Department of Electronics Communications Engineering
19ECL39Mini Project -I

REPORT ON

HUMAN FOLLOWER ROBOT USING ARDUINO

Submitted by
MOHAMMED SHARUK M S 1NH21EC420
CHAITRAVATHI MAMADAPUR 1NH21EC423
SRINIVASA V   1NH21EC424

Under the Guidance of
Ms. SALNA JOY
Assistant Professor

The framework is delivered in part to the fulfillment of the requirements
To receive a degree award for

BACHELOR OF ENGINEERING
in
ELECTRONICS AND COMMUNICATIONENGINEERING

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
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NEW HORIZON
COLLEGE OF ENGINEERING

Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NBA and NAAC with Grade "A"
New Horizon Knowledge Park, Ring Road, Bellandur Post, Bengaluru 560 103

BONAFIDE CERTIFICATE

This is to confirm that the project report titled, "Human follower robot uses arduino" is a real record of the work of the following people who did the Small Project work under my direction between 2021-2022:

MOHAMMED SHARUK M S	**1NH21EC420**
CHAITRAVATHI MAMADAPUR	**1NH21EC423**
SRINIVASA V	**1NH21EC424**

The framework was submitted by completing part of the merit award requirements for

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IN THE MIDDLE

ELECTRONICS AND COMMUNICATION ENGINEERING

New Horizon College of Engineering, Bangalore of Visvesvaraya Technological

University, Belgaum during the odd semester, academic year 2021-22 .

It is certified that all the corrections / suggestions indicated for Internal Assessment have been incorporated in the report deposited in the department library. The project report has been approved as it satisfies the academic requirements in respect of project phase I work prescribed for said Degree.

Signature of Project Guide

Ms. Salna joy

Signature of Head of Department

Dr. Sanjeev Sharma

Signature of Principal

Dr. Manjunatha

Semester End Examination held on _____

11·D7 — 28/3/22

(Internal Examiner)

28/3/22

(External Examiner)

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1. INTRODUCTION

Robot era has grown incredibly within the previous couple of years. Such invention Turned into only a dream for a few human beings a few years ago. But on this speedy transferring world, there may be now a need for a robot like "A Human Following Robot" that can work together and exist. The improvement of robot generation has Significantly elevated due to industrial, scientific, and military applications. In diverse Sectors with hard terrain together with underground mines, navy bases, scientific, Creation, exploration etc. man-made paintings may be very risky. The lives of helpers also are at stake. Human sports have their limits in many methods. Which will see past Human obstacles in imaginative and prescient, pace, consistency, flexibility, high-quality and so on. We need to use robots. A key requirement for these robots is their capacity to look people and to communicate in a non-technical manner. The primary cause of this dissertation is to make a robot that could assist humans with numerous responsibilities. In this paper, we introduce the prototype of a human-guided robot that makes use of Arduino Uno and diverse sensors to detect and tune an item. The

Robot should have the following objectives:

- The robotic have to be capable of music someone correctly.
- It need to have the ability to turn one of a kind tiers.
- The robotic must not ignore natural gadgets inclusive of noise.

With this advanced era, the robot have to be capable of detect and music humans. A Robot which can hit upon and music someone or an impediment within a sure distance is called a 'Human monitoring robot'. Robots are used to transform human's lives and make human's lives exceptional. A time-consuming buying robot that handles things, and tracks human beings with none very useful remote manipulate. A robot that can be used in the sanatorium to deliver medication more as it should be and quickly. A human-eye robot has many capabilities which includes a wheelbarrow, a clinic circulate, a small automobile basket, and so forth. Now on this converting world, human beings have began to stay with robots who comply with robots to stay a life of luxury. This venture is referred to as a human primarily based robot due to the fact it can song human beings with the assist of IR Sensors and may be gift with the aid of interacting with people and supporting human Beings in any type of interest with more accuracy and less time.A human-powered robot also can be used in protection and to carry weapons to the military. This sort of robotic can hit upon barriers and those automatically and can be used within the destiny in our cars. The next human-to-human robot can be programmed to be more efficient and efficient. This robot can be upgraded

