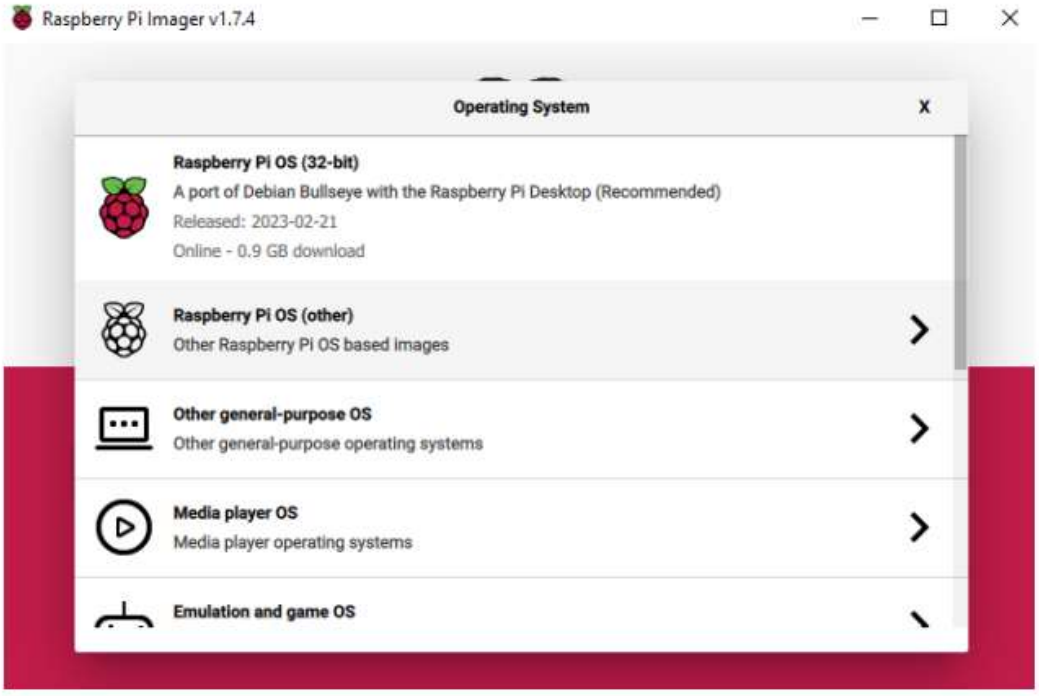
**Step 1:** first download Raspeery pi os in ur system using this link https://www.raspberrypi.com/software/

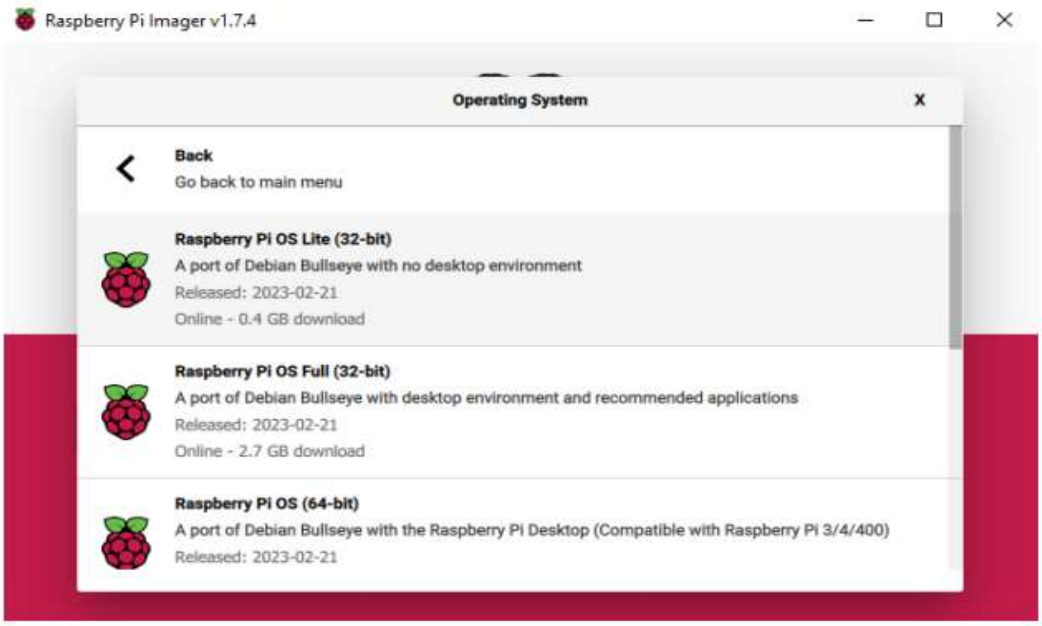


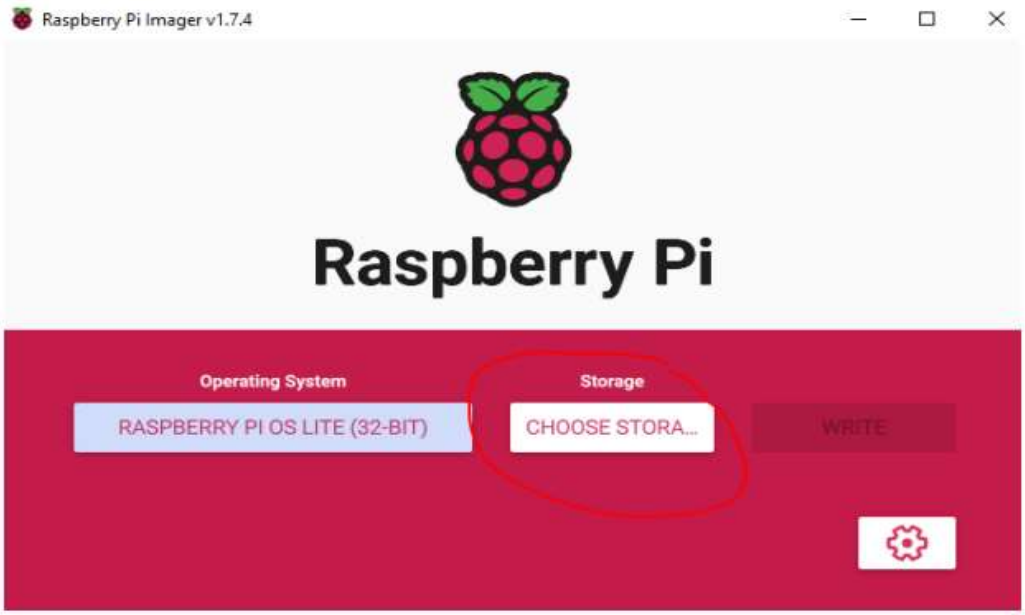
**Step 2**: after downloading just install this Raspberry pi imager setup

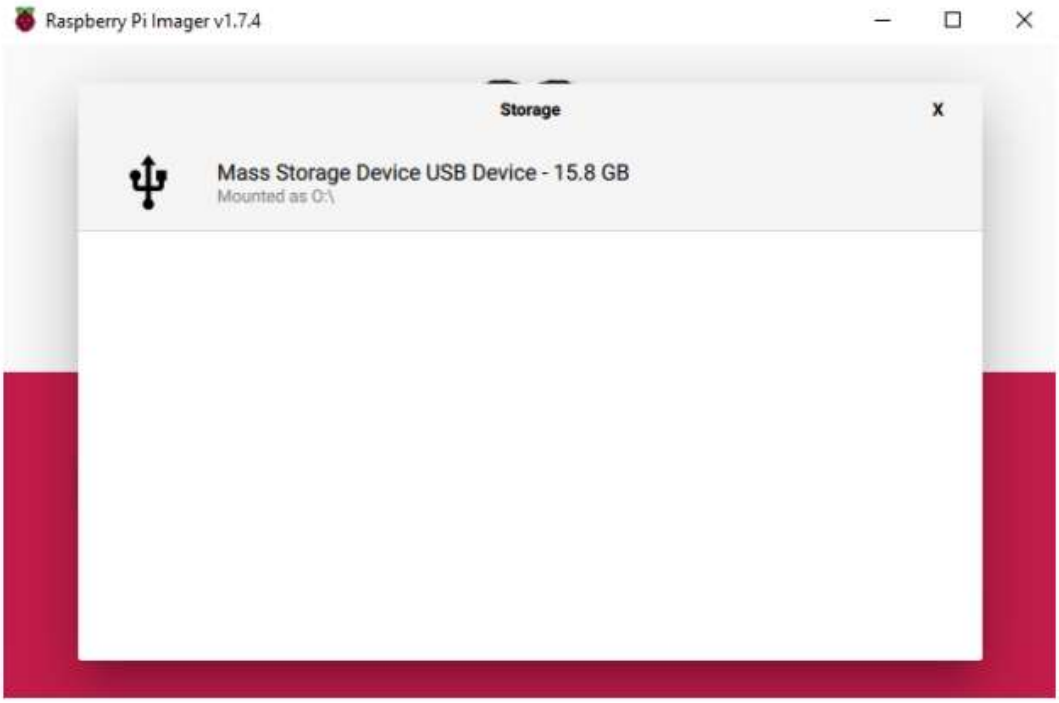



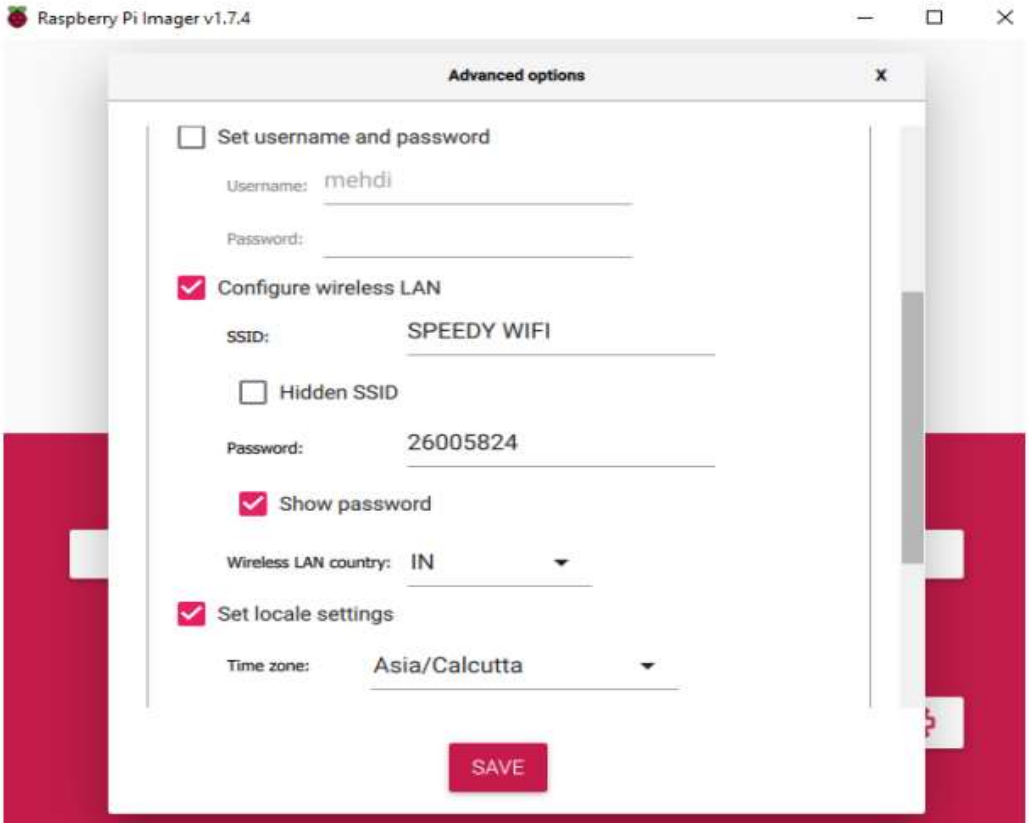

Raspberry Pi Imager v1.7.4
Raspberry Pi
Operating System
CHOOSE OS
Storage
CHOOSE STORAGE
WRITE


Raspberry Pi Imager v1.7.4
Operating System
Raspberry Pi OS (32-bit)
A port of Debian Bullseye with the Raspberry Pi Desktop (Recommended)
Released: 2023-02-21
Online - 0.9 GB download
Raspberry Pi OS (other)
Other Raspberry Pi OS based images
Other general-purpose OS
Other general-purpose operating systems
Media player OS
Media player operating systems
Emulation and game OS


Raspberry Pi Imager v1.7.4
Operating System
Back
Go back to main menu
Raspberry Pi OS Lite (32-bit)
A port of Debian Bullseye with no desktop environment
Released: 2023-02-21
Online - 0.4 GB download
Raspberry Pi OS Full (32-bit)
A port of Debian Bullseye with desktop environment and recommended applications
Released: 2023-02-21
Online - 2.7 GB download
Raspberry Pi OS (64-bit)
A port of Debian Bullseye with the Raspberry Pi Desktop (Compatible with Raspberry Pi 3/4/400)
Released: 2023-02-21


Raspberry Pi Imager v1.7.4
Raspberry Pi
Operating System
Storage
RASPBERRY PI OS LITE (32-BIT)
CHOOSE STORA...
WRITE



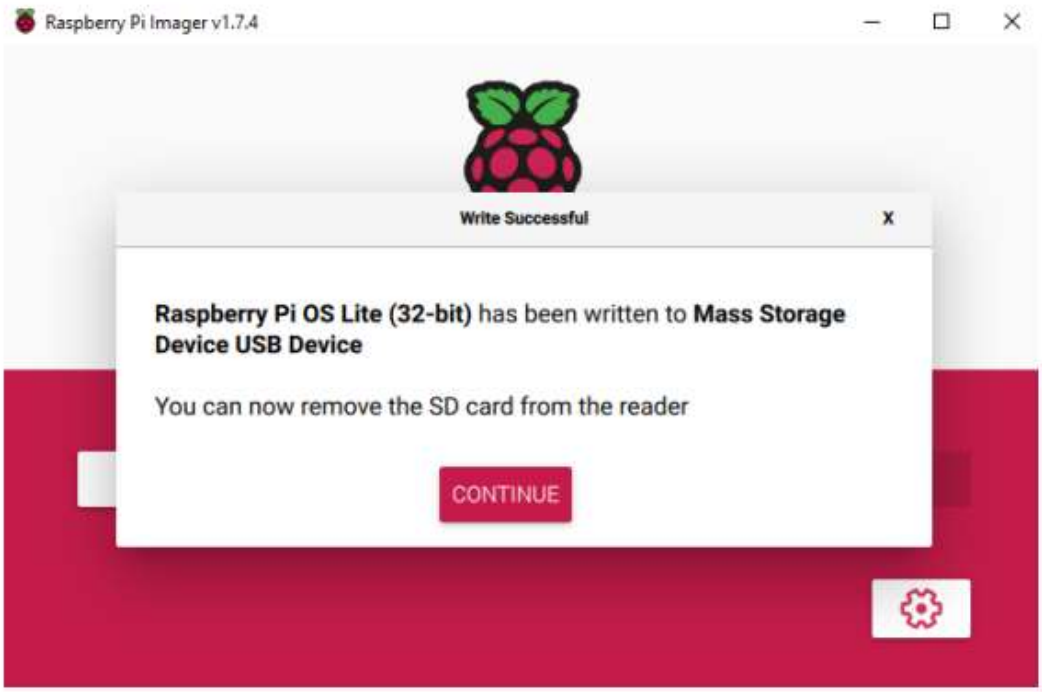

**Note :** click on set username and password and add user name “admin” and password “admin” In Configure wireless lan “ use your wifi passowrd and name and then save it


Raspberry Pi Imager v1.7.4
Raspberry Pi
Operating System
Storage
RASPBERRY PI OS LITE (32-BIT)
MASS STORAGE ...
WRITE

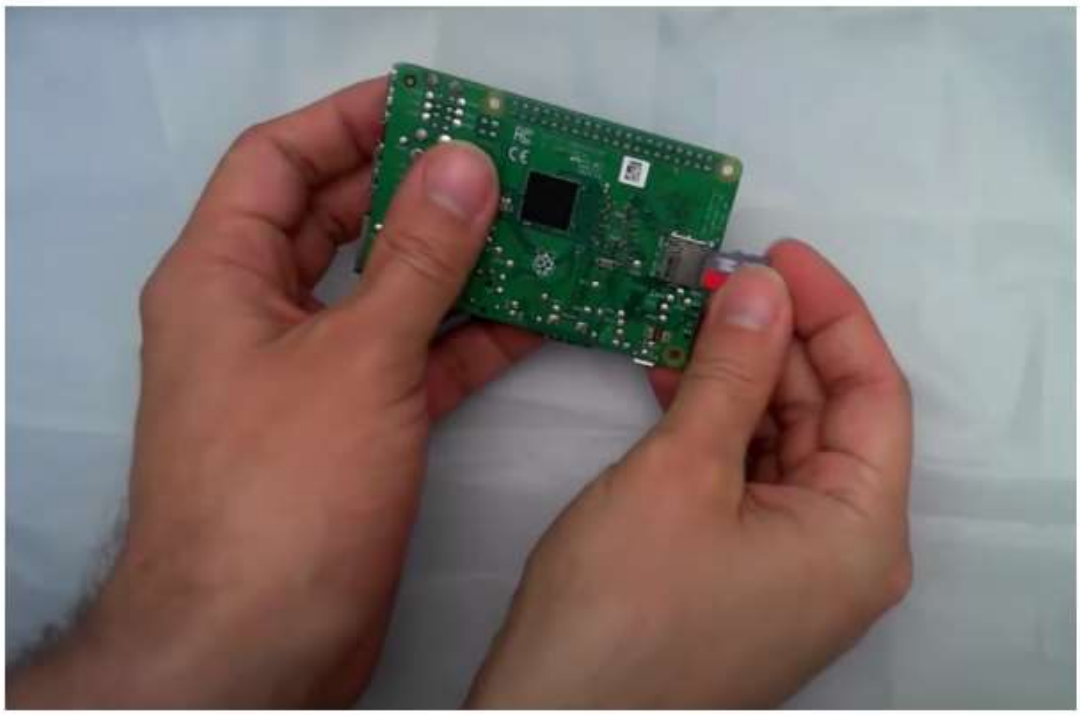

Raspberry Pi Imager v1.7.4
Raspberry Pi
Operating System
Storage
RASPBERRY PI OS LITE (32-BIT)
MASS STORAGE ...
WRITE
Preparing to write... (opening drive)
CANCEL WRITE


Raspberry Pi Imager v1.7.4
Raspberry Pi
Operating System
Storage
RASPBERRY PI OS LITE (32-BIT)
MASS STORAGE ...
WRITE
Writing... 21%
CANCEL WRITE

