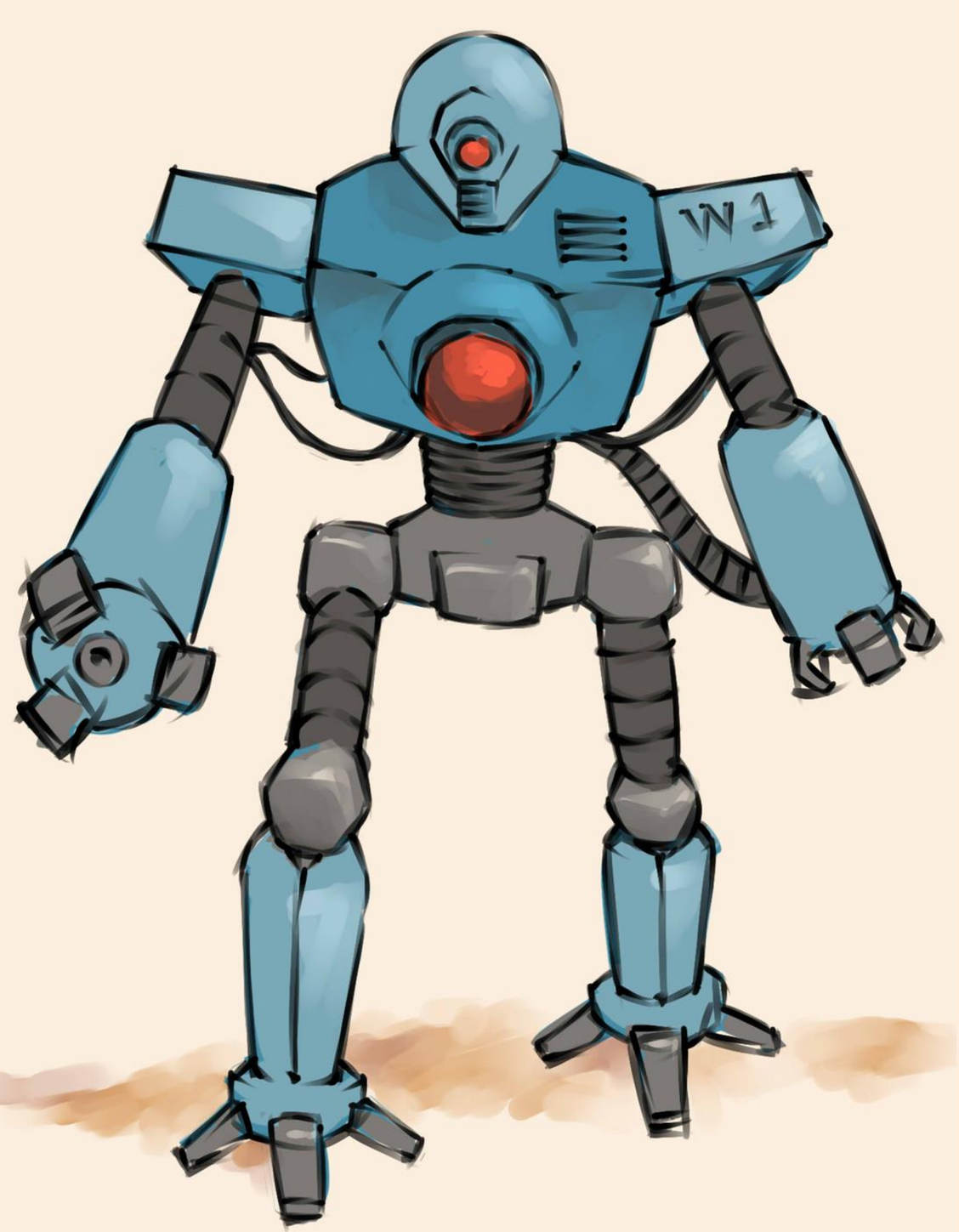


Patrol Robot to improve Safety in Blindspots

OUR TEAM

962219205003 : AJITH B

962219205012 : ASHISH A L

962219205026 : LIJISH WILSON S

962219205037 : SHAN PIEO WESLEY A

GUIDED BY:

Dr. ANNROSE J

B.TECH,M.E,Ph.D

PROBLEM DESCRIPTION

- According to the National Crime Records Bureau, India's crime rate (crime incidence per 100,000 of the population) dropped from 487.8 in 2020 to 445.9 in 2021.

- It is to be noted that majority of this incidents take place in places where it is impossible to establish a camera system.

- Even if the majority of locations in India are monitored, there are still blind spots, which thieves exploit. causing the people to suffer. Additionally, most people don't feel secure going for a walk..

- In accordance with this and to ensure public safety, we are proposing a patrol robot for surveillance of the blind spot.

LITERATURE SURVEY

No	Title	Author/year	Method	Summary	Drawbacks
1	Night Patrolling Device Using IOT	Nishant Gadhawe, Bhushan Kohade, Sameer Dongre/2008	ESP 32- Technique	The Night watching mechanical vehicle moves during an irregular way while watching or catching pictures through a webcam. It utilizes Arduino, ESP32, IR sensors, DC Motors, ESP8266 camera module.	The Night watching mechanical vehicle moves during an irregular way while watching or catching pictures through a webcam. It utilizes Arduino, ESP32, IR sensors, DC Motors, ESP8266 camera module.
2	Smart Motion Detection Surveillance Rover with Night Patrolling for Women's Safety and Monitoring	B.N. Divya, Bhargavi Hegde, B.R.Chaithanya, M.T.Moulya Raju, S. Shambhavi /2009	Smart Motion Detection using raspberry pi,open cv	They utilize a surveillance camera with the night vision capacities utilizing raspberry pi and OpenCV. The profound learning method CNN is utilized for abnormality discovery	Limited coverage: Depending on the placement of the sensors and the range of the technology, smart motion detection may have limited coverage. This can leave blind spots that may be exploited by intruders.
3	Night Vision Patrolling Robot for Security Patrolling Using Raspberry Pi	Pavan Kitchagiri, Saitharun Vaddi, Shyamsundar Rao Rajanala, Bharathvenkatavarma Manthena /2021	Raspberry Pi , IR to follow path	The mechanized vehicle moves at express ranges and outfits with night vision camera and sound sensors. It gets and begins imparting the photographs of circumstance quickly on sound or human face conspicuous evidence.	A night patrol robot requires long battery life, and Raspberry Pi devices are known to consume more power compared to other microcontrollers.