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2. COMPONENTS REQUIRED

- *Arduino Uno*

- *L293D Motor driver*

- *Infrared sensors*

- *Ultrasonic sensor*

- *Servo motor*

- *four DC Geared engines*

- *four wheels*

- *robot chassis*

- *Jumping cables*

- *108650 batteries*

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2.1 COMPONENTS DESCRIPTION

ARDUINO UNO

It is the brain of our undertaking. It can provide all of the command in its Lower components to be implemented to human conduct. It also gives Feedback to other sections and those. To be used as a method of verbal Exchange among human beings and robots and vice versa. . Arduino Uno is a Mega328 microcontroller input voltage is 7v- 12v. And 14 virtual inputs and Outputs pin 6 analog inputs. It has 8 bit CPU specification, sixteen MHZ clock Pace, 2 KB SRAM 32 KB flash memory, 1 KB EEPROM.
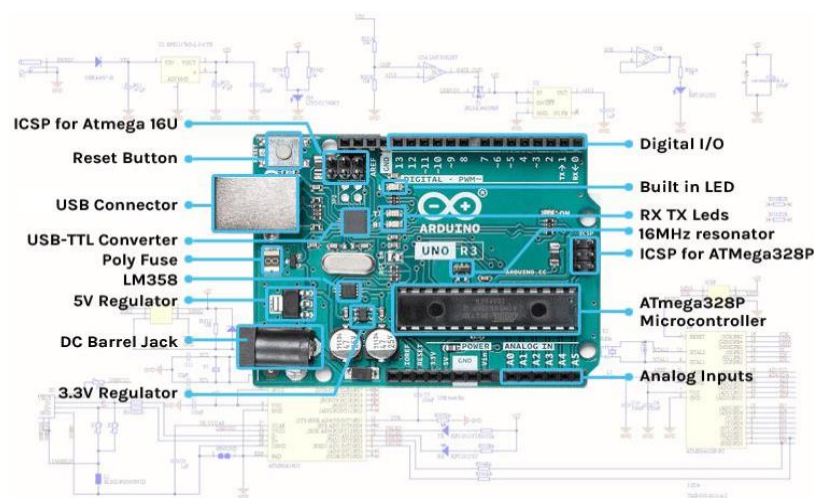

ULTRASONIC SENSOR

Ultrasonic sensor is a device that measures distance to an item the usage of ultrasonic Sound waves. The running device of this module is easy, it sends an ultrasonic pulse Out at 40kHz that travels thru the air and if there is an impediment or item, it's going to Return to the sensor. By way of calculating journey time and sound pace, distance may be calculated.
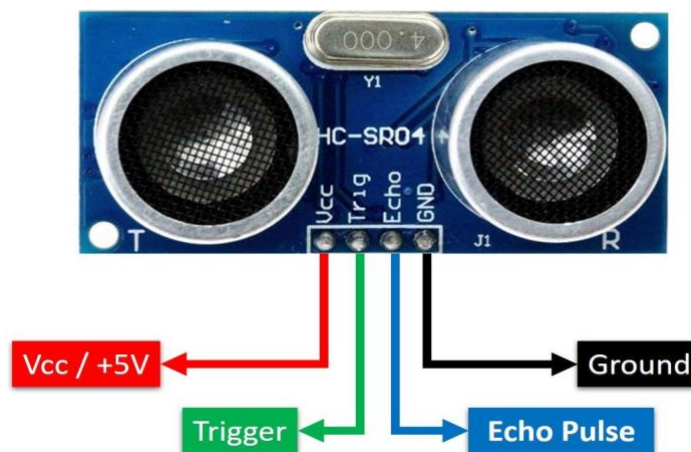
IR SENSOR