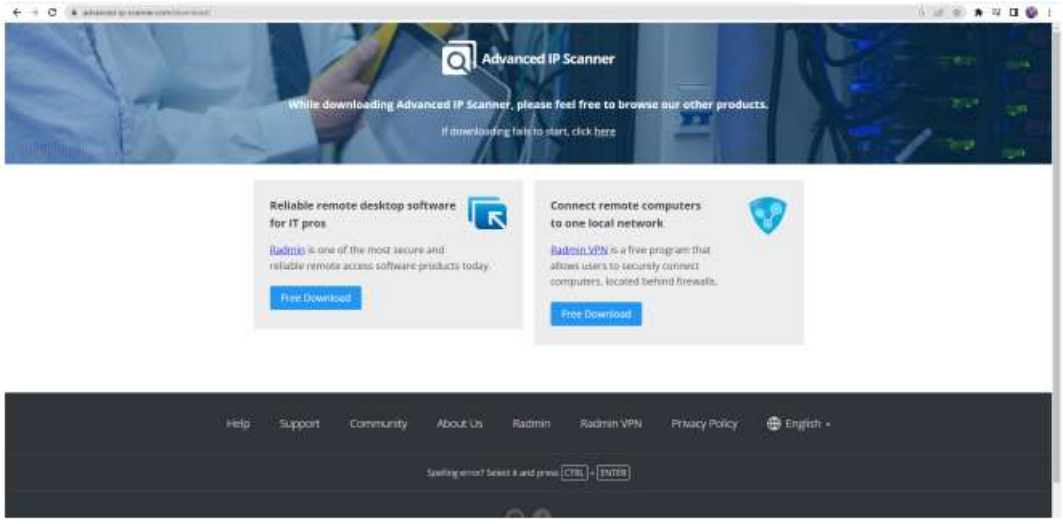

Raspberry Pi Imager v1.7.4
Raspberry Pi
Operating System
Storage
RASPBERRY PI OS LITE (32-BIT)
MASS STORAGE ...
WRITE
Verifying... 22%
CANCEL VERIFY

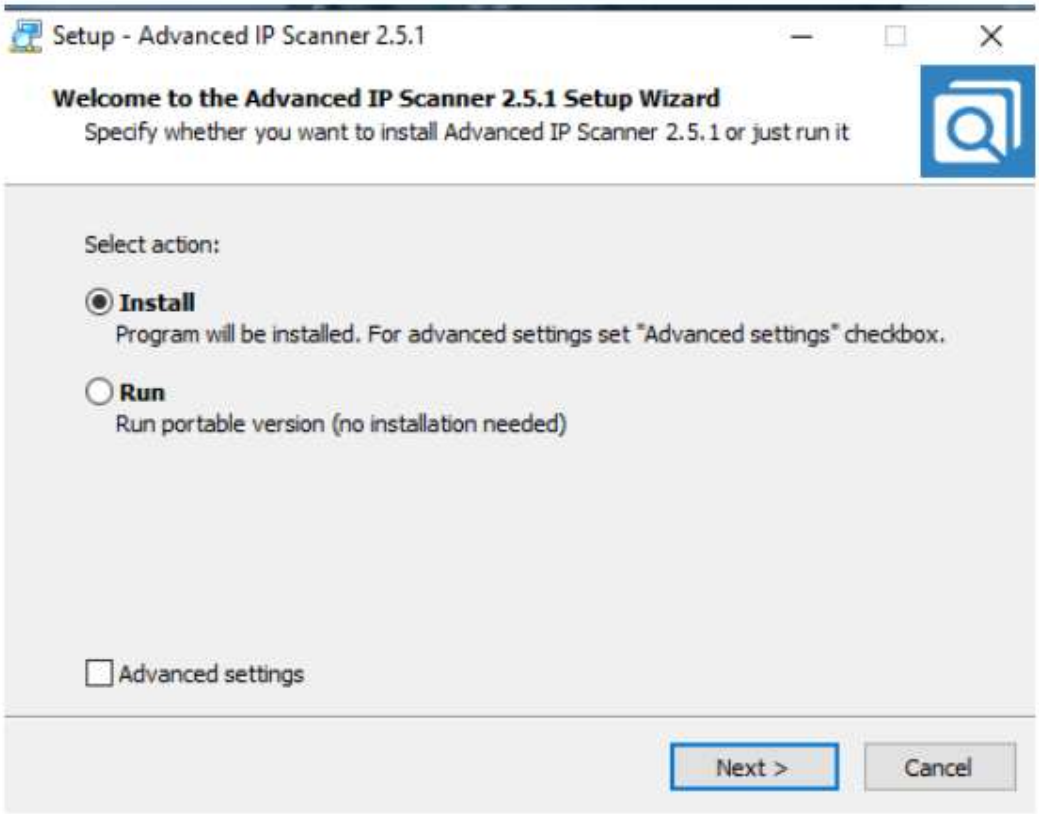



**Step 3:**after completeing step 2 **"add the blank .ssh file in your folder "** then insert your sd card in raspbery pi and connect the charger after that check ur phone that raspbeey is connect to the wifi or not if its connected then open cmd and check the connection throug ip address (to know the ip address download the ip scanner "for that follow the next step ")

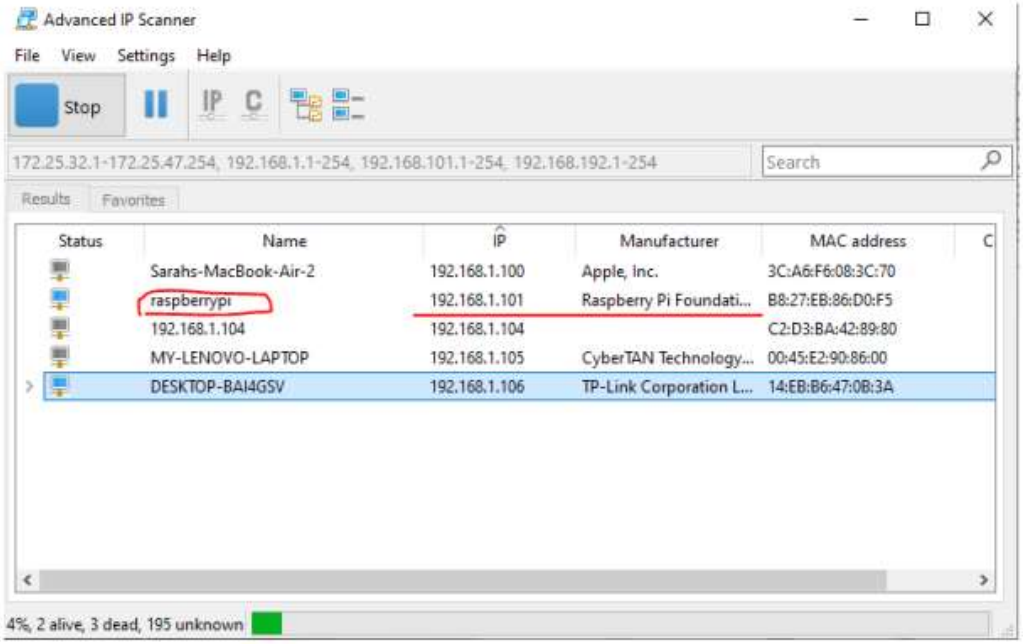


Step 4: install advance ip scanner and scan the ip address of raspbery pi



**Step 5:** Open the ip scanner and start scan

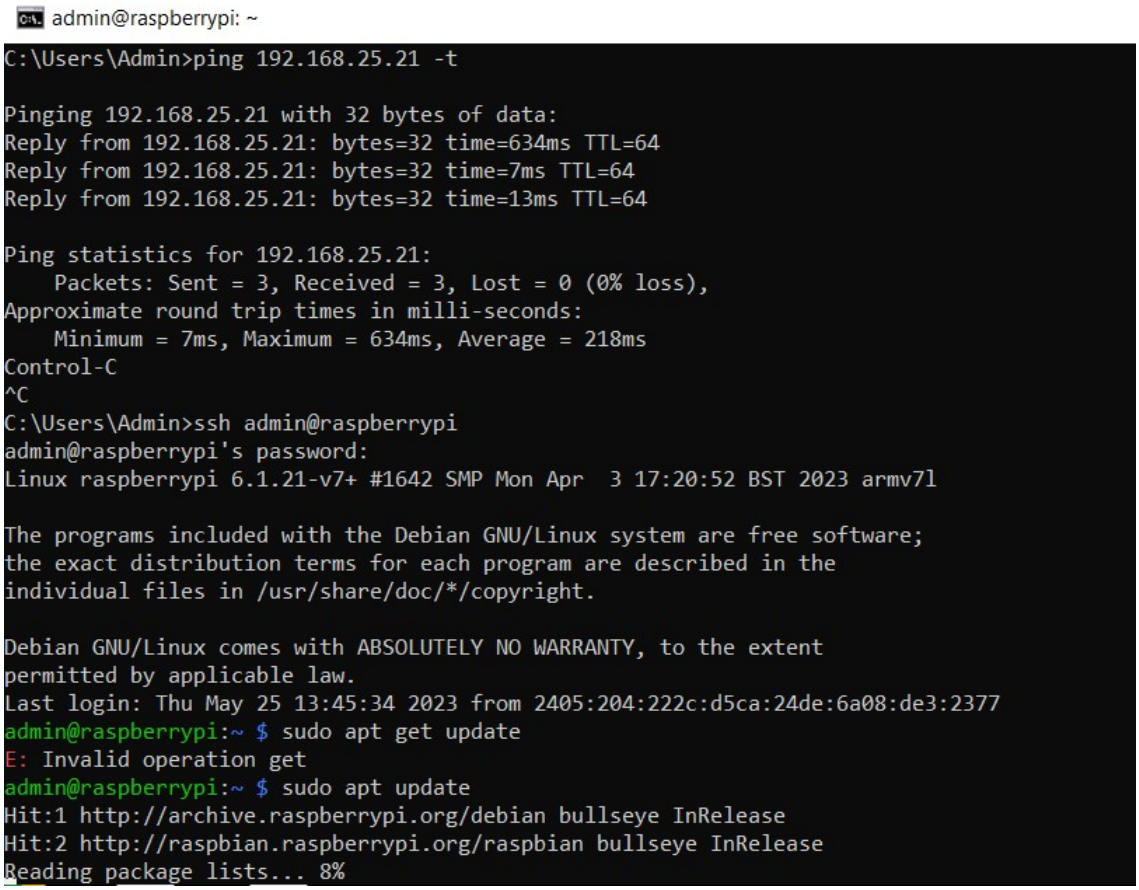



**Step 6:** open cmd and ping the raspberry pi

1) Ping raspberry pi
2) Ssh admin@raspberrypi

```
admin@raspberrypi: ~
Microsoft Windows [Version 10.0.19045.2965]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Admin>ping 192.168.25.21 -t

Pinging 192.168.25.21 with 32 bytes of data:
Reply from 192.168.25.21: bytes=32 time=634ms TTL=64
Reply from 192.168.25.21: bytes=32 time=7ms TTL=64
Reply from 192.168.25.21: bytes=32 time=13ms TTL=64

Ping statistics for 192.168.25.21:
    Packets: Sent = 3, Received = 3, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 634ms, Average = 218ms
Control-C
^C
C:\Users\Admin>ssh admin@raspberrypi
admin@raspberrypi's password:
Linux raspberrypi 6.1.21-v7+ #1642 SMP Mon Apr  3 17:20:52 BST 2023 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Thu May 25 13:45:34 2023 from 2405:204:222c:d5ca:24de:6a08:de3:2377
admin@raspberrypi:~ $
```

Here raspberry pi is connected succesfuly

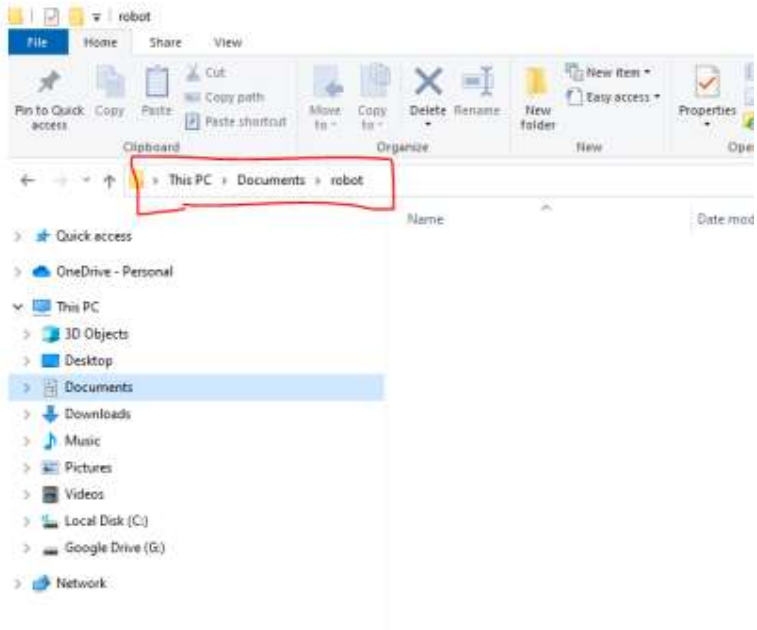



Now we can perform the linux command here for eg “ sudo apt update “

# Practical 2

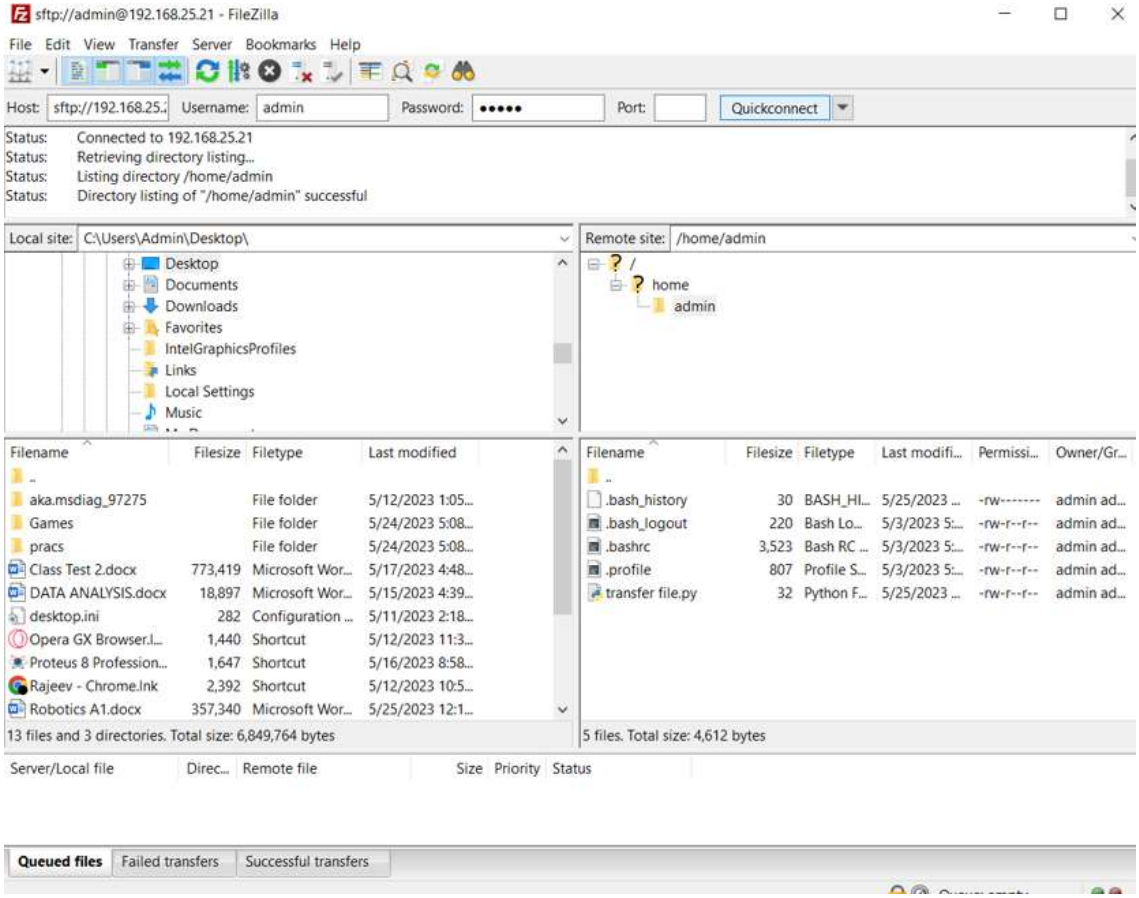
Aim: - Using sftp upload files from PC.

**Step 1:**Prepare the Raspberry pi  from Practical 1



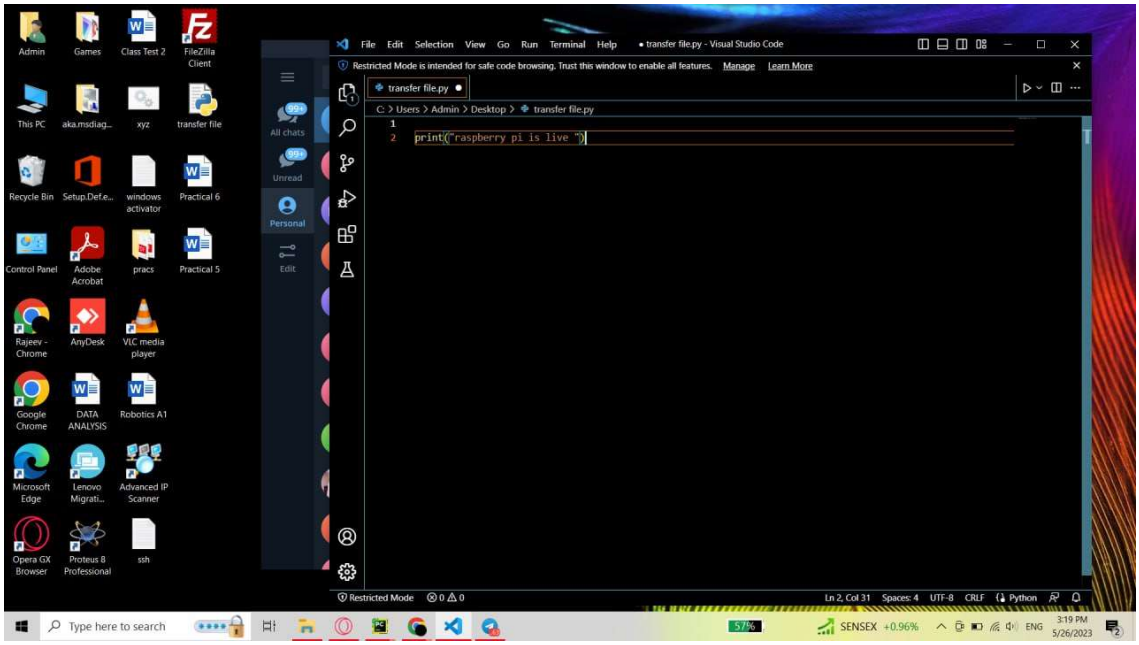

**Step 2:** download file zilla to transfer the file in raspberry pi

Step 3: write host name of raspberry pi and username that u have put in raspberry pi  imager (we have written “admin” as a user and password as “admin “ and port number “22”)then click on quick connection