LITERATURE SURVEY

No	Title	Author/year	Method	Summary	Drawbacks
4	NIGHT VISION PATROLLING NAVIGATION SYSTEM FOR WOMEN'S SAFETY	Dr. Rohith S, Ms.Brunda R, Ms.Arbin Taj, Ms.Challa Nandini Reddy /2009	Navigation System using Camera	Robot can hear anything strong in the space then begins moving towards the sound in its predefined way. It then examines the region utilizing its camera to identify any human face. It catches and begins sending the pictures to the server	Depending on the navigation system, there may be a risk of over-reliance on technology.
5	Night Vision Patrolling Rover Navigation System for Women's Safety Using Machine Learning	K. Gopalakrishnan, S. Thiruvenkatasamy , E. Prabhakar and R.Aarthi /2009	Machine Learning using precission algoritm	Calculations like Boosting, Bagging, Stacking and Enhanced reweight part in Ensemble are utilized. Disarray lattice with individual classifier precision is considered for evaluating the outcomes.	There may be ethical considerations around the use of machine learning systems for security purposes.
6	Iot Based Night Patrolling Robot for Women Safety	A Raganna, Nithesh k , Neha B, Omchandra V Shrivastav , Praveen T Musaguppi /2010	GSM , arduino and GPS module.	GSM , arduino and GPS module.	GSM modules can be relatively expensive, and adding them to the night patrolling robot could increase the overall cost of the project.

LITERATURE SURVEY

No	Title	Author/year	Method	Summary	Drawbacks
7	Raspberry pi Controlled Night Vision Patrolling Robot	Nagadeepa , Ganesh V N , Kavya , Aishwarya, Aswathi /2010	Fightback app sending alert sms and Flash framework for receiving live video stream	It goes along a predetermined line. The accompanying IR- based way framework is utilized to watch the allotted field. It rapidly begins recording and transferring photos of the circumstance in the wake of identifying a sound or a human face.	The IR sensors has short range
8	Women Safety Night Patrolling Robot	Komal Muraskar, Devendra Bire, Sakshi Dafare, Renuka Bhoyar /2011	Vision system ,IoT technology and Node MCU equipped with NVC	This gadget is very versatile and can be set off by the casualty being attacked simply by tapping the button to catch the aggressor's picture through the Raspberry pi camera.	The robot may create false alarms.
9	Women Night Vision Patrolling Robot	Poojari Manasa, K. Sri Harsha, Deepak D M, Karthik R /2012	Night vision camera, Sound sensor,Blynk Android program using Iot	The camera utilized in this proposed framework has 360-degree turning highlight, It examines the region utilizing the camera and it perceive the human face found.. IOT neighborhood (LAN) is utilized to sent pictures.	Vision robots may require specific lighting conditions

LITERATURE SURVEY

No	Title	Author/year	Method	Summary	Drawbacks
10	WOMEN'S SAFETY SYSTEM USING RASPBERRY PI	V.Saravanan Perumal, R.Charulatha, M.Kavipriya, R.Kowsalya /2012	screaming alarm , Tear gas , Live Streaming Video .	This is like a band on the wrist consolidated with pressure switch as an info which when initiates shows the outcome. Send area and messages to the crisis contacts also utilizes live web based video	Requires band to trigger the activity
11	Implementation of spy robot for a surveillance system	Ghanem Osman Elhaj Abdalla T. Veeramanikandasamy /2017	Night vision pi camera , PIR(passive infrared sensor)	The information regarding the detection of living objects by PIR sensor is sent to the users through the web server and pi camera capture the moving object which is posted inside the webpage simultaneously. The user in control room able to access the robotwithwheel drive control buttons on the webpage.	PIR sensors have a limited detection range, typically up to 30 feet
12	Design and Implementation of an IoT Based Patrol Robot	Adnan Amir;Aaryaman Chandgothia;Moksh Goel /2012	Ultrasonic sensor (obstacle detection system) and proximity sensor (detect the object)	The bot, as a single unit or a team of up to 4 units, makes use of technologies like perception, path following, IoT-based Twitter alerts, and camouflage to patrol a typical commercial setting such as a retail store at night.	Path following robots may be affected by changes in lighting conditions or other environmental factors

Outcome of Literature Survey

- In the existing system, robot has to be controlled remotely where the person has to monitor the area using remote control and more human resource is needed for this operation of the patrol robot.

- Some systems require a smart phone for controlling the night vision robot.

- Some use local host webpage hence the control range is limited to local network range. Lacking of few parts, autonomous operation requires work force to operate.