An IR sensor is an electronic device, which emits mild to sense some thing inside the Surroundings. The IR sensor can sense degree of temperature of an object and hit upon Movement. Normally, inside the infrared spectrum, all materials emit a certain form of Radiation.
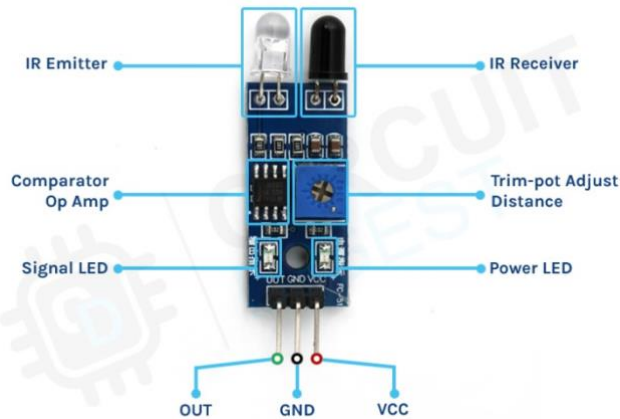
MOTOR DRIVER

Motor drivers acts as an interface between the motors and the control circuits. Motor require high amount of current whereas the controller circuit works on low current signals. So the function of motor drivers is to take a low-current control signal and then turn it into a higher-current signal that can drive a motor.
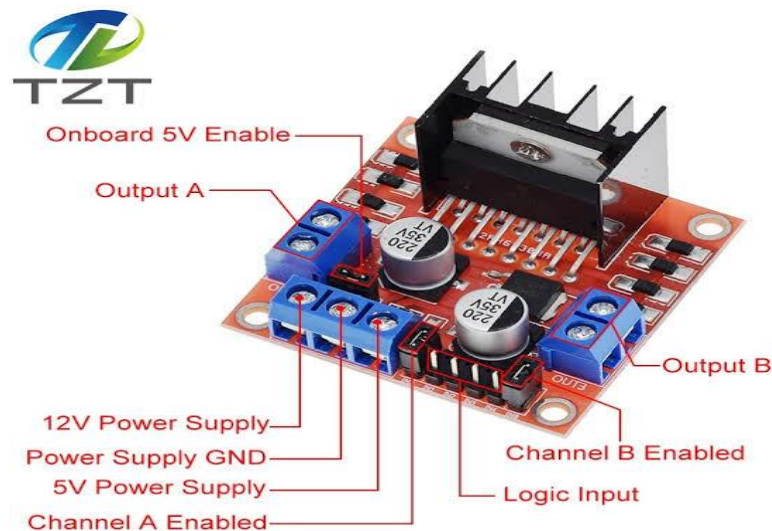
DC MOTOR

DC Motor is a device that converts any sort of strength into mechanical power or Affords movement. In constructing a robotic, the engine frequently plays an critical Position in supplying robotic motion. Right here a 4 DC motor is used to power a robot .The servomotor is a rotator or linear actuator, those bikes pass with angular Movement, speed and acceleration Engines had been used to turn two wheels to the clock or opposite the clock. This Offers the robotic movement.

WHEEL

Wheels are used for the movement of robot.

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2.2 COST ESTIMATION

- Microcontroller board – Arduino Uno: 800
- Ultrasonic Sensor – HCSR04:   50
- IR Sensors: 2*50:   100
- Motor driver: 125
- DC Motor: 4*58:   228
- Jumping wires: Lump sum: 40
- Wheels :   4*25:   100
- Batteries: 2*80:   160
- Others: :   100

Total Cost: 1703 Rs

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3. METHODOLOGY

A human following robot has two building stages: hardware and software.