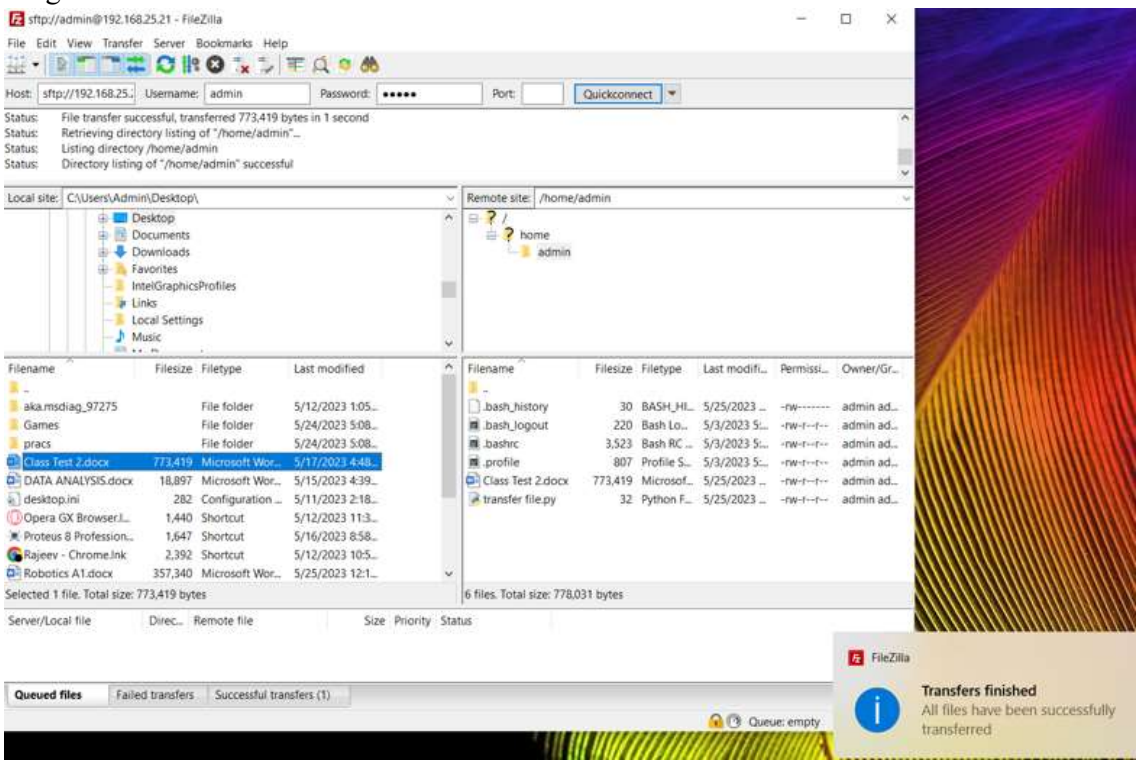


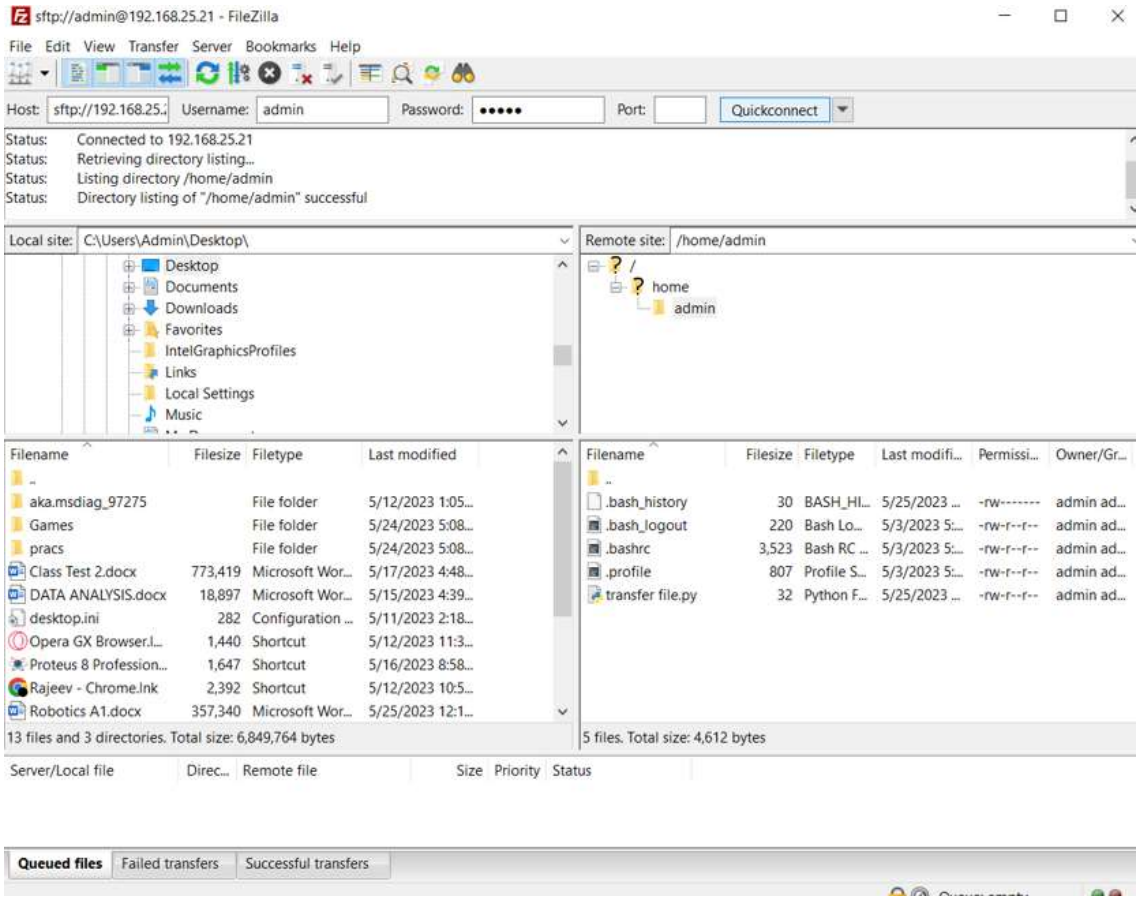

Here we can see 2 pannel one is windows and other is raspberry pi pannel

Step 4: make any file that u have to transfer in raspbeery pi here I have made “transfer.py” and other one is “class test 2 “



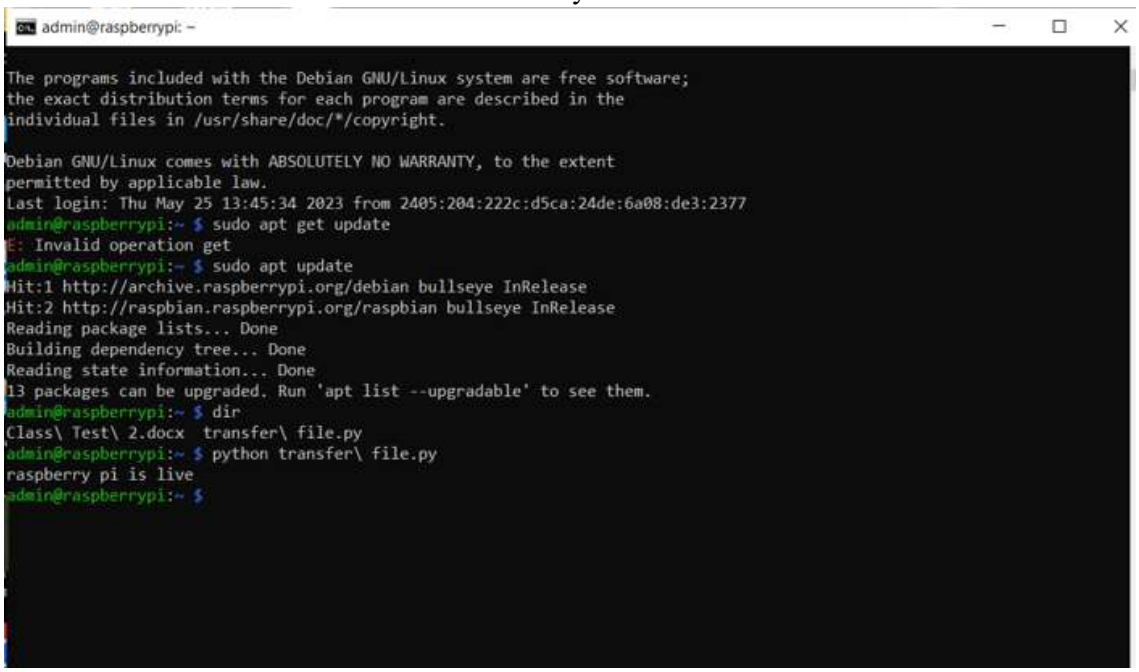

Drag the file from one side to other






Here u can see the file has been transferred

And in cmd we can see both file are successfully transferred



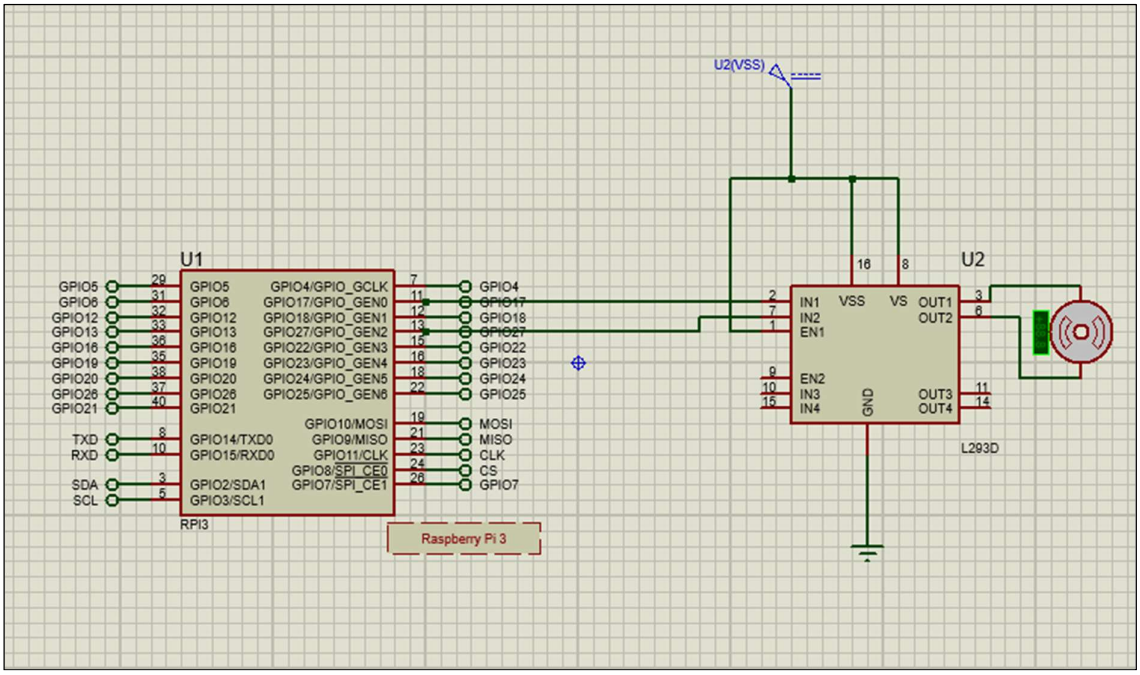
# Practical 3

**Aim:** Write Python code to test  motors

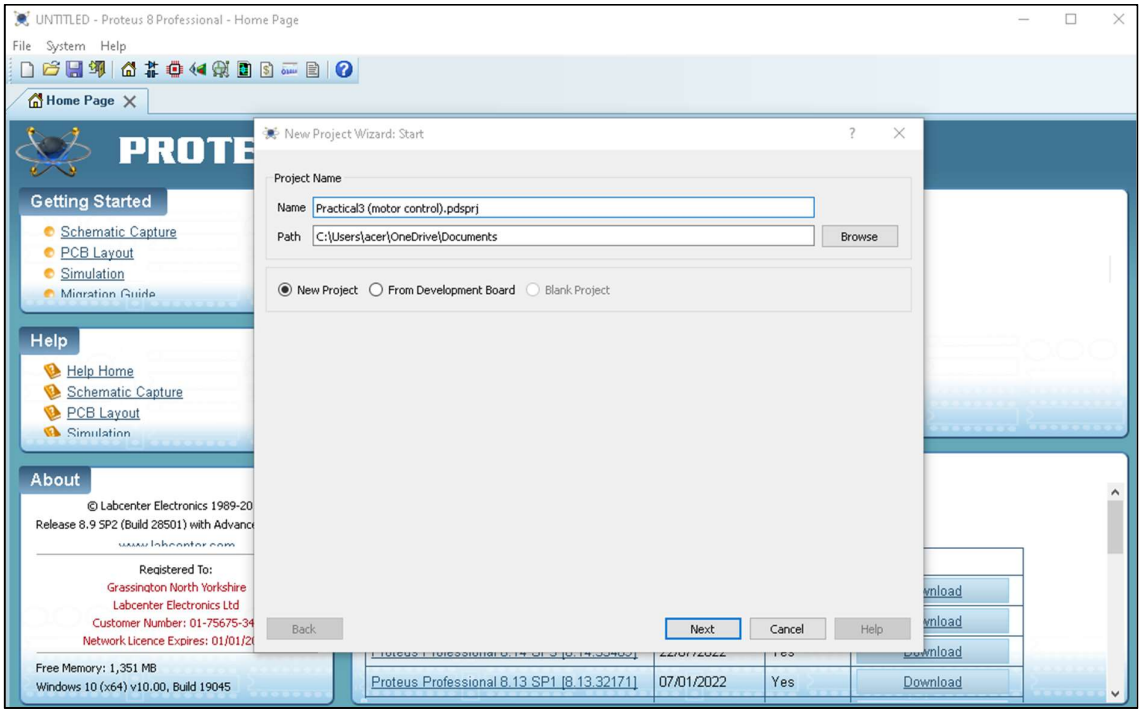
**Requirements:**

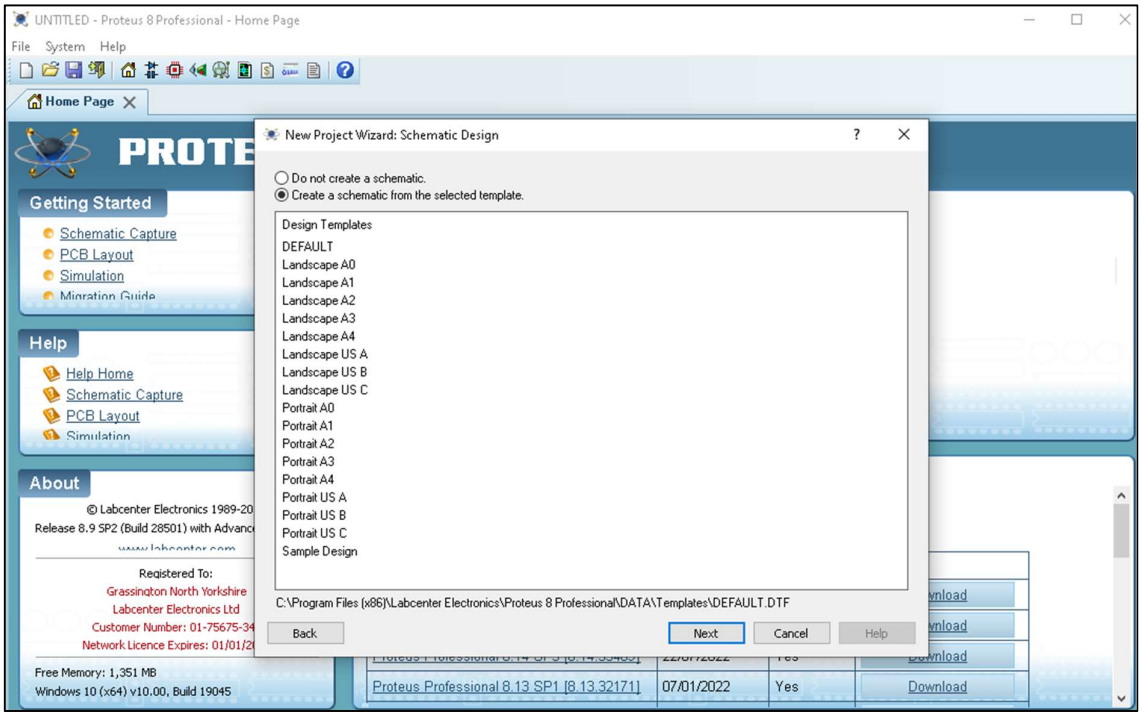
- L293D  Analog
- RPI3
- DC motor (Animated)
- Dc power
- Ground