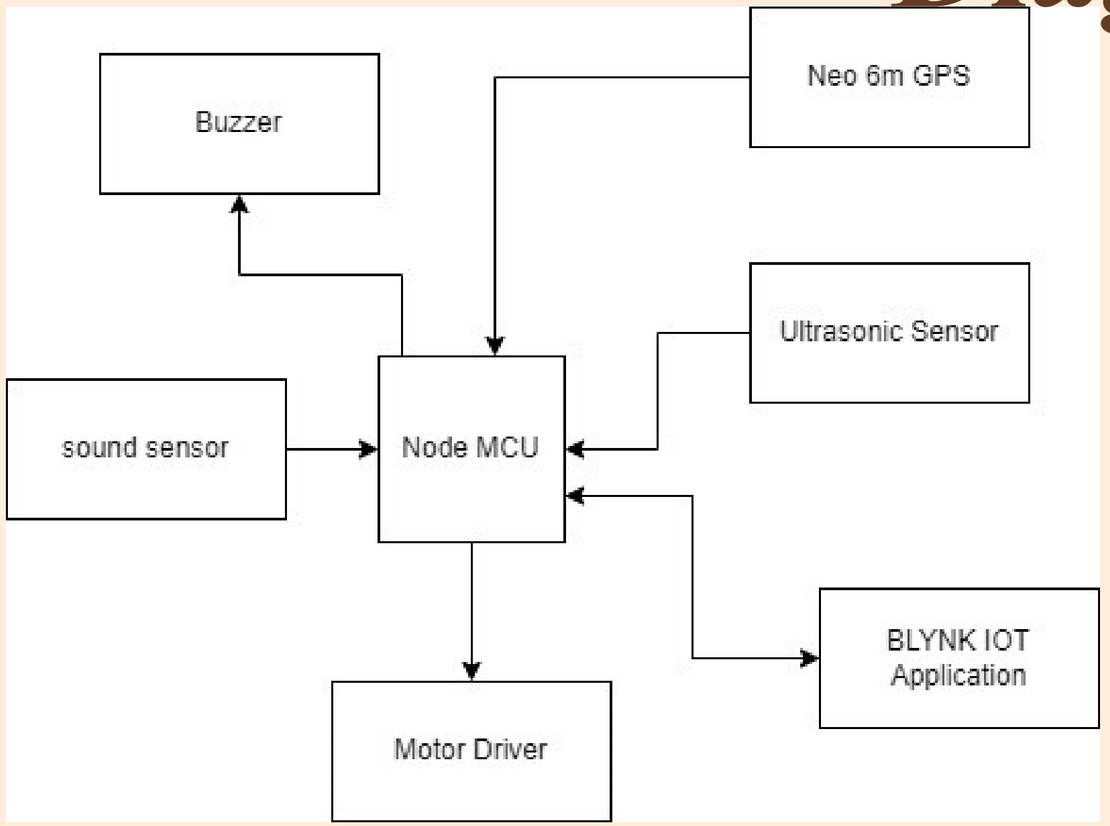
Proposed System

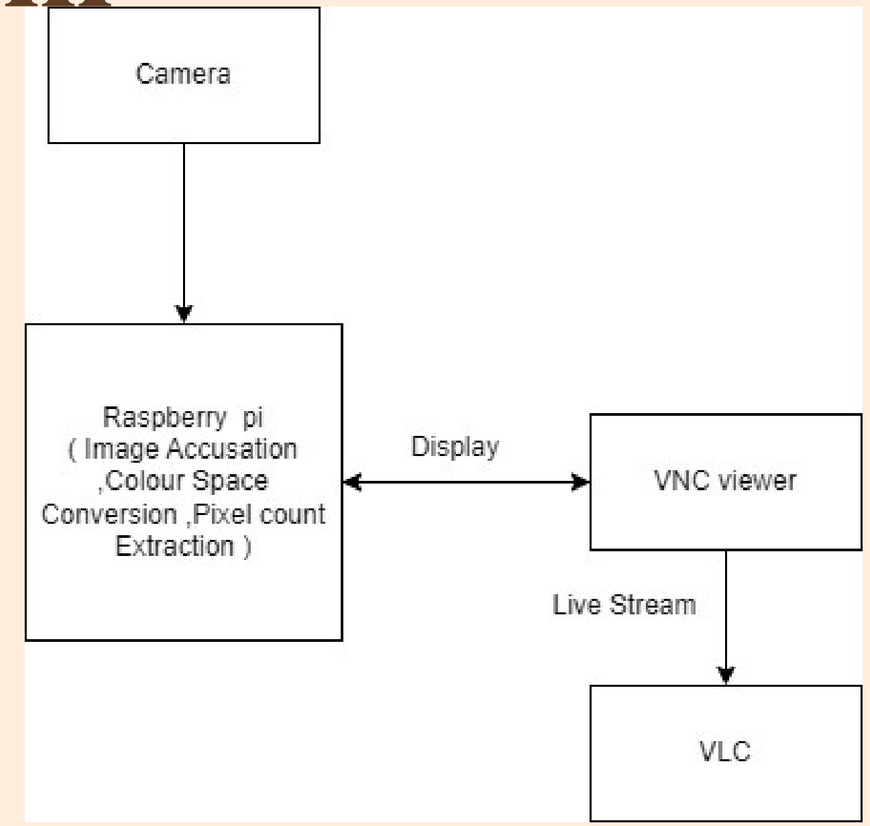
- The majority of locations in India are monitored, and there are rare occasions when the system will not be effective. Additionally, thieves benefit from this blind area. And this problem is what our project is addressing.

- Our model has the ability to patrol the area and can avoid obstacles without colliding. The majority of the time, it patrols the area. If a sound is heard, the device stops and gives the control room the live location and streaming information. Our robot may be manually operated from the control room as well.

- Object detecting technology is also included in the Patrol robot's setup. We must practice it on prospective suspects. We have to train it with potential suspects' data. As a result, whenever it patrols or in any other circumstance, if the suspect is captured on camera, it will report the name and other information to the control center. Therefore, the suspect is caught sooner.

Block Diagram





Module 1

Module 2

COMPONENTS

Hardware

- Raspberry PI: 3B+ model
- Node MCU ESP32
- Ultrasonic sensor
- DC Motor: 12 volts (4 motors)
- Motor Drivers
- Raspberry PI CAM
- Lithium battery: 6AH (2 batteries)
- Sound Sensor
- GPS Module + Antenna
- Power Supply Unit 12v, 5v, 3.5v.

Software

- Processor: i5 9th generation
- RAM: 8GB
- Raspberry Pi Configuration
- Raspberry RAM: 1GB
- Model: 3B+
- Processor speed: 1.4 GHz
- Number of cores: Quad Core
- Blynk Application
- VNC Viewer

Raspberry Pi

- Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation.

- It was designed with the aim of promoting the teaching of basic computer science in schools and developing countries.