Hardware

First, we have to build a frame or chassis as per the requirement now arrange the component in chassis as per The circuit diagram. Now connect trigger pin to A2 number pin in Arduino, now connect Echo pin to A1 of the Arduino. Likewise left IR sensor is connected to the A3 pin of the Arduino board, the servo motor is connected To PIN10 of Arduino. Likewise, the motor driver(L293D) has 16 pins, first, 1,8,9 and 16 pins of the motor driver Are connected to +5 volt pin and 4,5,10 and 11 pins of the motor driver are connected to the ground pin. Similarly PIN 2 of the motor driver is connected to the PIN 4 of Arduino, and PIN 7 of Arduino is connected to PIN 10 of the motor driver, and now PIN 8 of Arduino is connected to the PIN 15 of the motor driver pin . Likewise in motor, motor1 is connected to the 1 and 2 pins of the motor drive shield. And now, similarly motor2 Is connected to 3 and 4 pins of the motor driver shield , and now motor3 connects to 5 and 6 pins of the motor Driver. And last one motor4 connect to 7 and 8 of the motor driver pins.

Software

To make the hardware parts work or run, it should be programmed through the required software like Arduino IDE . Since the microcontroller at first will not be having any program, if we also build up the hard ware it will not have the capability to work or run due to lack of instructions which is provided by a program. There fore we need a software to upload the program on any microcontroller. To implement the task all three Section are taking and giving information. Sensor module parts it sense data and provide it to the Microcontroller chip.

Microcontroller part software take all data from the all sensor and saving to the corrected path. According to the data input the microcontroller parts giving the necessary input for the motor control section to guiding and Run the motor for working. Since we are using Arduino microcontroller we have to use Arduino IDE software to Write and upload program in microcontroller.
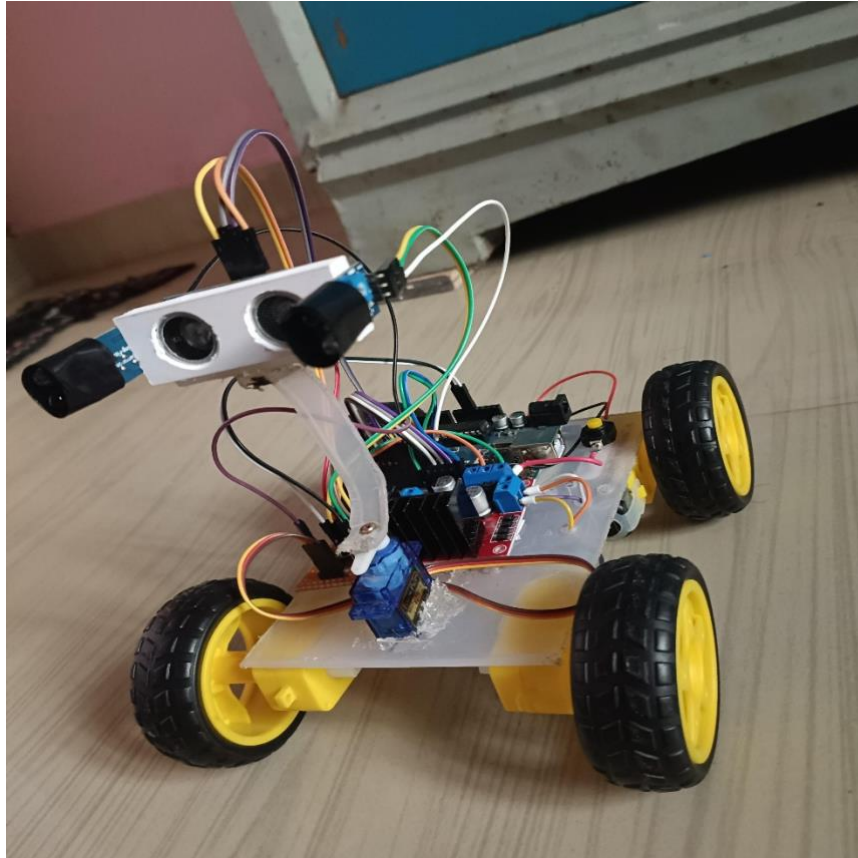
3.1HARDWARE PICTURE
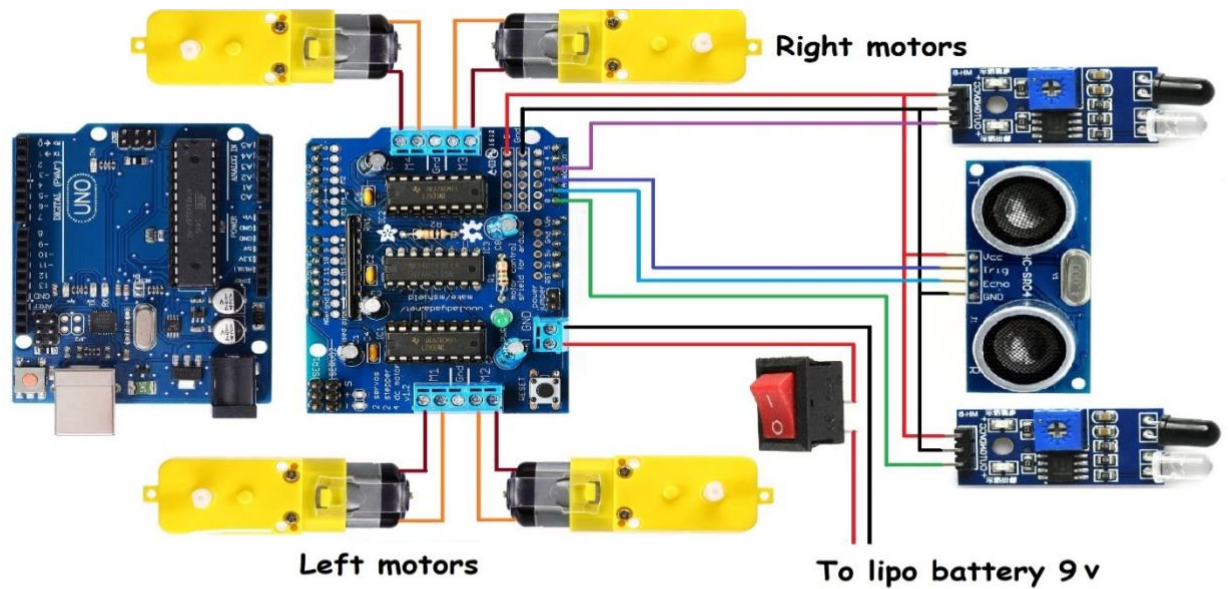
Our model