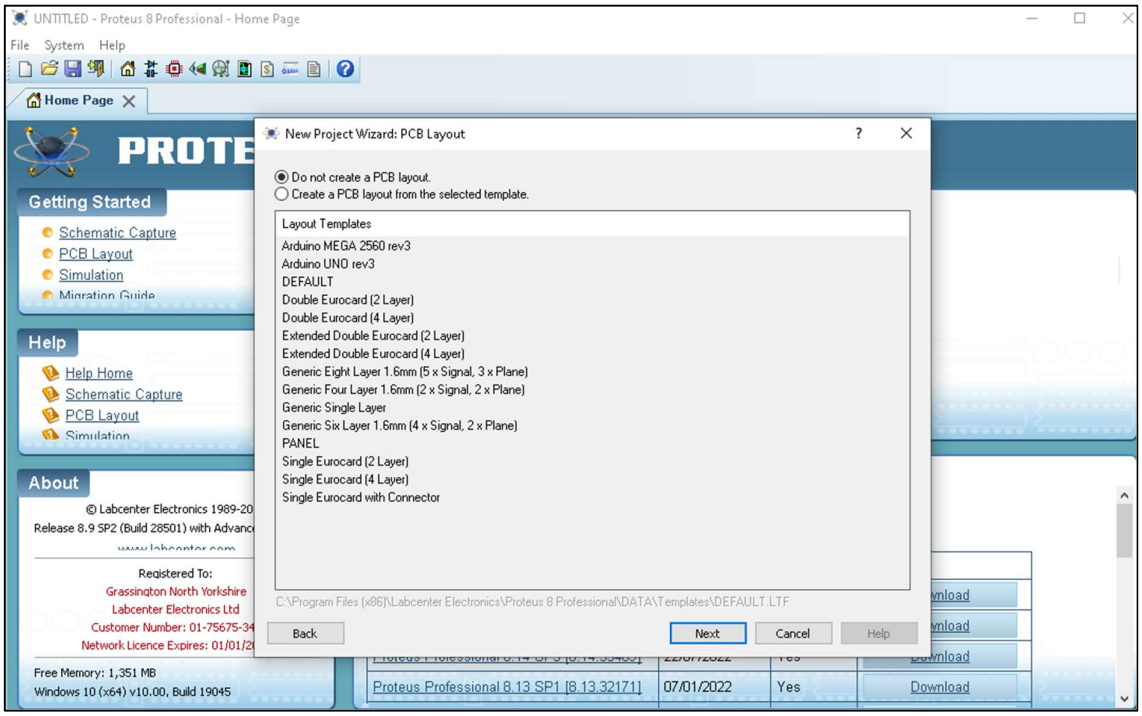
**Diagram :**

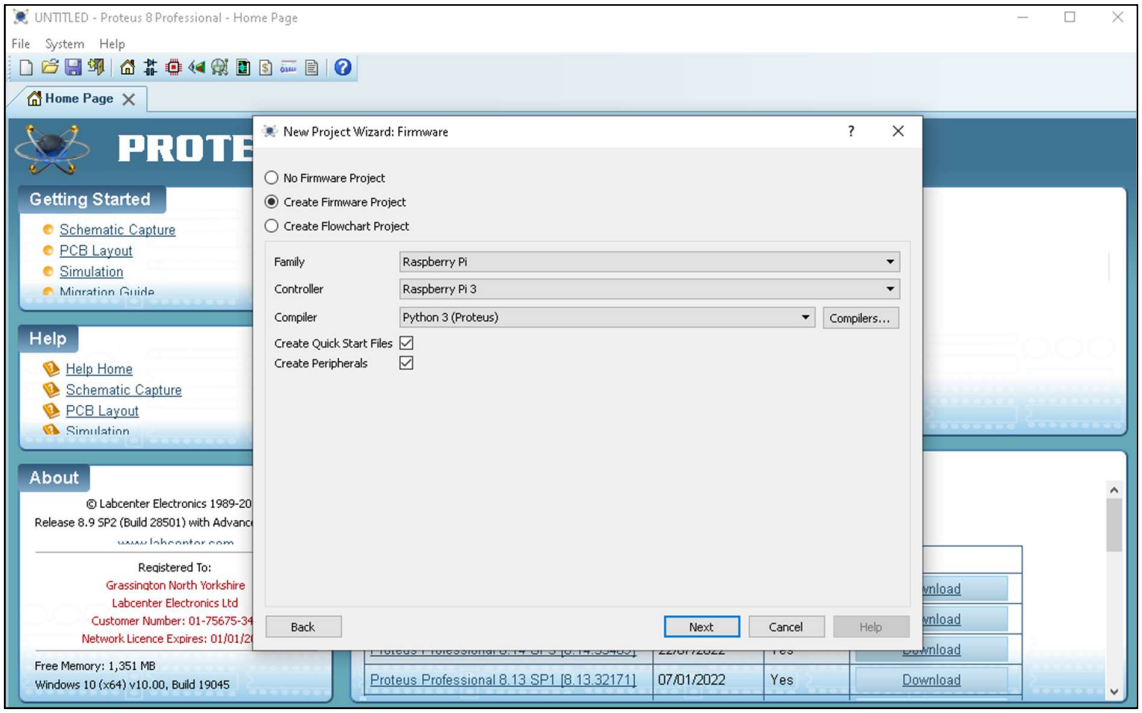


**Step 1 :** To test  motor control first we have to take new project in proteus

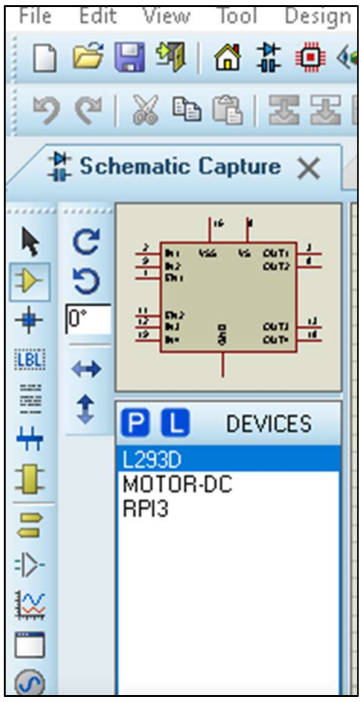


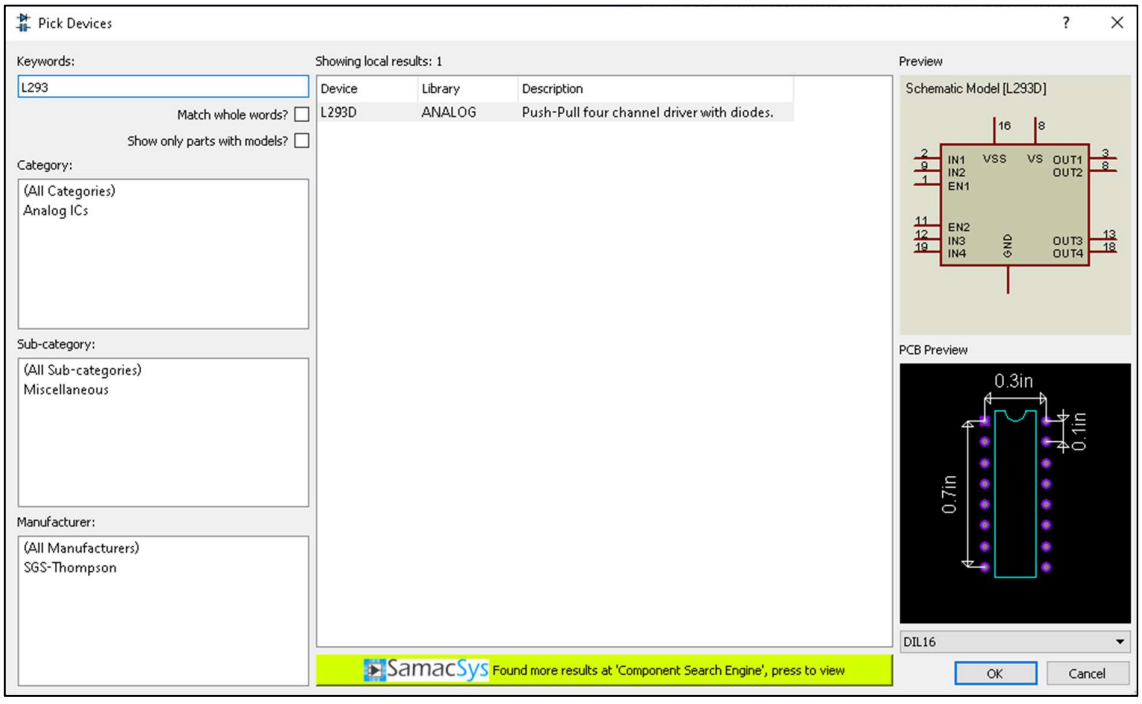



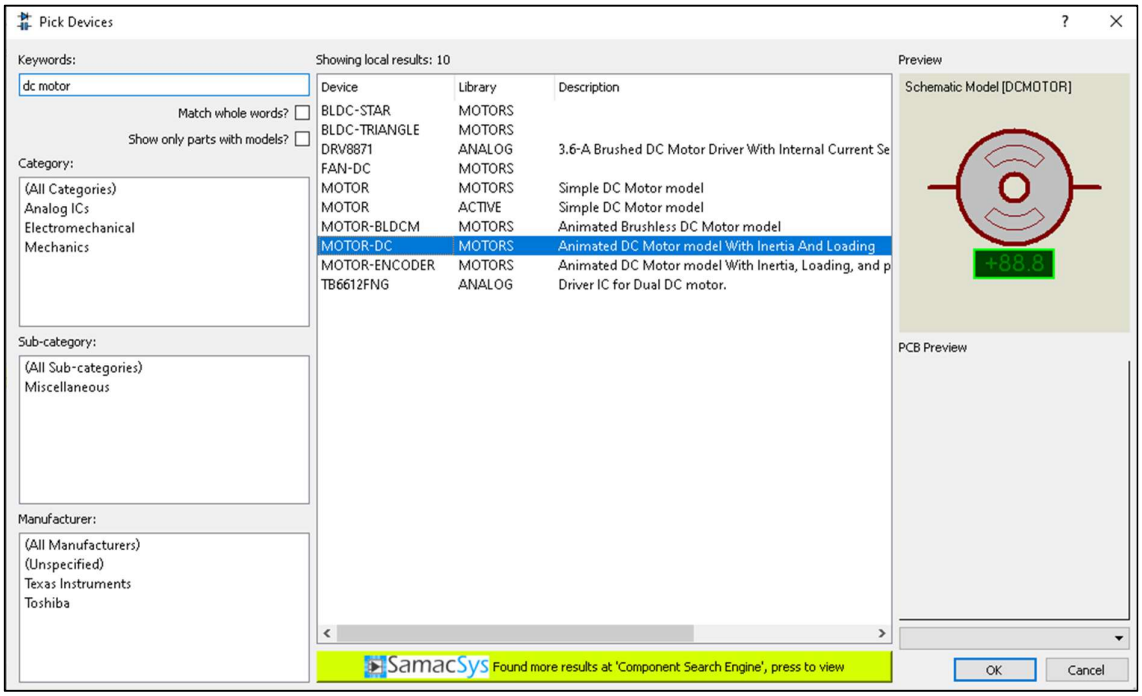

UNTITLED - Proteus 8 Professional - Home Page
File System Help
Home Page
New Project Wizard: PCB Layout
Do not create a PCB layout.
Create a PCB layout from the selected template.
Layout Templates
Arduino MEGA 2560 rev3
Arduino UNO rev3
DEFAULT
Double Eurocard (2 Layer)
Double Eurocard (4 Layer)
Extended Double Eurocard (2 Layer)
Extended Double Eurocard (4 Layer)
Generic Eight Layer 1.6mm (5 x Signal, 3 x Plane)
Generic Four Layer 1.6mm (2 x Signal, 2 x Plane)
Generic Single Layer
Generic Six Layer 1.6mm (4 x Signal, 2 x Plane)
PANEL
Single Eurocard (2 Layer)
Single Eurocard (4 Layer)
Single Eurocard with Connector
C:\Program Files (x86)\Labcenter Electronics\Proteus 8 Professional\DATA\Templates\DEFAULT.LTF
Back
Next
Cancel
Help
Getting Started
Schematic Capture
PCB Layout
Simulation
Migration Guide
Help
Help Home
Schematic Capture
PCB Layout
Simulation
About
Registered To:
Grassington North Yorkshire
Labcenter Electronics Ltd
Free Memory: 1,351 MB
Windows 10 (x64) v10.00, Build 19045
Proteus Professional 8.13 SP1 [8.13.32171]
07/01/2022
Yes
Download


UNTITLED - Proteus 8 Professional - Home Page
File System Help
Home Page
New Project Wizard: Firmware
No Firmware Project
Create Firmware Project
Create Flowchart Project
Family
Raspberry Pi
Controller
Raspberry Pi 3
Compiler
Python 3 (Proteus)
Compilers...
Create Quick Start Files
Create Peripherals
Back
Next
Cancel
Help
Getting Started
Schematic Capture
PCB Layout
Simulation
Migration Guide
Help
Help Home
Schematic Capture
PCB Layout
Simulation
About
Registered To:
Grassington North Yorkshire
Labcenter Electronics Ltd
Free Memory: 1,351 MB
Windows 10 (x64) v10.00, Build 19045
Proteus Professional 8.13 SP1 [8.13.32171]
07/01/2022
Yes
Download

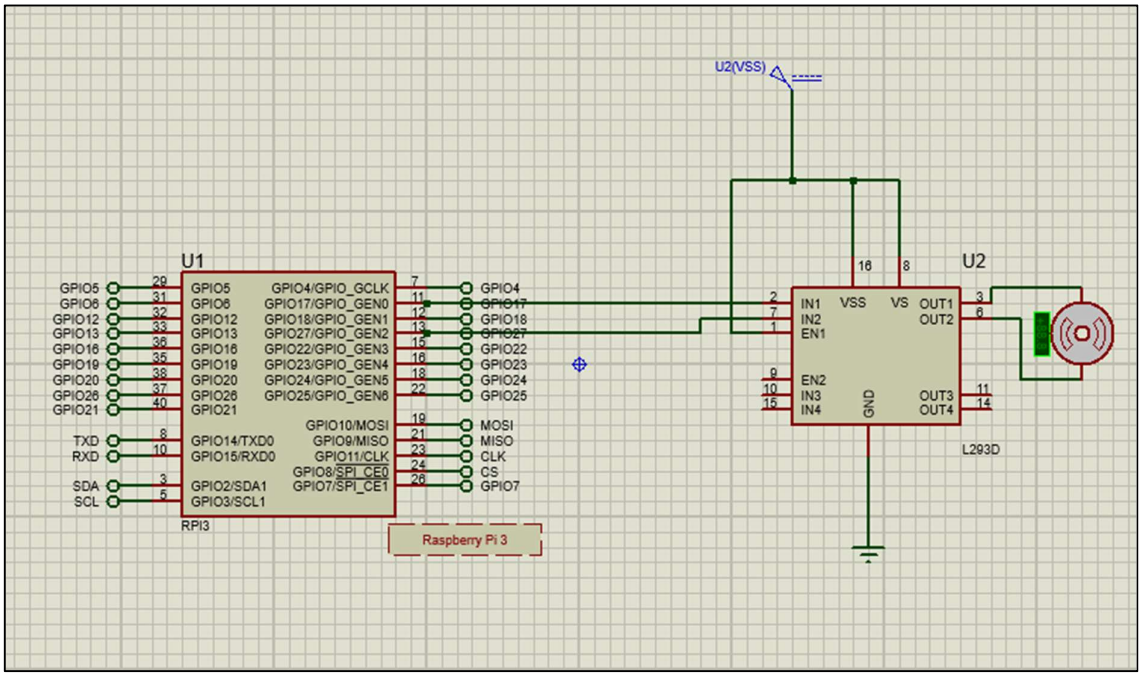
**Step 2:** after completing first step select the device click on component  then click on pick device(p) and select the device






**Step 3 :** Connect all device

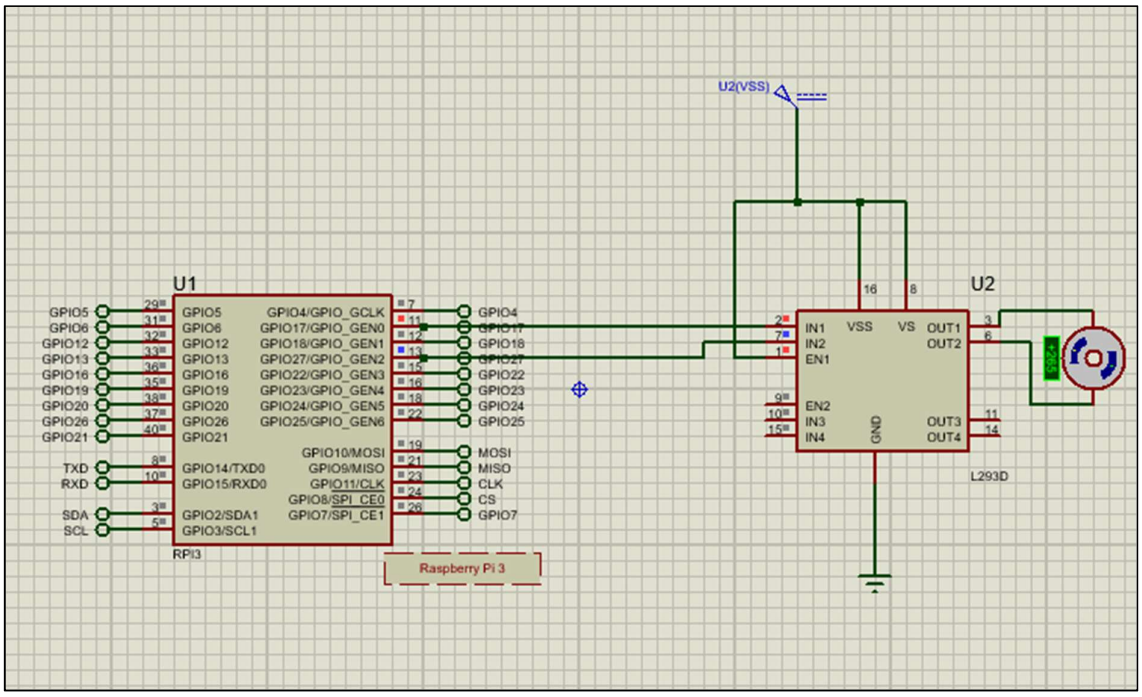



**Step 4:** write a code for operating the device

```
# import Library to access GPIO Pins
import RPi.GPIO as GPIO
#to access delay function
import time
```

```
GPIO.setmode(GPIO.BOARD)                #Consider complete raspberrypi board
GPIO.setwarnings(False)                 #To avoid same PIN use warning

DC_Motor_Pin1 = 11                      #Define PIN for DC motor
DC_Motor_Pin2 = 13                      #Define PIN for DC motor

GPIO.setup(DC_Motor_Pin1, GPIO.OUT)     #set pin function as output
GPIO.setup(DC_Motor_Pin2, GPIO.OUT)     #set pin function as output

while(1):
  GPIO.output(DC_Motor_Pin1,GPIO.HIGH)  #Motor on
  GPIO.output(DC_Motor_Pin2,GPIO.LOW)   #Motor on
  time.sleep(5)                         #Give 5 second delay
  GPIO.output(DC_Motor_Pin1, GPIO.LOW )  #motor on
  GPIO.output(DC_Motor_Pin1, GPIO.HIGH )  #motor on
  time.sleep(5)
```