- Raspberry Pi boards are used for a variety of purposes, including education, robotics, media centers, servers, and more.

Gps + Gps Antenna

- GPS is live location tracking.
- Best example: navigation systems or online map services, starting with Google Maps.
- GPS antenna is a device designed to receive and amplify the radio signels transmitted on specific frequencies by GPS satellites and convert them to an electronic signal for use by a GPS receiver.
- The output of the GPS antenna is fed into a GPS receiver that can compute the position.

Motor Driver

- A motor driver IC is an integrated circuit chip that controls motors in autonomous robots and embedded circuits.
- L293D and ULN2003 are the most commonly used motor Driver IC that is used in simple robots and RC cars.
- Motor drivers acts as an interface between the motors and the control circuits.

Ultrasonic Sensor

- An ultrasonic sensor is a type of sensor that uses high-frequency sound waves to detect the distance, presence, or absence of objects.
- It works by emitting a burst of ultrasonic waves, which bounce off the object and are then detected by the sensor.
- Based on the time it takes for the waves to bounce back to the sensor, the sensor can calculate the distance to the object.

12v DC Motor

- 12 volt DC motor is a rotary motor which can convert the direct current into mechanical energy or convert mechanical energy into DC power.

- DC motors take electrical power through direct current, and convert this energy into mechanical rotation.

- DC motors use magnetic fields that occur from the electrical currents generated, which powers the movement of a rotor fixed within the output shaft.

Raspberry Pi Camera

- The Raspberry Pi Camera Board is a custom designed add-on module for Raspberry Pi hardware. It attaches to Raspberry Pi hardware through a custom CSI interface. The sensor has 5 megapixel native resolution in still capture mode.

- The Pi camera module is a portable light weight camera that supports Raspberry Pi. It communicates with Pi using the MIPI camera serial interface protocol.

- It is commonly used in surveillance drones since the payload of camera is very less. Apart from these modules Pi can also use normal USB webcams that are used along with computer.

Sound Sensor

- The sound sensor is one type of module used to notice the sound. Generally, this module is used to detect the intensity of sound. The applications of this module mainly include switch, security, as well as monitoring.

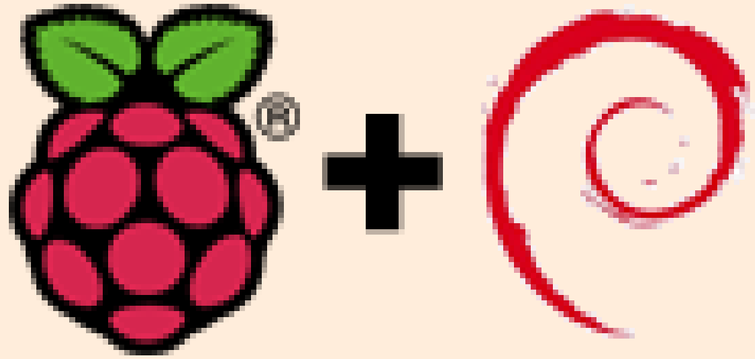
- The accuracy of this sensor can be changed for the ease of usage.This sensor employs a microphone to provide input to the buffer, peak detector and an amplifier.

- This sensor notices a sound, & processes an o/p voltage signal to a microcontroller. After that, it executes required processing.

- This sensor is capable of determining noise levels within DB’s or decibels at 3 kHz 6 kHz frequencies approximately wherever the human ear is sensitive.

Raspbian Os

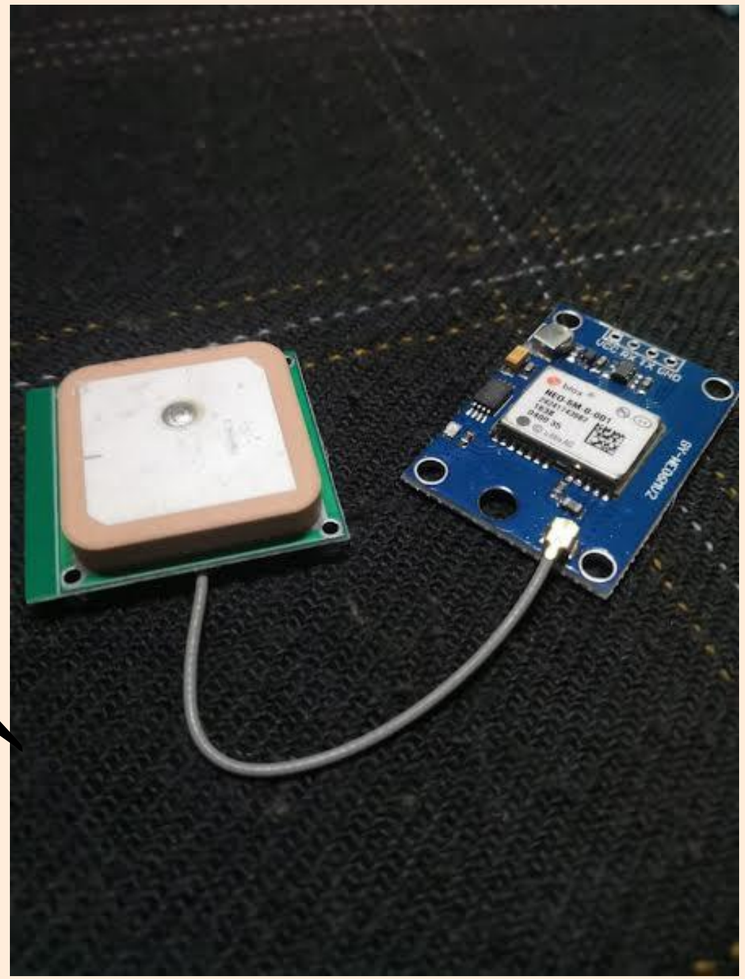
- Raspbian is a Debian-based engineered especially for the Raspberry Pi and it is the perfect general-purpose OS for Raspberry users.
- It employs the Open box stacking window manager and the Pi Improved Xwindows Environment Lightweight coupled with a number of pre-installed software which includes Minecraft Pi, Java, Mathematica, and Chromium.
- Raspbian is the Raspberry foundation’s official supported OS and is capable of accomplishing any task you throw at it.



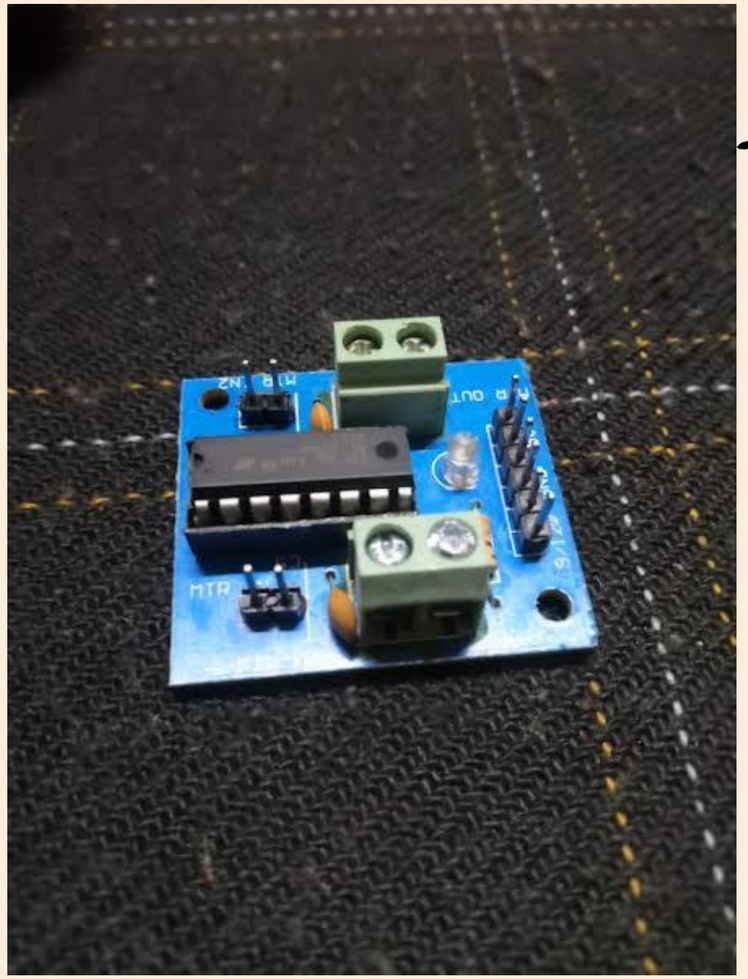
Components

Raspberry Pi

Gps + Gps antenna

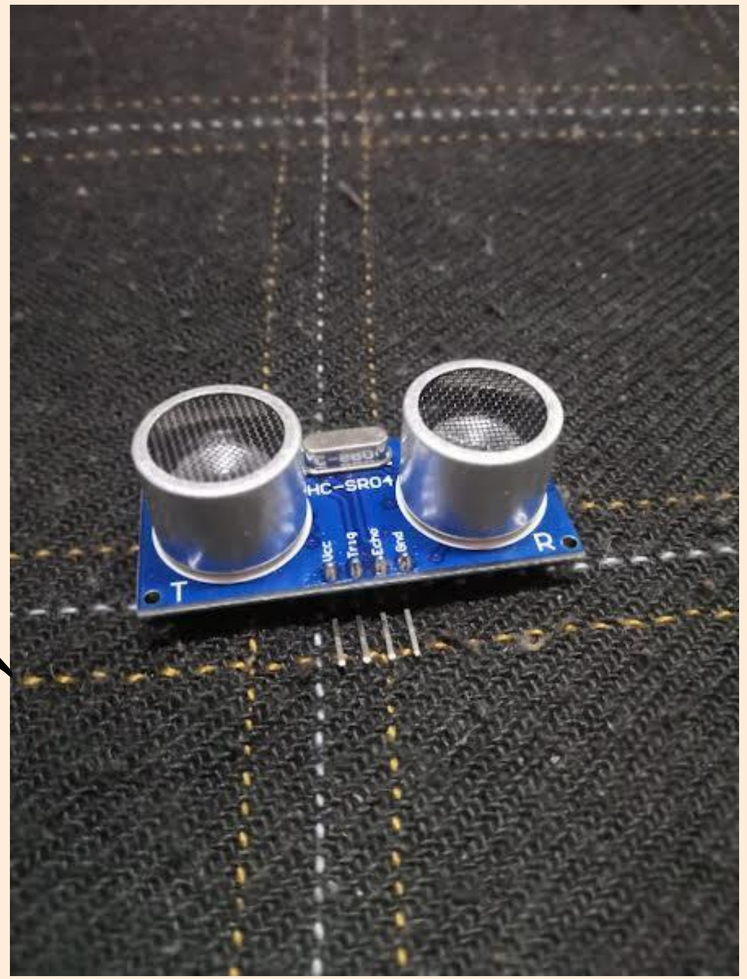


Components

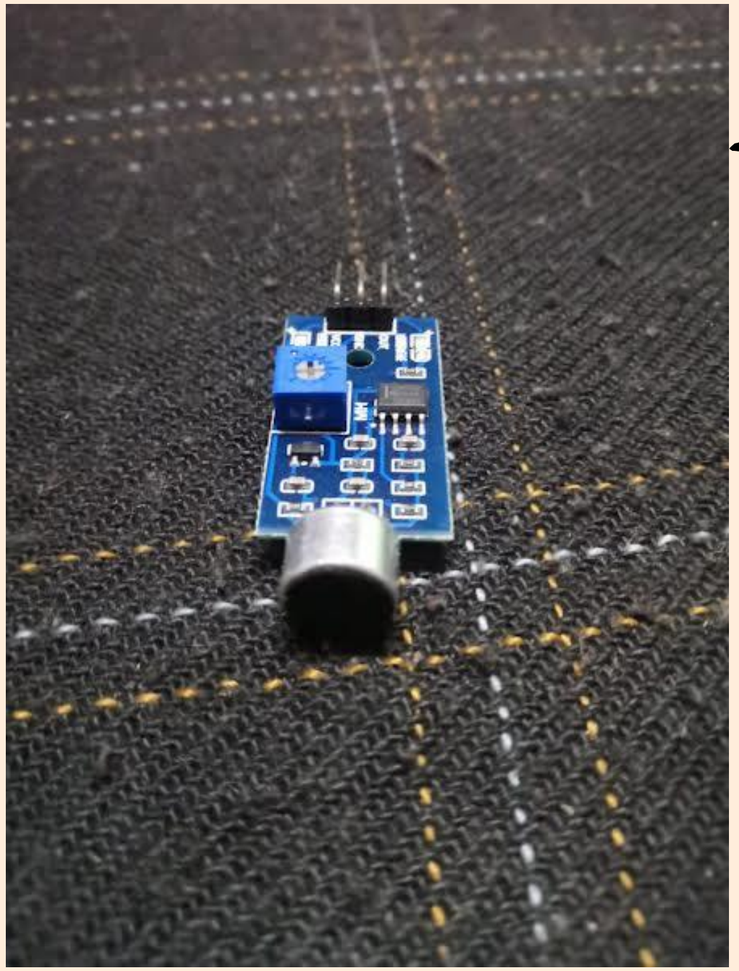


Motor Driver

Ultra Sonic Sensor



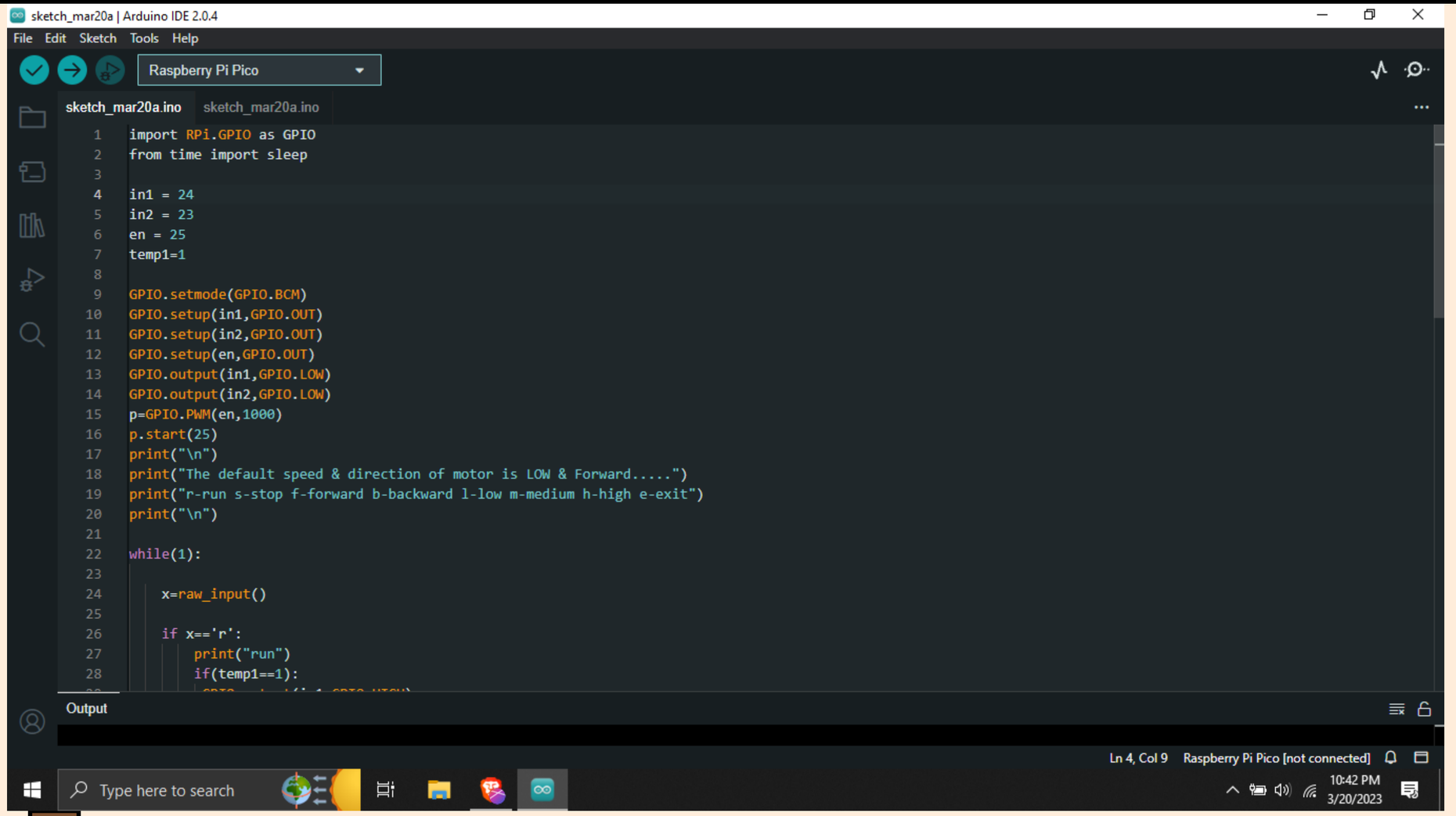
Components



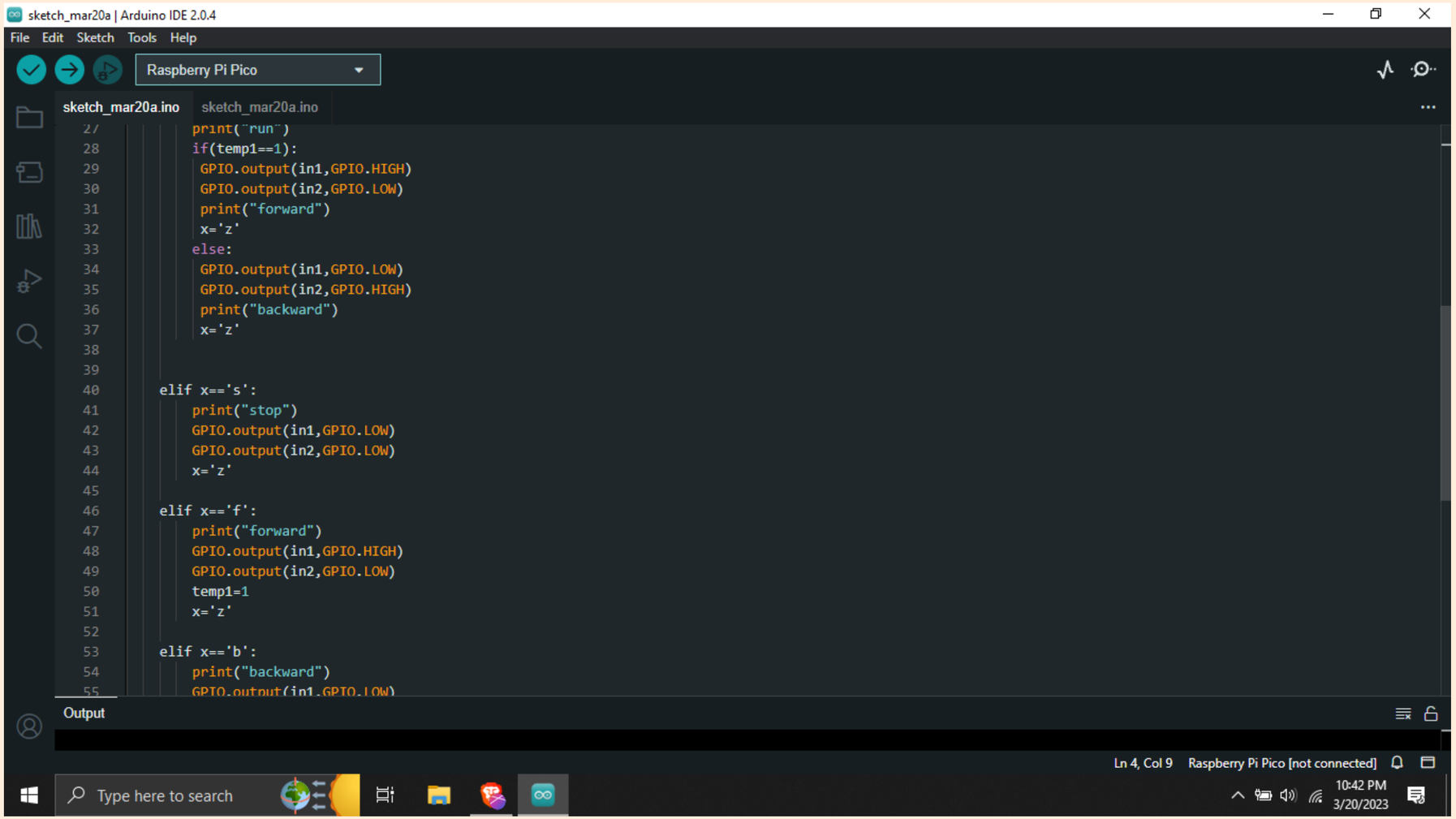
Sound Sensor

12V DC Motor

Code


sketch_mar20a | Arduino IDE 2.0.4
File Edit Sketch Tools Help
Raspberry Pi Pico
sketch_mar20a.ino
sketch_mar20a.ino
1 import RPi.GPIO as GPIO
2 from time import sleep
3
4 in1 = 24
5 in2 = 23
6 en = 25
7 temp1=1
8
9 GPIO.setmode(GPIO.BCM)
10 GPIO.setup(in1,GPIO.OUT)
11 GPIO.setup(in2,GPIO.OUT)
12 GPIO.setup(en,GPIO.OUT)
13 GPIO.output(in1,GPIO.LOW)
14 GPIO.output(in2,GPIO.LOW)
15 p=GPIO.PWM(en,1000)
16 p.start(25)
17 print("\n")
18 print("The default speed & direction of motor is LOW & Forward.....")
19 print("r-run s-stop f-forward b-backward l-low m-medium h-high e-exit")
20 print("\n")
21
22 while(1):
23
24 x=raw_input()
25
26 if x=='r':
27 print("run")
28 if(temp1==1):
Output
Ln 4, Col 9 Raspberry Pi Pico [not connected]
Type here to search
10:42 PM
3/20/2023