**OUTPUT:**



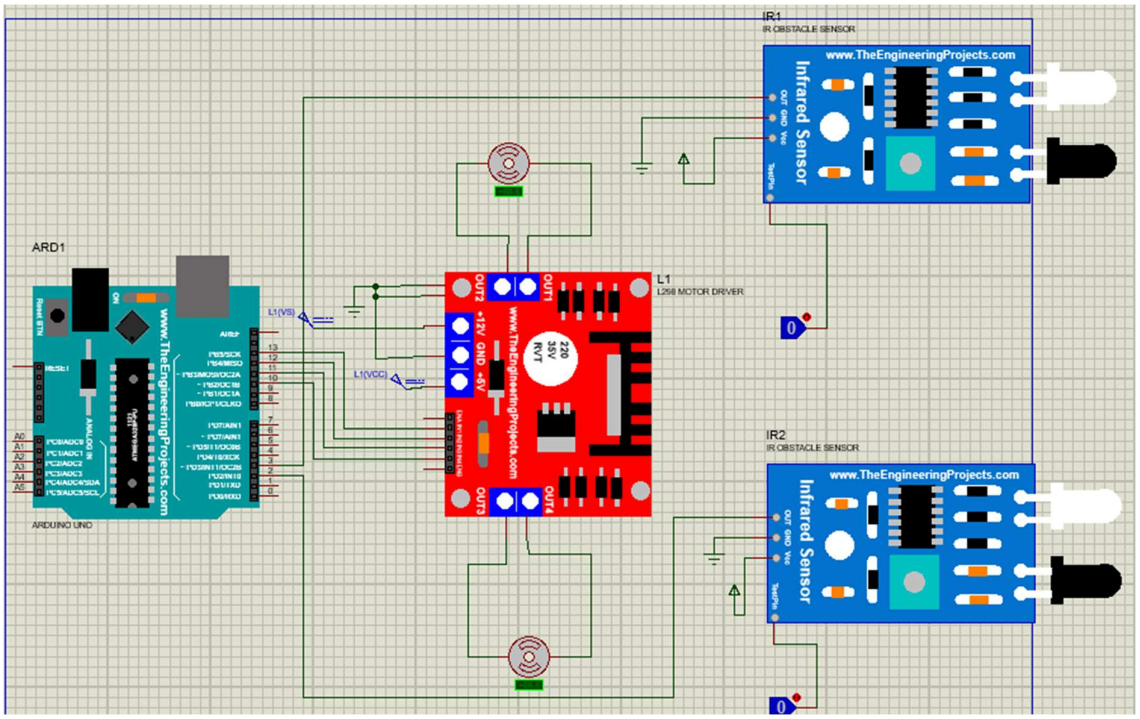
# Practical 4

**Aim:** Add the sensors to the Robot object and develop the line-following behaviour code

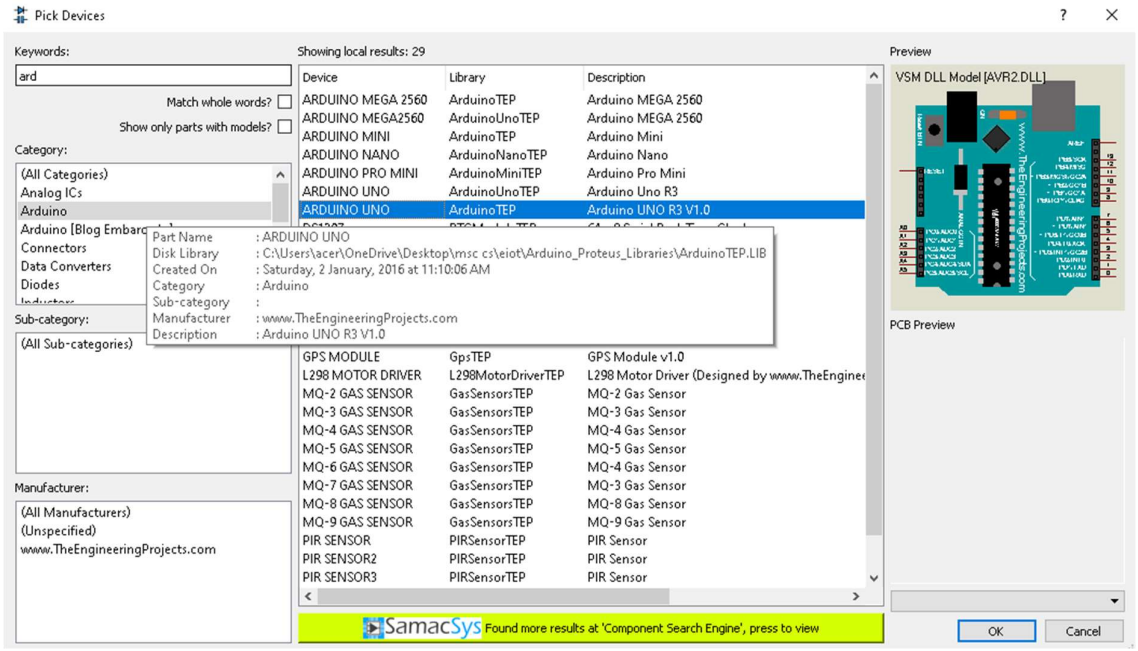
**Requirements:**

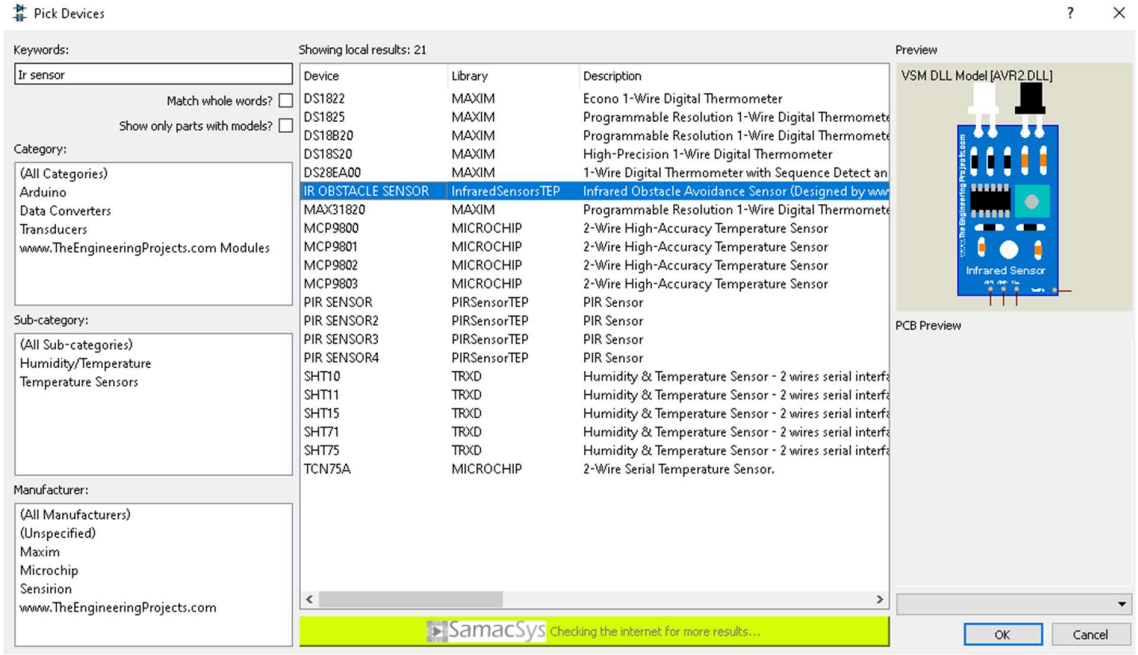
- Dc power
- Ground
- Motor-DC
- Logic toggle
- L298 Motor Driver
- IR obstacle sensor
- Arduino uno
- Power

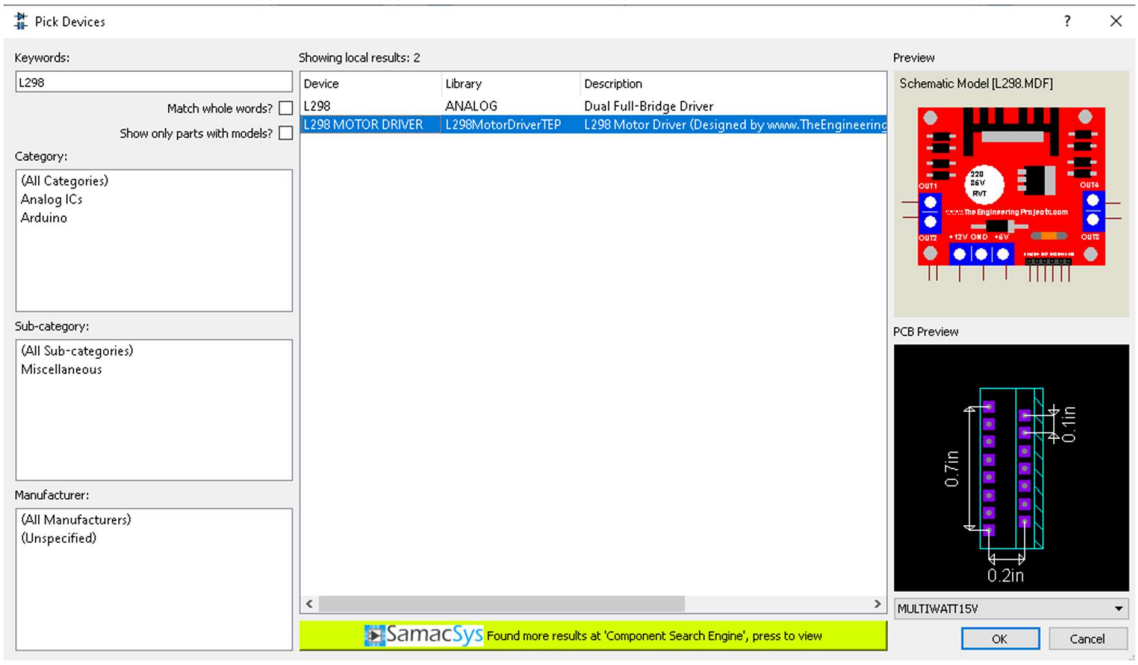
**Diagram:**

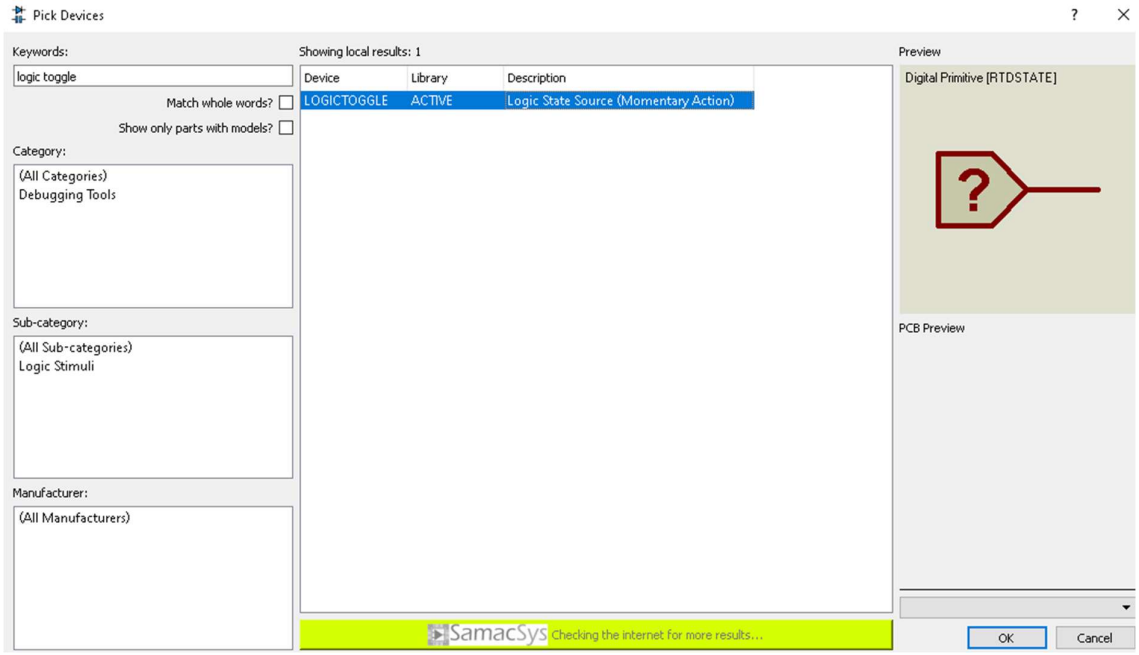


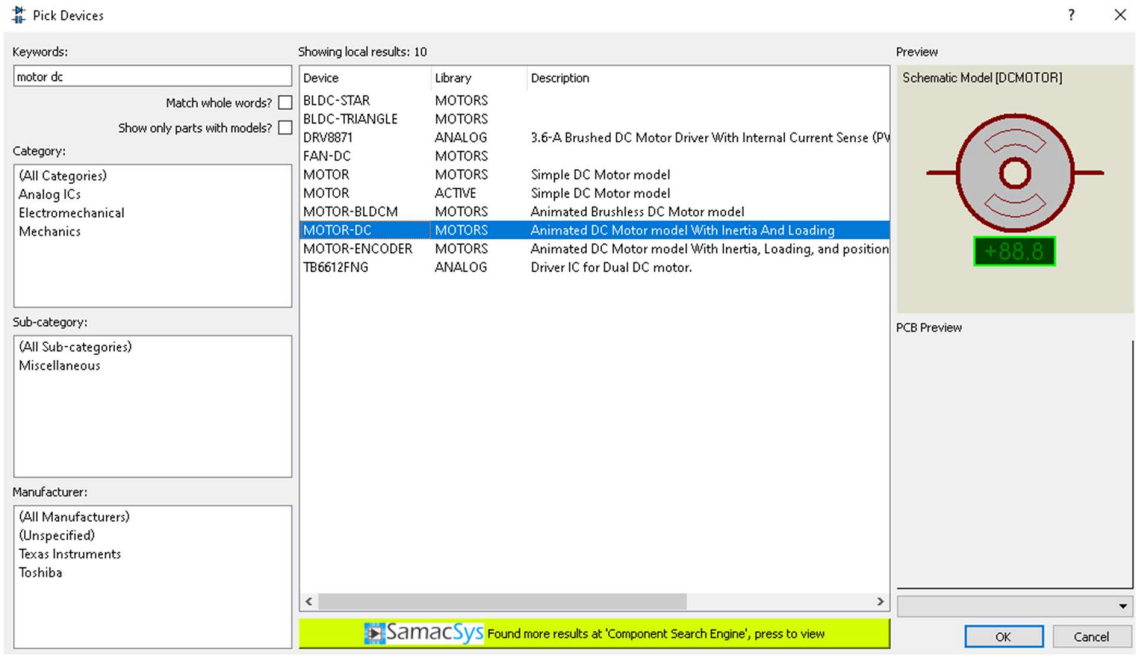

**Step 1:** To perform line-following behavior first open new project in proteus and select all component

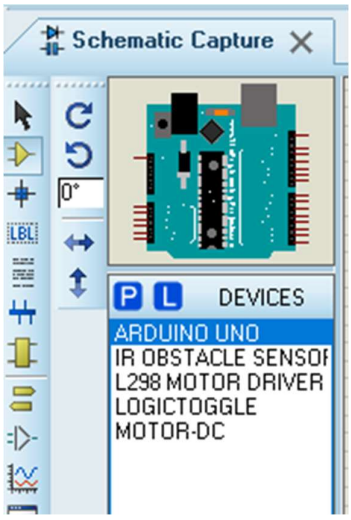

Pick Devices
Keywords:
ard
Match whole words?
Show only parts with models?
Category:
(All Categories)
Analog ICs
Arduino
Connectors
Data Converters
Diodes
Sub-category:
(All Sub-categories)
Manufacturer:
(All Manufacturers)
(Unspecified)
www.TheEngineeringProjects.com
Showing local results: 29
Device
Library
Description
ARDUINO MEGA 2560 ArduinoTEP Arduino MEGA 2560
ARDUINO MEGA2560 ArduinoUnoTEP Arduino MEGA 2560
ARDUINO MINI ArduinoTEP Arduino Mini
ARDUINO NANO ArduinoNanoTEP Arduino Nano
ARDUINO PRO MINI ArduinoMiniTEP Arduino Pro Mini
ARDUINO UNO ArduinoUnoTEP Arduino Uno R3
ARDUINO UNO ArduinoTEP Arduino UNO R3 V1.0
Part Name : ARDUINO UNO
Disk Library : C:\Users\acer\OneDrive\Desktop\msc cs\eiot\Arduino_Proteus_Libraries\ArduinoTEP.LIB
Created On : Saturday, 2 January, 2016 at 11:10:06 AM
Category : Arduino
Sub-category :
Manufacturer : www.TheEngineeringProjects.com
Description : Arduino UNO R3 V1.0
GPS MODULE GpsTEP GPS Module v1.0
L298 MOTOR DRIVER L298MotorDriverTEP L298 Motor Driver (Designed by www.TheEnginee
MQ-2 GAS SENSOR GasSensorsTEP MQ-2 Gas Sensor
MQ-3 GAS SENSOR GasSensorsTEP MQ-3 Gas Sensor
MQ-4 GAS SENSOR GasSensorsTEP MQ-4 Gas Sensor
MQ-5 GAS SENSOR GasSensorsTEP MQ-5 Gas Sensor
MQ-6 GAS SENSOR GasSensorsTEP MQ-4 Gas Sensor
MQ-7 GAS SENSOR GasSensorsTEP MQ-3 Gas Sensor
MQ-8 GAS SENSOR GasSensorsTEP MQ-8 Gas Sensor
MQ-9 GAS SENSOR GasSensorsTEP MQ-9 Gas Sensor
PIR SENSOR PIRSensorTEP PIR Sensor
PIR SENSOR2 PIRSensorTEP PIR Sensor
PIR SENSOR3 PIRSensorTEP PIR Sensor
SamacSys Found more results at 'Component Search Engine', press to view
Preview
VSM DLL Model [AVR2.DLL]
PCB Preview
OK
Cancel


Pick Devices
Keywords:
Ir sensor
Match whole words?
Show only parts with models?
Category:
(All Categories)
Arduino
Data Converters
Transducers
www.TheEngineeringProjects.com Modules
Sub-category:
(All Sub-categories)
Humidity/Temperature
Temperature Sensors
Manufacturer:
(All Manufacturers)
(Unspecified)
Maxim
Microchip
Sensirion
www.TheEngineeringProjects.com
Showing local results: 21
Device
Library
Description
DS1822 MAXIM Econo 1-Wire Digital Thermometer
DS1825 MAXIM Programmable Resolution 1-Wire Digital Thermomete
DS18B20 MAXIM Programmable Resolution 1-Wire Digital Thermomete
DS18S20 MAXIM High-Precision 1-Wire Digital Thermometer
DS28EA00 MAXIM 1-Wire Digital Thermometer with Sequence Detect an
IR OBSTACLE SENSOR InfraredSensorsTEP Infrared Obstacle Avoidance Sensor (Designed by www
MAX31820 MAXIM Programmable Resolution 1-Wire Digital Thermomete
MCP9800 MICROCHIP 2-Wire High-Accuracy Temperature Sensor
MCP9801 MICROCHIP 2-Wire High-Accuracy Temperature Sensor
MCP9802 MICROCHIP 2-Wire High-Accuracy Temperature Sensor
MCP9803 MICROCHIP 2-Wire High-Accuracy Temperature Sensor
PIR SENSOR PIRSensorTEP PIR Sensor
PIR SENSOR2 PIRSensorTEP PIR Sensor
PIR SENSOR3 PIRSensorTEP PIR Sensor
PIR SENSOR4 PIRSensorTEP PIR Sensor
SHT10 TRXD Humidity & Temperature Sensor - 2 wires serial interfa
SHT11 TRXD Humidity & Temperature Sensor - 2 wires serial interfa
SHT15 TRXD Humidity & Temperature Sensor - 2 wires serial interfa
SHT71 TRXD Humidity & Temperature Sensor - 2 wires serial interfa
SHT75 TRXD Humidity & Temperature Sensor - 2 wires serial interfa
TCN75A MICROCHIP 2-Wire Serial Temperature Sensor.
SamacSys Checking the internet for more results...
Preview
VSM DLL Model [AVR2.DLL]
Infrared Sensor
PCB Preview
OK
Cancel