Code


sketch_mar20a | Arduino IDE 2.0.4
File Edit Sketch Tools Help
Raspberry Pi Pico
sketch_mar20a.ino
sketch_mar20a.ino
print("run")
if(temp1==1):
GPIO.output(in1,GPIO.HIGH)
GPIO.output(in2,GPIO.LOW)
print("forward")
x='z'
else:
GPIO.output(in1,GPIO.LOW)
GPIO.output(in2,GPIO.HIGH)
print("backward")
x='z'
elif x=='s':
print("stop")
GPIO.output(in1,GPIO.LOW)
GPIO.output(in2,GPIO.LOW)
x='z'
elif x=='f':
print("forward")
GPIO.output(in1,GPIO.HIGH)
GPIO.output(in2,GPIO.LOW)
temp1=1
x='z'
elif x=='b':
print("backward")
GPIO.output(in1,GPIO.LOW)
Output
Ln 4, Col 9
Raspberry Pi Pico [not connected]
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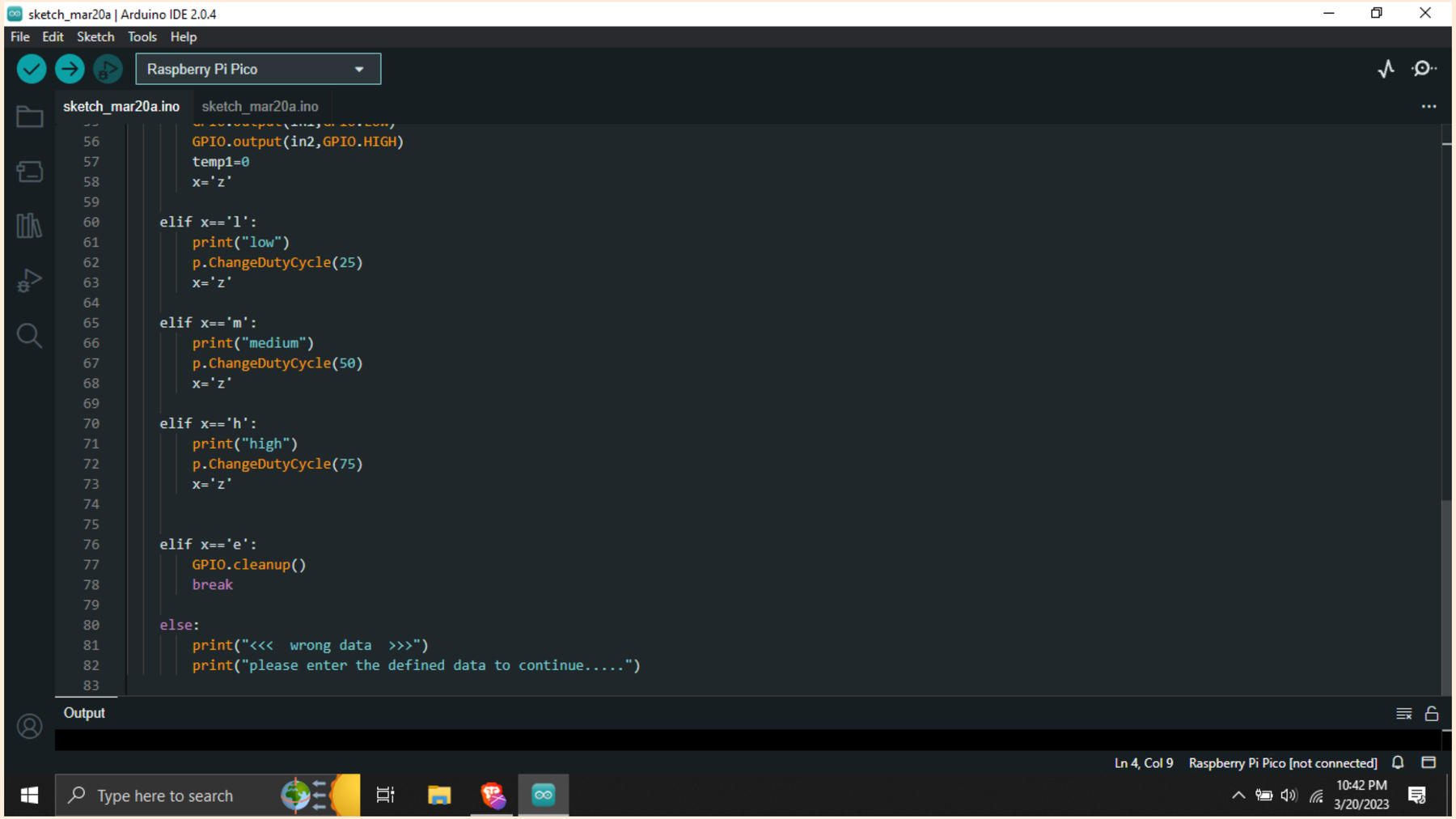
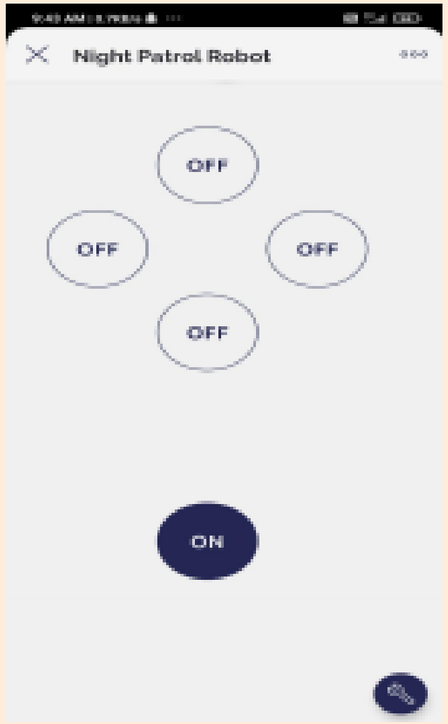
3/20/2023

Code


sketch_mar20a | Arduino IDE 2.0.4
File Edit Sketch Tools Help
Raspberry Pi Pico
sketch_mar20a.ino
sketch_mar20a.ino
GPIO.output(in2,GPIO.HIGH)
temp1=0
x='z'
elif x=='l':
print("low")
p.ChangeDutyCycle(25)
x='z'
elif x=='m':
print("medium")
p.ChangeDutyCycle(50)
x='z'
elif x=='h':
print("high")
p.ChangeDutyCycle(75)
x='z'
elif x=='e':
GPIO.cleanup()
break
else:
print("<<< wrong data >>>")
print("please enter the defined data to continue.....")
Output
Ln 4, Col 9 Raspberry Pi Pico [not connected]
Type here to search
10:42 PM
3/20/2023

Results



Conclusion

- The patrol robots for improving Public safety in blind spots is a viable solution that can significantly reduce the incidence of crimes against people in public spaces. The robot is equipped with technologies such as sensors, cameras, and other detection tools to monitor blind spots and detect any suspicious activity.

- In future enhancements, we can fit ultrasonic sensors on all four sides to improve obstacle avoidance and install an IR or night vision camera to improve efficiency at night. We can also make the camera rotate 360° to improve coverage.

- We can also integrate both modules to work simultaneously. Finally, we can make a coating to protect the equipment from getting damaged by rain..Overall, the patrol robot is a promising solution for improving public safety in blind spots.

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Thank You!