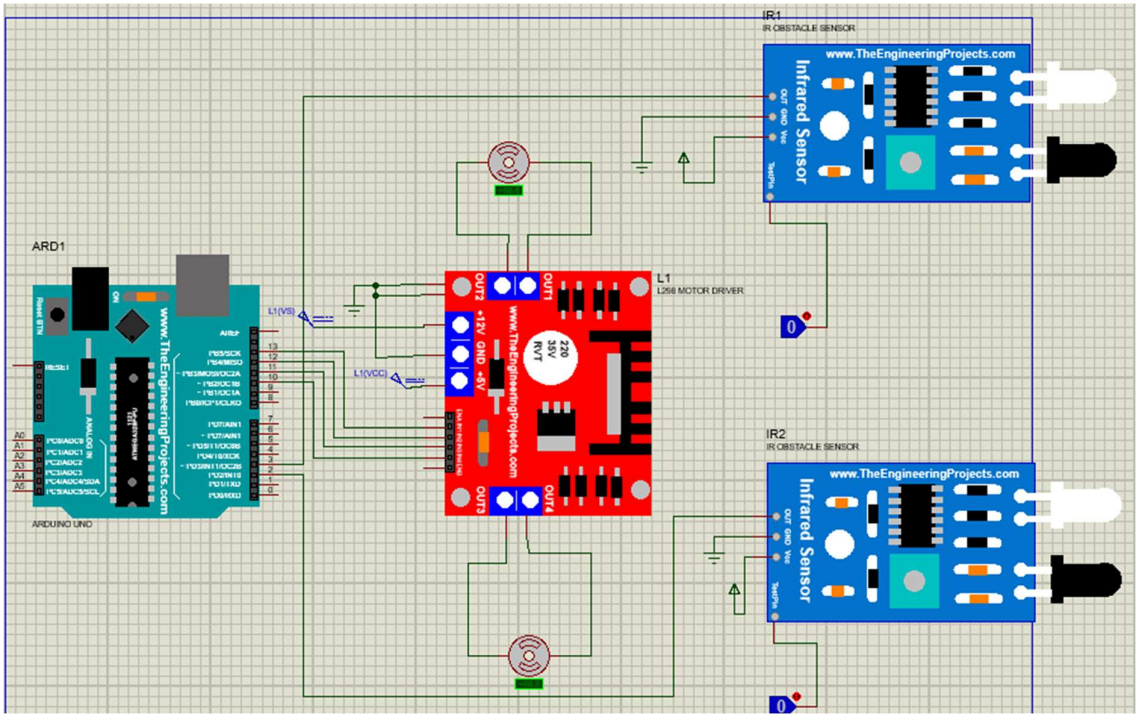

Pick Devices
Keywords:
L298
Match whole words?
Show only parts with models?
Category:
(All Categories)
Analog ICs
Arduino
Sub-category:
(All Sub-categories)
Miscellaneous
Manufacturer:
(All Manufacturers)
(Unspecified)
Showing local results: 2
Device
Library
Description
L298
ANALOG
Dual Full-Bridge Driver
L298 MOTOR DRIVER
L298MotorDriverTEP
L298 Motor Driver (Designed by www.TheEngineerinc
SamacSys Found more results at 'Component Search Engine', press to view
Preview
Schematic Model [L298.MDF]
PCB Preview
0.7in
0.1in
0.2in
MULTIWATT15V
OK
Cancel


Pick Devices
Keywords:
logic toggle
Match whole words?
Show only parts with models?
Category:
(All Categories)
Debugging Tools
Sub-category:
(All Sub-categories)
Logic Stimuli
Manufacturer:
(All Manufacturers)
Showing local results: 1
Device
Library
Description
LOGICTOGGLE
ACTIVE
Logic State Source (Momentary Action)
SamacSys Checking the internet for more results...
Preview
Digital Primitive [RTDSTATE]
PCB Preview
OK
Cancel


Pick Devices
Keywords:
motor dc
Match whole words?
Show only parts with models?
Category:
(All Categories)
Analog ICs
Electromechanical
Mechanics
Sub-category:
(All Sub-categories)
Miscellaneous
Manufacturer:
(All Manufacturers)
(Unspecified)
Texas Instruments
Toshiba
Showing local results: 10
Device
Library
Description
BLDC-STAR MOTORS
BLDC-TRIANGLE MOTORS
DRV8871 ANALOG 3.6-A Brushed DC Motor Driver With Internal Current Sense (PV
FAN-DC MOTORS
MOTOR MOTORS Simple DC Motor model
MOTOR ACTIVE Simple DC Motor model
MOTOR-BLDCM MOTORS Animated Brushless DC Motor model
MOTOR-DC MOTORS Animated DC Motor model With Inertia And Loading
MOTOR-ENCODER MOTORS Animated DC Motor model With Inertia, Loading, and position
TB6612FNG ANALOG Driver IC for Dual DC motor.
SamacSys Found more results at 'Component Search Engine', press to view
Preview
Schematic Model [DCMOTOR]
+88.8
PCB Preview
OK
Cancel


Schematic Capture
0°
P L DEVICES
ARDUINO UNO
IR OBSTACLE SENSOI
L298 MOTOR DRIVER
LOGICTOGGLE
MOTOR-DC

**Step 2 :** Connect all device




**Step 3 :**wirte a code in ardunio and compile it

```
void setup() {
  // put your setup code here, to run once:

  pinMode(2,INPUT);
  pinMode(3,INPUT);
  pinMode(10,OUTPUT);
  pinMode(11,OUTPUT);
  pinMode(12,OUTPUT);
  pinMode(13,OUTPUT);
}

void loop() {
  // put your main code here, to run repeatedly:
int v=digitalRead(2);
  int s=digitalRead(3);
```

```
 if(v==1 and s==1){
   digitalWrite(13,1);
   digitalWrite(12,0);
   digitalWrite(11,1);
   digitalWrite(10,0);
 }
 if(v==1 and s==0){
   digitalWrite(13,0);
   digitalWrite(12,1);
   digitalWrite(11,0);
   digitalWrite(10,1);
   }
 if(v==0 and s==1){
   digitalWrite(13,1);
   digitalWrite(12,0);
   digitalWrite(11,0);
   digitalWrite(10,1);
   }
 if(v==0 and s==0){
   digitalWrite(13,0);
   digitalWrite(12,1);
   digitalWrite(11,0);
   digitalWrite(10,1);
   }
}
```

sketch_may19a | Arduino 1.8.18

File Edit Sketch Tools Help

sketch_may19a §

```
void setup() {
  // put your setup code here, to run once:

  pinMode(2,INPUT);
  pinMode(3,INPUT);
  pinMode(10,OUTPUT);
  pinMode(11,OUTPUT);
  pinMode(12,OUTPUT);
  pinMode(13,OUTPUT);
}

void loop() {
  // put your main code here, to run repeatedly:
int v=digitalRead(2);
  int s=digitalRead(3);

  if(v==1 and s==1){
    digitalWrite(13,1);
    digitalWrite(12,0);
    digitalWrite(11,1);
    digitalWrite(10,0);
 }
  if(v==1 and s==0){
    digitalWrite(13,0);
    digitalWrite(12,1);
    digitalWrite(11,0);
    digitalWrite(10,1);
    }
  if(v==0 and s==1){
```

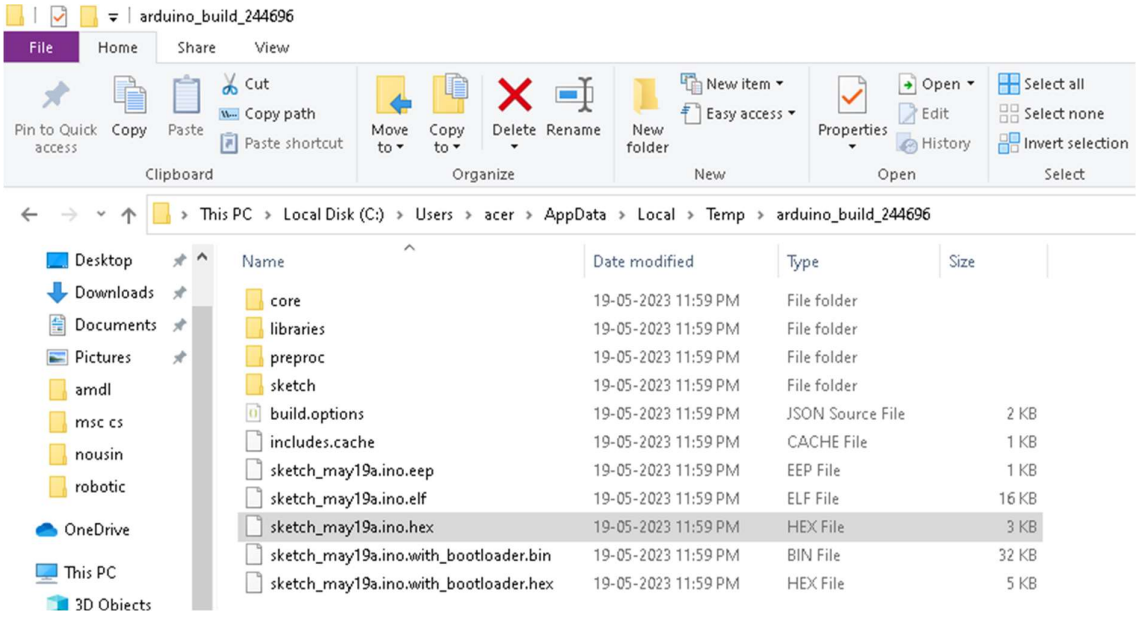
Done compiling.

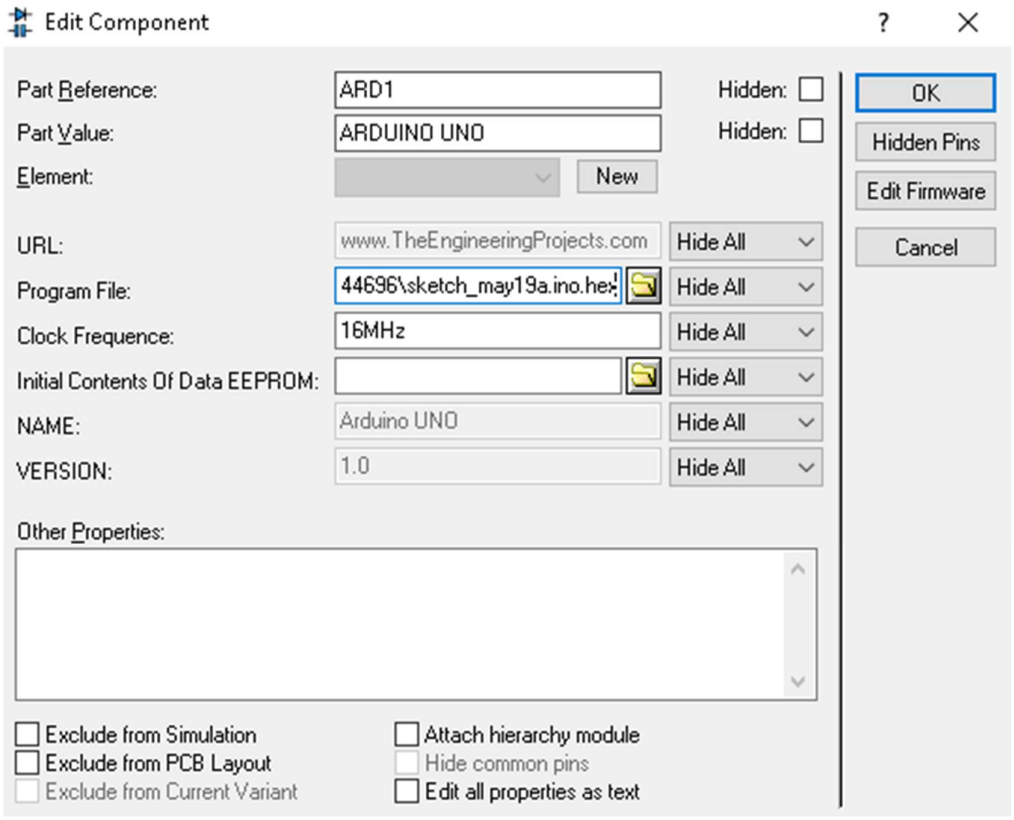
```
Sketch uses 1050 bytes (3%) of program storage space. Maximum is 32256 bytes.
Global variables use 9 bytes (0%) of dynamic memory, leaving 2039 bytes for local variables. Maximum is 2048 bytes.
```

**Step 4:** after compiling the file will get .hex file which we have to add in Arduino uno

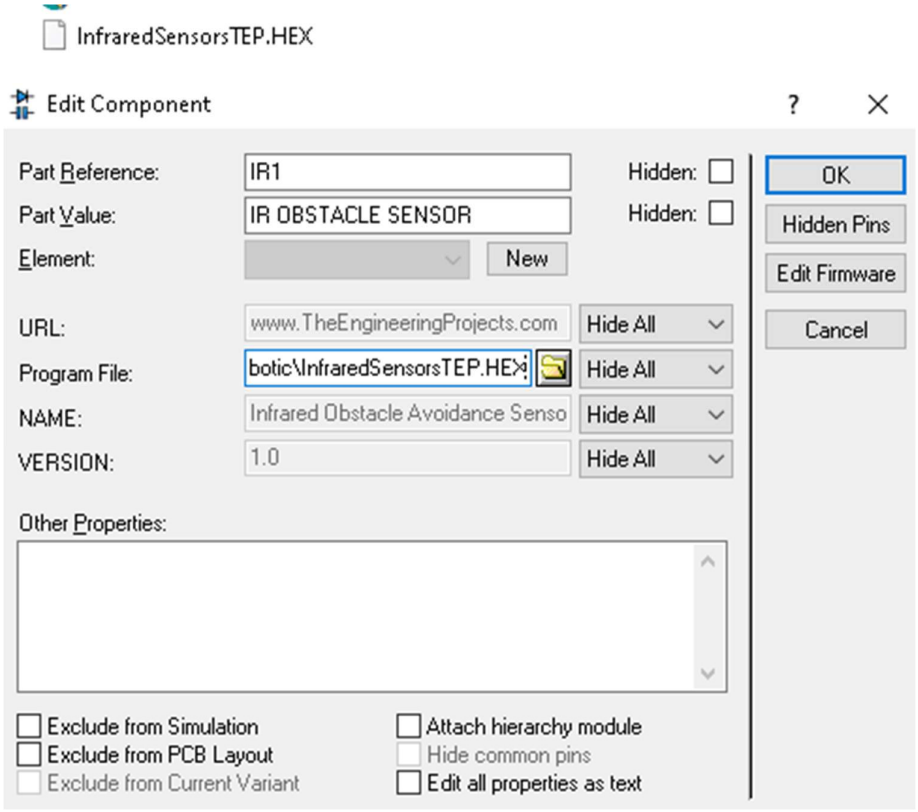
Go to C:\Users\acer\AppData\Local\Temp\arduino_build_244696

In this location w'll get .hex file which we have to upload in Arduino



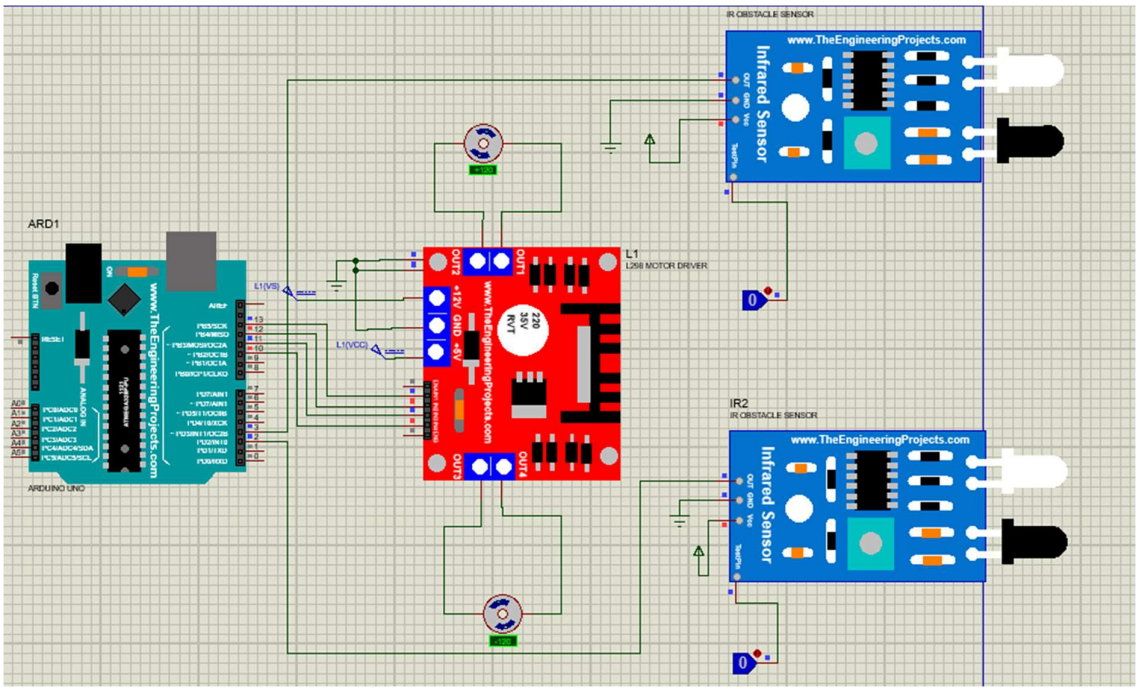


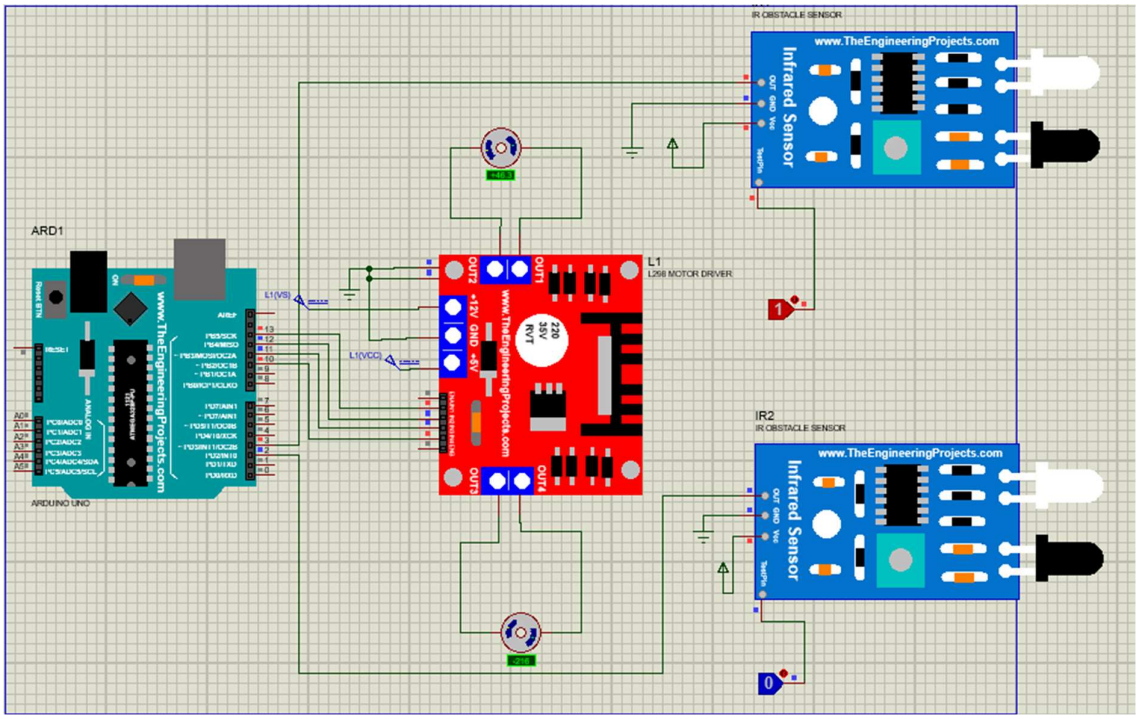

**Step 5:** In both IR obstacle sensor we have to add .hex fir of infraredSensortep.hex

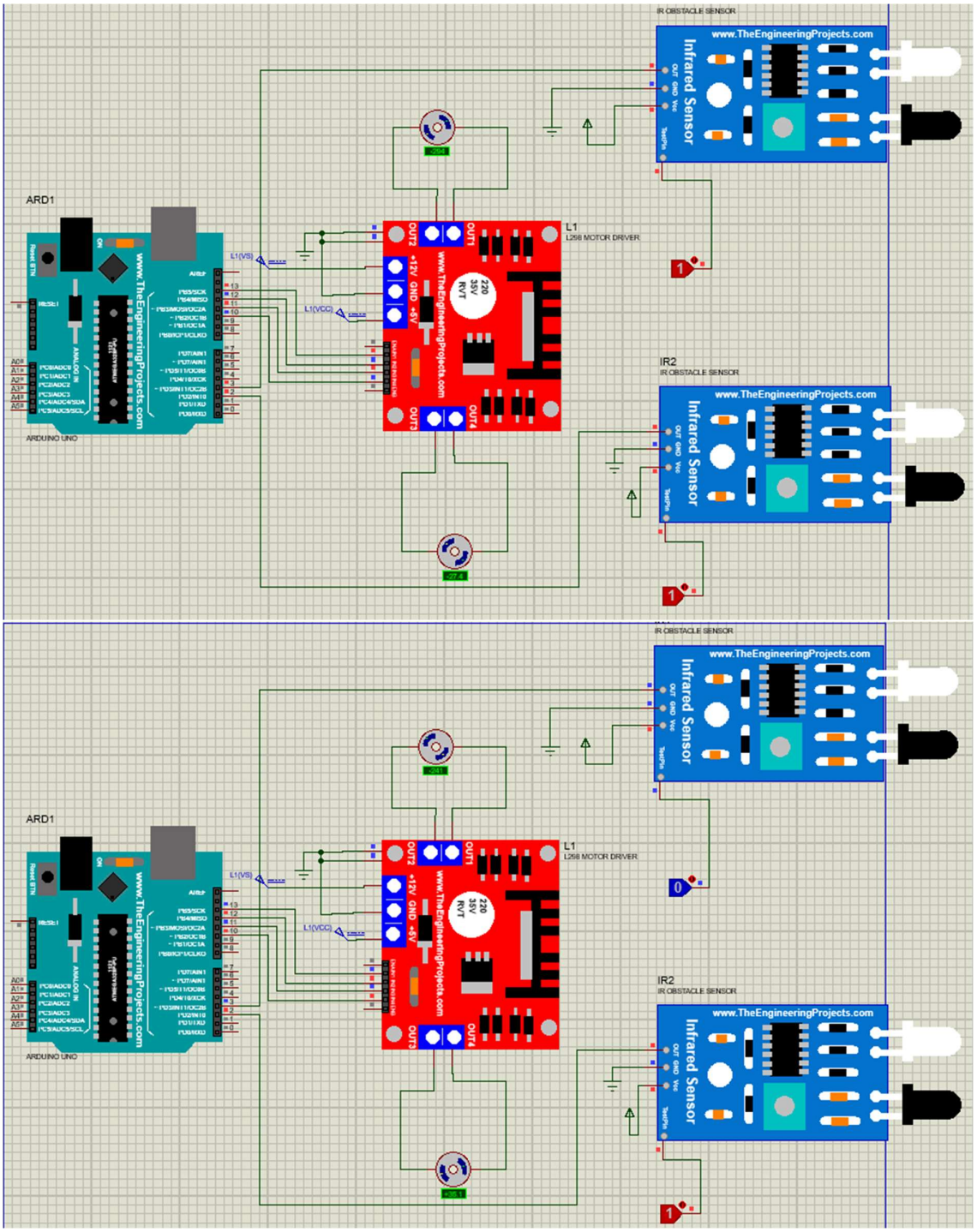



like this we have to add .hex file  in both obstacle sensor

**OUTPUT:**


IR OBSTACLE SENSOR
www.TheEngineeringProjects.com
Infrared Sensor
ARD1
L1
L298 MOTOR DRIVER
IR2
IR OBSTACLE SENSOR
ARDUINO UNO


IR OBSTACLE SENSOR
www.TheEngineeringProjects.com
Infrared Sensor
ARD1
L1
L298 MOTOR DRIVER
IR2
IR OBSTACLE SENSOR
ARDUINO UNO


IR OBSTACLE SENSOR
www.TheEngineeringProjects.com
Infrared Sensor
ARD1
ARDUINO UNO
L1
L298 MOTOR DRIVER
IR2
IR OBSTACLE SENSOR
www.TheEngineeringProjects.com
Infrared Sensor
ARD1
ARDUINO UNO
L1
L298 MOTOR DRIVER
IR2
IR OBSTACLE SENSOR
www.TheEngineeringProjects.com
Infrared Sensor

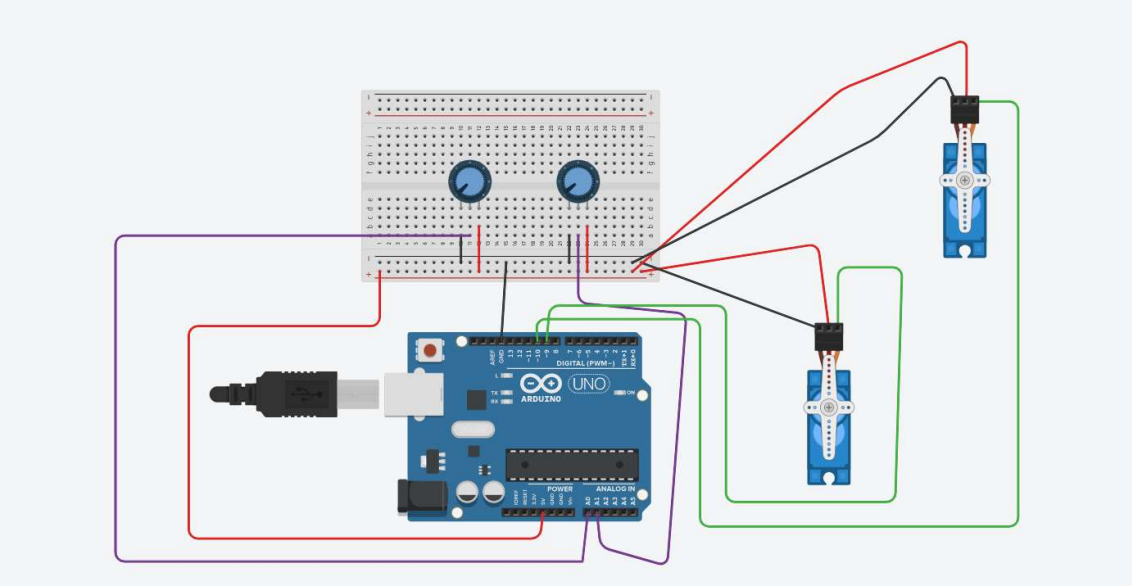
# Practical 5

**Aim: -** Add pan and tilt service to the robot object and test it.

**Requirements:**

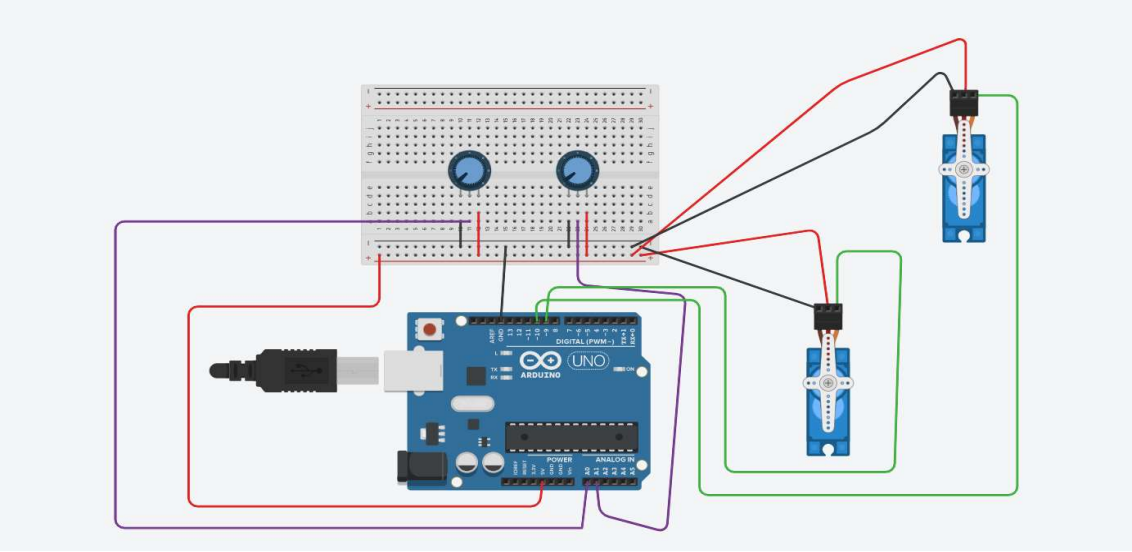
- Arduino Uno R3
- Micro servo
- Breadboard small
- Potentiometer

**Diagram:**

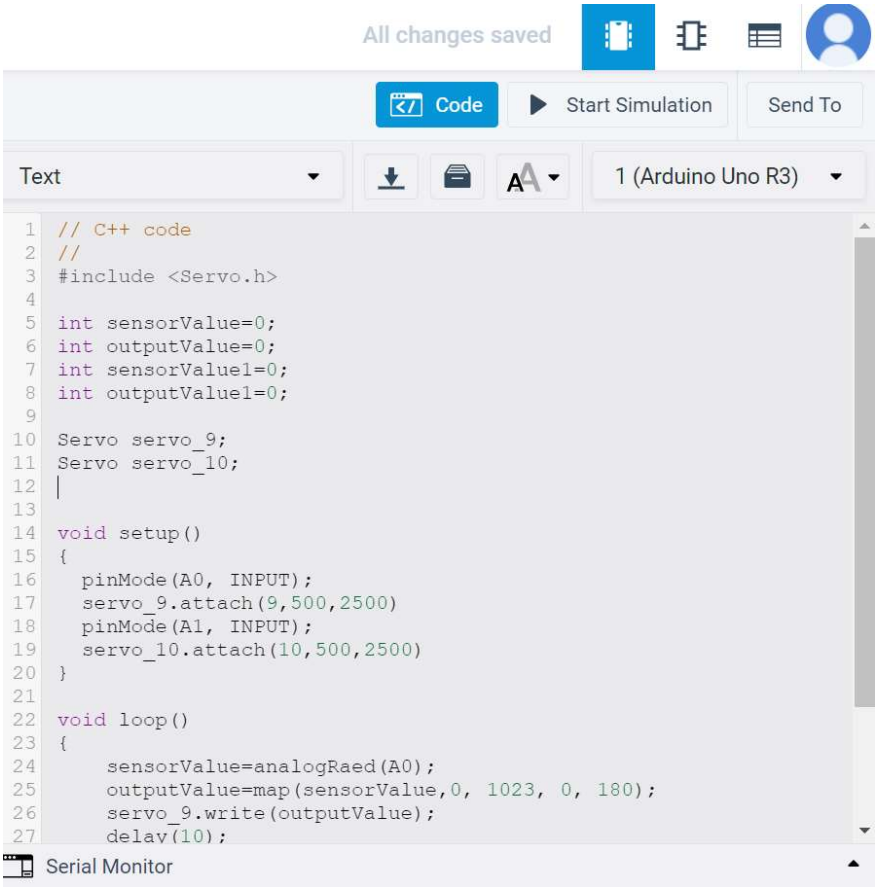


**Step 1:**we will perform this on tinkercad (https://www.tinkercad.com/dashboard)

**Step 2:** To connect the component as per below snapshot.



**Step 3:**To write the code section and to set edit mode to Text

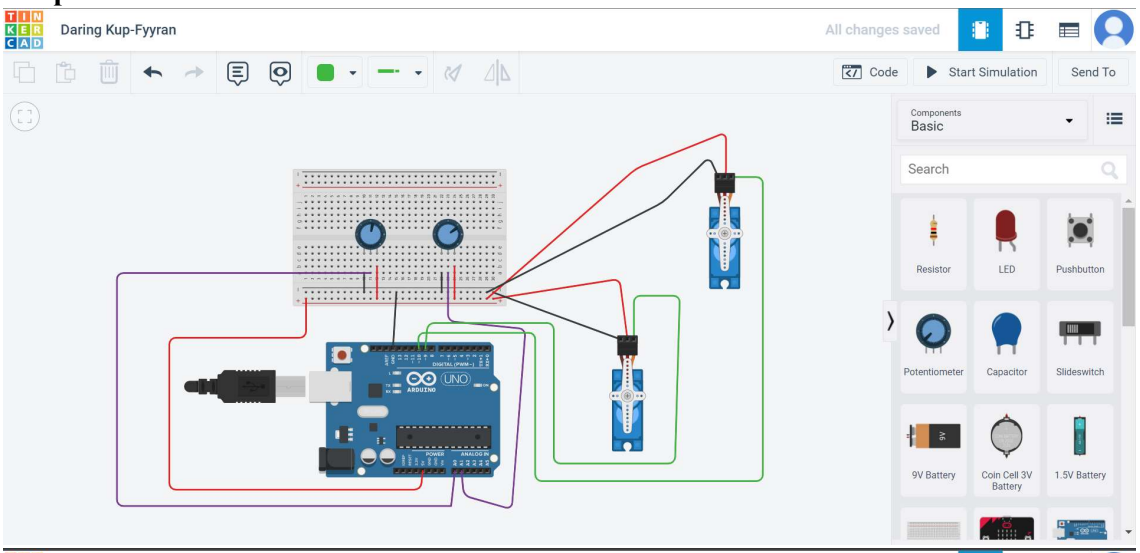


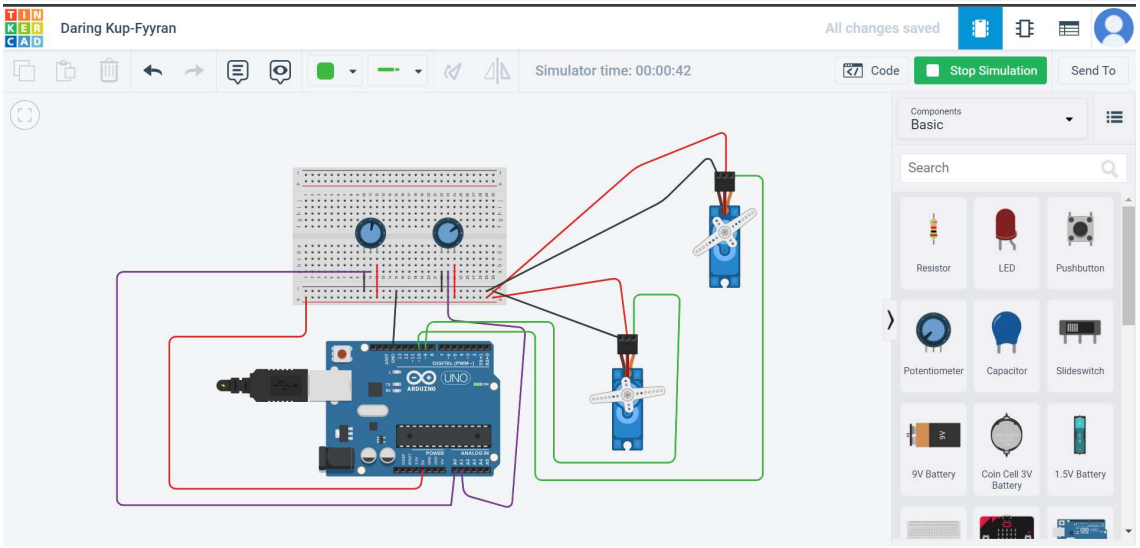

**Source code:**

```
// C++ code
//
#include <Servo.h>

int sensorValue=0;
int outputValue=0;
int sensorValue1=0;
int outputValue1=0;

Servo servo_9;
Servo servo_10;


void setup()
{
 pinMode(A0, INPUT);
 servo_9.attach(9,500,2500);
 pinMode(A1, INPUT);
 servo_10.attach(10,500,2500);
```

```
}

void loop()
{
        sensorValue=analogRead(A0);
        outputValue=map(sensorValue,0, 1023, 0, 180);
   servo_9.write(outputValue);
        delay(10);

        sensorValue1=analogRead(A1);
        outputValue1=map(sensorValue1,0, 1023, 0, 180);
   servo_10.write(outputValue1);
        delay(10);
}
```

**Output:**



# Practical 6

**Aim: - Detect faces with Haar cascades**

**Step 1:** Install command to work with opencv

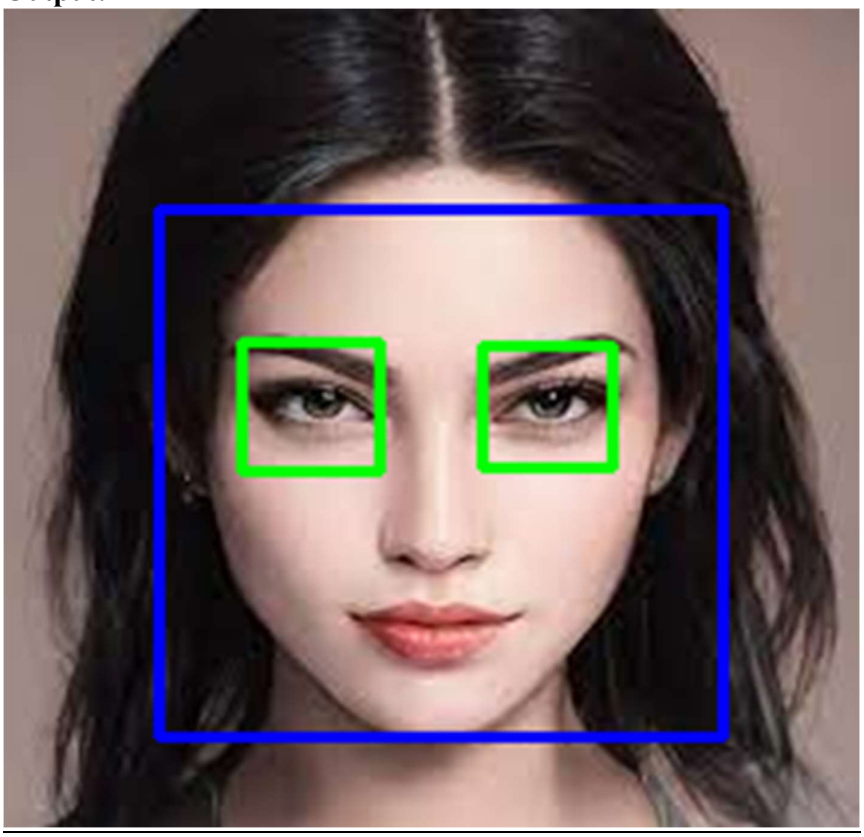
- pip install opencv-python
- pip install opencv-contrib-python

**Source code:**

```
import numpy as np
import cv2

#First we need to load the required XML classifiers. Then load our input image (or video) in grayscale mode.

face_cascade = cv2.CascadeClassifier('haarcascade_frontalface_default.xml')
eye_cascade = cv2.CascadeClassifier('haarcascade_eye.xml')

img = cv2.imread('test.jpg')
gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)

#Now we find the faces in the image. If faces are found, it returns the positions of detected faces as Rect(x,y,w,h). Once we get these locations, we can create a ROI for the face and apply eye detection on this ROI (since eyes are always on the face !!! ).

faces = face_cascade.detectMultiScale(gray, 1.3, 5)
for (x,y,w,h) in faces:
    img = cv2.rectangle(img,(x,y),(x+w,y+h),(255,0,0),2)
    roi_gray = gray[y:y+h, x:x+w]
    roi_color = img[y:y+h, x:x+w]
    eyes = eye_cascade.detectMultiScale(roi_gray)
    for (ex,ey,ew,eh) in eyes:
        cv2.rectangle(roi_color,(ex,ey),(ex+ew,ey+eh),(0,255,0),2)

cv2.imshow('img',img)
cv2.waitKey(0)
```

```
cv2.destroyAllWindows()
```

**Output:**



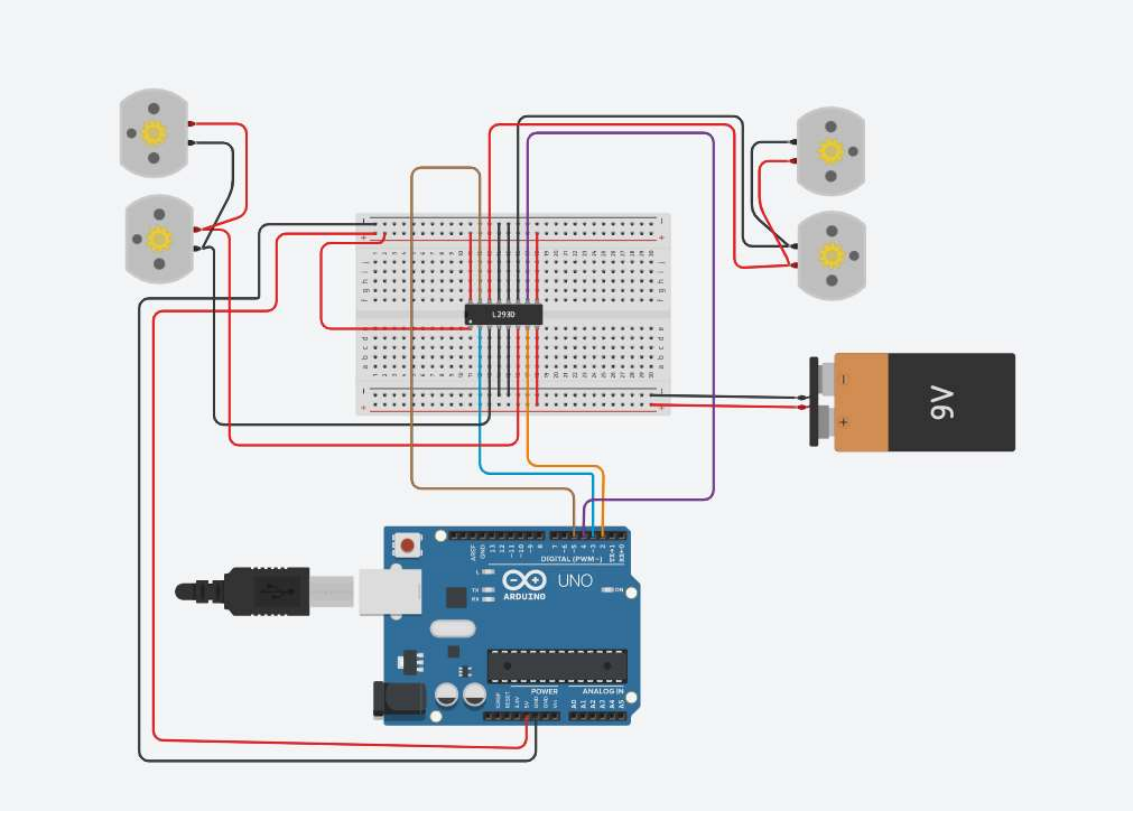
# Practical 7

**Aim: -** Create an obstacle avoidance behaviour for robot and test it.

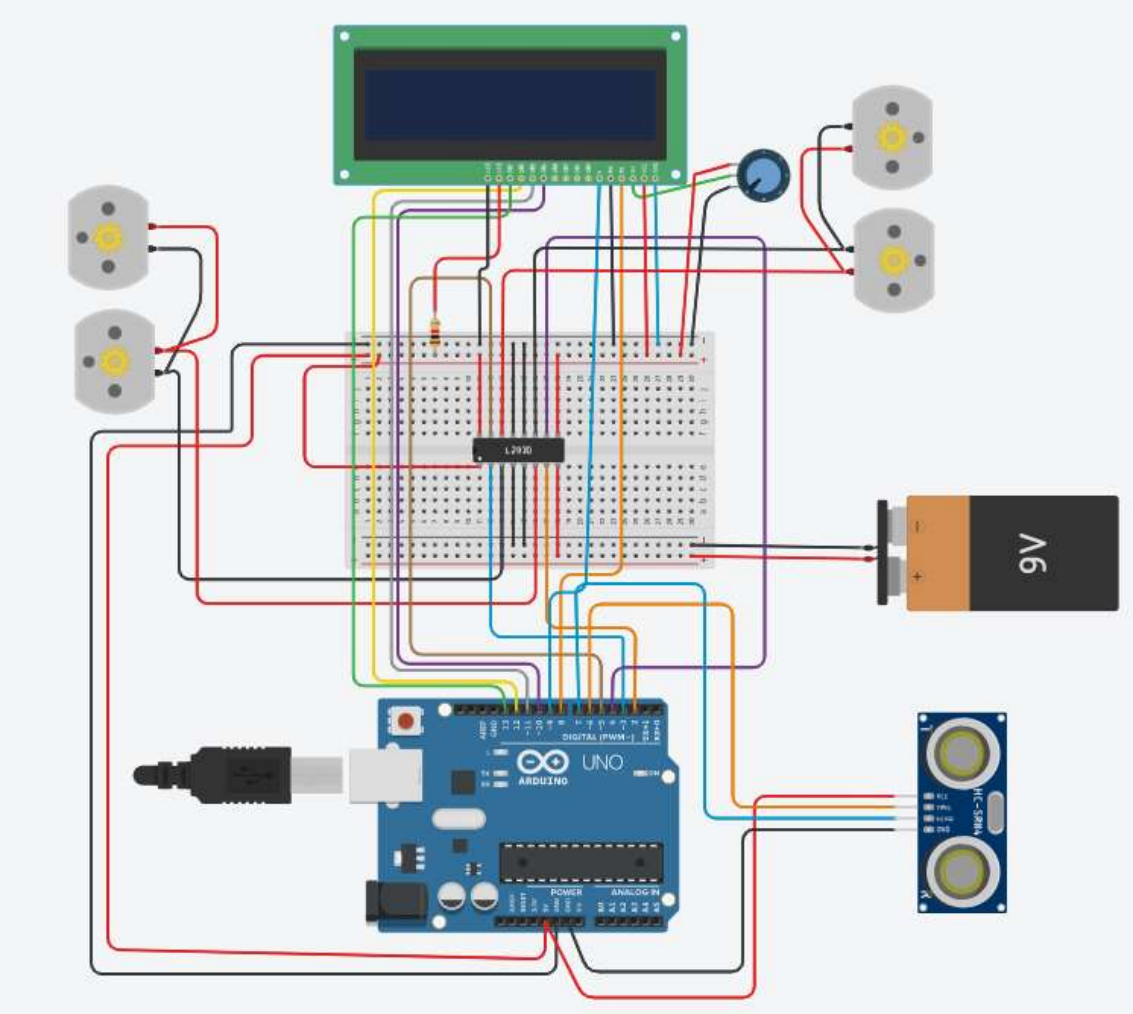
**Requirements:**

- Arduino Uno R3
- Breadboard small
- Potentiometer
- 9v battery
- DC motor
- l293d
- ultrasonic distance sensor
- lcd 16 x 2

**Step 1:** Connect 4 DC motors, 9 V battery, Arduino, breadboard and l293d as per below snapshot.




**Step 2:-** Add LCD 16 x 2 and ultrasonic distance sensor on the circuits.




**Source code:**

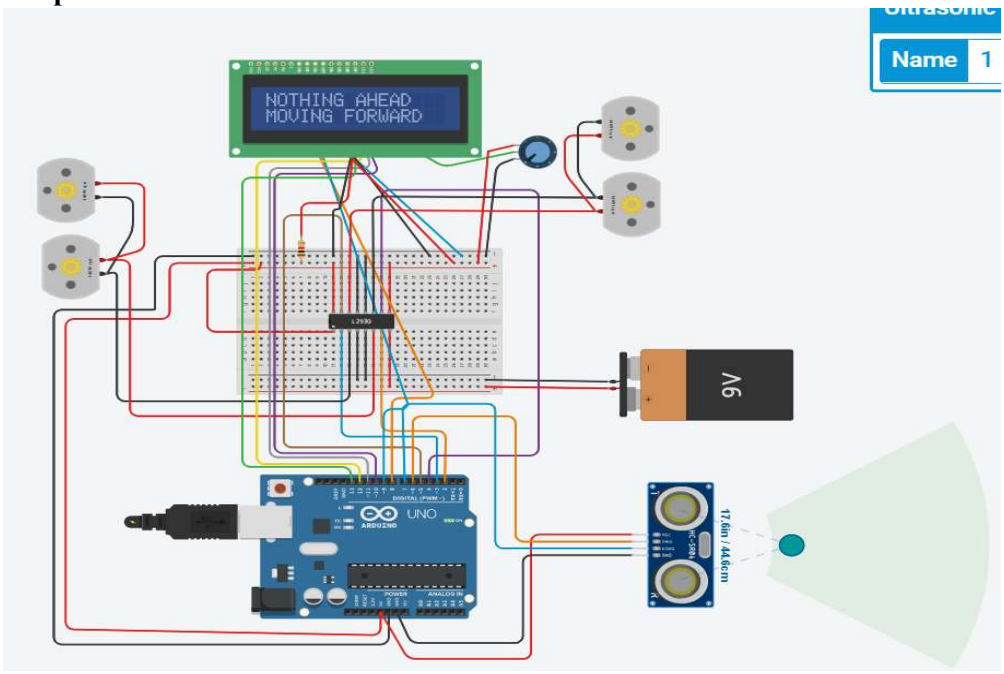
```
 //code for obstacle avoiding robot
#include <LiquidCrystal.h>
LiquidCrystal lcd(8,9,10,11,12,13);
long cm, duration;
const int echoPin = 7;
const int trigPin = 6;
const int lm1 = 2;
const int lm2 = 3;
const int rm1 = 4;
const int rm2 = 5;
void setup()
{
pinMode(lm1, OUTPUT);
pinMode(lm2, OUTPUT);
pinMode(rm1, OUTPUT);
pinMode(rm2, OUTPUT);
```

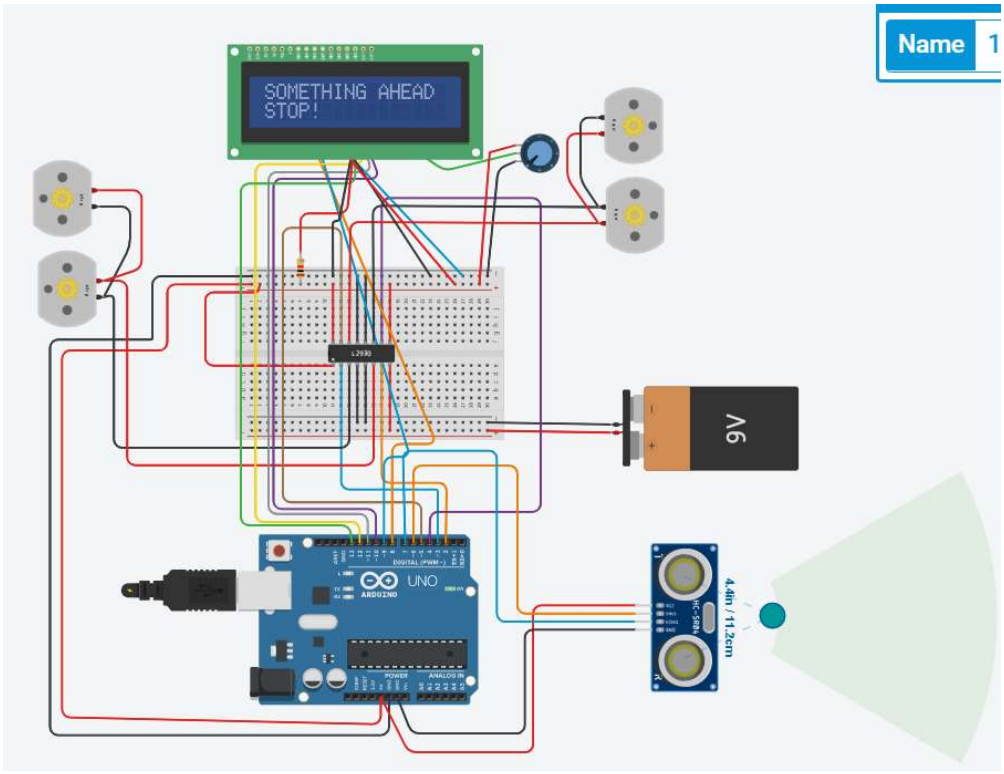
```
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
Serial.begin(9600);
lcd.begin(16,2);
}
void loop()
{
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
delayMicroseconds(5);
digitalWrite(trigPin, LOW);
duration = pulseIn(echoPin,HIGH);
//converting time into distance in centimetre
cm = duration*0.034/2;
if(cm < 20){
stop_bot();
delay(2000);
go_back();
delay(2000);
stop_again();
delay(1000);
go_left();
delay(1000);
}
else
{
go_straight();
delay(1000);
Serial.print("Distance:CM");
Serial.println(cm);
}
}
void go_straight()
{
lcd.setCursor(0,0);
lcd.print("NOTHING AHEAD");
lcd.setCursor(0,1);
lcd.print("MOVING FORWARD");
digitalWrite(lm1,HIGH);
digitalWrite(lm2,LOW);
digitalWrite(rm1,HIGH);
digitalWrite(rm2,LOW);
}
void go_back(){
lcd.clear();
```

```
lcd.setCursor(0,0);
lcd.print("TAKING REVERSE");
lcd.setCursor(0,1);
lcd.print(cm);
digitalWrite(lm2,HIGH);
digitalWrite(lm1,LOW);
digitalWrite(rm2,HIGH);
digitalWrite(rm1,LOW);
}
void stop_bot()
{
lcd.clear();
lcd.setCursor(0,0);
lcd.print("SOMETHING AHEAD");
lcd.setCursor(0,1);
lcd.print("STOP!");
digitalWrite(lm1,LOW);
digitalWrite(lm2,LOW);
digitalWrite(rm1,LOW);
digitalWrite(rm2,LOW);
}
void stop_again()
{
lcd.clear();
lcd.setCursor(0,0);
lcd.print("BREAK FOR TURN");
digitalWrite(lm1,LOW);
digitalWrite(lm2,LOW);
digitalWrite(rm1,LOW);
digitalWrite(rm2,LOW);
}
void go_left()
{
lcd.clear();
lcd.setCursor(0,0);
lcd.print("TURNING LEFT");
lcd.setCursor(0,1);
lcd.print(cm);
digitalWrite(lm1,LOW);
digitalWrite(lm2,LOW);
digitalWrite(rm1,HIGH);
digitalWrite(rm2,LOW);
}
void go_right()
{
lcd.clear();
```

```
lcd.setCursor(0,0);
lcd.print("TURNING RIGHT");
lcd.setCursor(0,1);
lcd.print(cm);
digitalWrite(lm1,HIGH);
digitalWrite(lm2,LOW);
digitalWrite(rm1,LOW);
digitalWrite(rm2,LOW);
}
```

**Output:**




Name
SOMETHING AHEAD
STOP!
9V
UNO
ARDUINO
4.4in / 11.2cm

# Practical 8

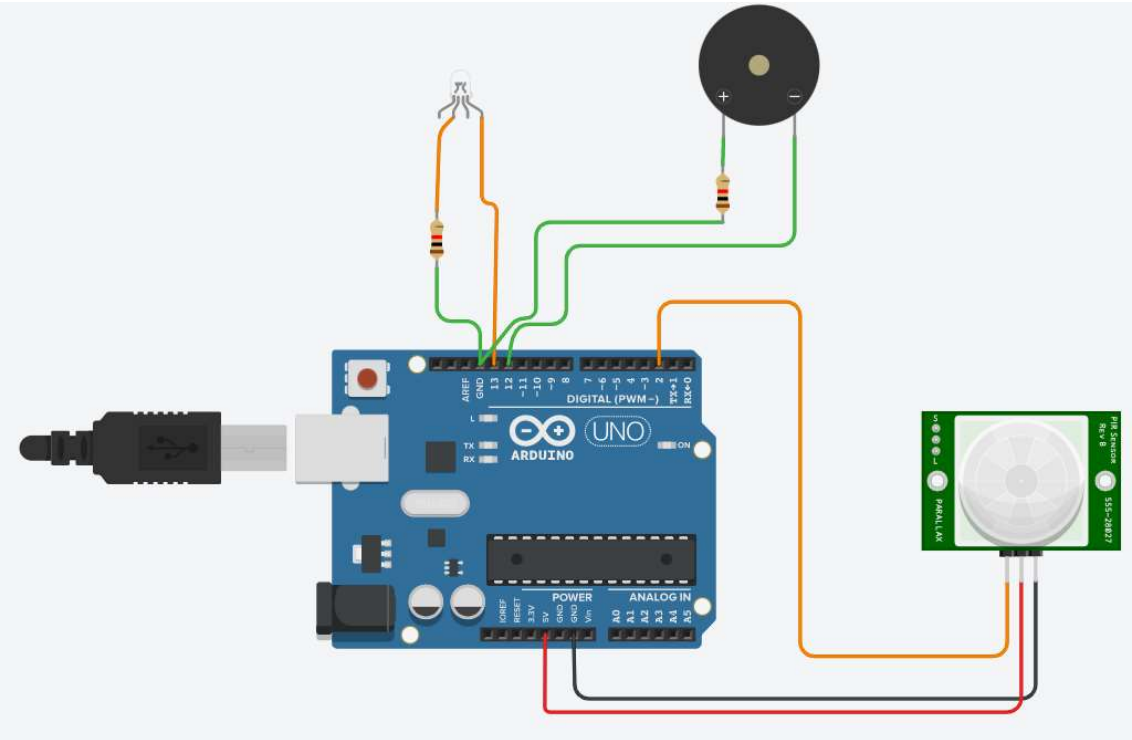
**Aim: Develop Python code for testing the sensors.**

**Step 1:** Place the following component in TinkerCad.

Components:

- PIR
- Resistor
- Piezo
- Arduino Uno R3
- LED RGB(Light)

**Step 2:**Connect the component as per below snapshot.




**Source code:**

```
int pirsensor = 0;
void setup()
{
pinMode(2, INPUT);
pinMode(12, OUTPUT);
pinMode(13, OUTPUT);
}
void loop()
```

```
{
pirsensor = digitalRead(2);
if (pirsensor == HIGH)
{
digitalWrite(13,HIGH);
tone(12,500,500);
}
digitalWrite(13,LOW);
}
```

**Output:**