3.2 PROGRAM CODE

```
// Pin Numbers: L298N Motor Driver

#define LeftMtr_Pin1 5     //Connect to IN1 of L298N, Left Motor Pin1

#define LeftMtr_Pin2 4     //Connect to IN2 of L298N, Left Motor Pin2

#define RightMtr_Pin1 3    //Connect to IN3 of L298N, Right Motor Pin1

#define RightMtr_Pin2 2    //Connect to IN4 of L298N, Right Motor Pin2

#define ENA_Pin 11         //Connect to ENA of L298N

#define ENB_Pin 10         //Connect to ENB of L298N


// Pin Numbers: Ultrasonic Sensor

#define US_Trig_Pin 6   // (OUTPUT) Connect to Trig pin

#define US_Echo_Pin 7   // (INPUT)  Connect to Echo pin


// Pin Numbers: Obstacle IR

#define LeftIR_Pin 12  // (Input) Connect to Obstacle Sensor.
```

```
#define RightIR_Pin 8  // (Input) Connect to Obstacle Sensor.


// Variables:
Int distance;
Bool leftIR_State;
Bool rightIR_State;


Void setup() {
  /* Define Output Pins: */
  pinMode(LeftIR_Pin, INPUT);
  pinMode(RightIR_Pin, INPUT);


  pinMode(US_Trig_Pin, OUTPUT);
  pinMode(US_Echo_Pin, INPUT);


  pinMode(LeftMtr_Pin1, OUTPUT);
  pinMode(LeftMtr_Pin2, OUTPUT);
  pinMode(RightMtr_Pin1, OUTPUT);
  pinMode(RightMtr_Pin2, OUTPUT);
  pinMode(ENA_Pin, OUTPUT);
  pinMode(ENB_Pin, OUTPUT);
  Stop();


  // Establish serial communication:
  Serial.begin(9600);
  Delay(2000);


  analogWrite(ENA_Pin, 100);
  analogWrite(ENB_Pin, 100);
}
```

```
Void loop() {
  Distance = GetUltrasonicDist(US_Trig_Pin, US_Echo_Pin, 2);
  leftIR_State = digitalRead(LeftIR_Pin);
  rightIR_State = digitalRead(RightIR_Pin);

  Serial.print("Distance = ");
  Serial.println(distance);
  Serial.print("Left IR  = ");
  Serial.println(leftIR_State);
  Serial.print("Right IR = ");
  Serial.println(rightIR_State);
  Serial.println();

  If (leftIR_State == 0 && rightIR_State == 1) {
    GoForwardWithLeftSwingTurn();
  } else if (leftIR_State == 1 && rightIR_State == 0) {
    GoForwardWithRightSwingTurn();
  } else if (distance == 0) {
    Stop();
  } else if (distance <= 6) {
    GoBackward();
  } else if (distance > 6  && distance <= 10) {
    Stop();
  } else if (distance > 10 && distance <= 20) {
    GoForward();
  } else if (distance > 20) {
    Stop();
  }
}

// Transmission Control: Turn Off
```

```
Void MotorOFF(int pin1, int pin2) {
 digitalWrite(pin1, LOW);
 digitalWrite(pin2, LOW);
}


// Direction Control: Forward (CW)
Void ForwardDir(int pin1, int pin2) {
 digitalWrite(pin1, HIGH);
 digitalWrite(pin2, LOW);
}


// Direction Control: Backward (CCW)
Void BackwardDir(int pin1, int pin2) {
 digitalWrite(pin1, LOW);
 digitalWrite(pin2, HIGH);
}


Void Stop() {
 MotorOFF(LeftMtr_Pin1, LeftMtr_Pin2);
 MotorOFF(RightMtr_Pin1, RightMtr_Pin2);
}


Void GoForward() {
 ForwardDir(LeftMtr_Pin1, LeftMtr_Pin2);
 ForwardDir(RightMtr_Pin1, RightMtr_Pin2);
}


Void GoBackward() {
 BackwardDir(LeftMtr_Pin1, LeftMtr_Pin2);
 BackwardDir(RightMtr_Pin1, RightMtr_Pin2);
}
```

```
Void TurnLeftPointTurn() {

  BackwardDir(LeftMtr_Pin1, LeftMtr_Pin2);

  ForwardDir(RightMtr_Pin1, RightMtr_Pin2);

}


Void TurnRightPointTurn() {

  ForwardDir(LeftMtr_Pin1, LeftMtr_Pin2);

  BackwardDir(RightMtr_Pin1, RightMtr_Pin2);

}


Void GoForwardWithLeftSwingTurn() {

  GoForward();

  Delay(2);

  MotorOFF(LeftMtr_Pin1, LeftMtr_Pin2);

  Delay(2);

}


Void GoForwardWithRightSwingTurn() {

  GoForward();

  Delay(2);

  MotorOFF(RightMtr_Pin1, RightMtr_Pin2);

  Delay(2);

}


Int GetUltrasonicDist(int trigPin, int echoPin, int n) {

  Int distSum = 0;

  For (int I = 1; I <= n; i++) {

    /* Clear the trig pin by setting it LOW */

    digitalWrite(trigPin, LOW);

    delayMicroseconds(10);
```

```
/* Trigger the sensor by setting the trig pin HIGH for 10 microseconds */

digitalWrite(trigPin, HIGH);

delayMicroseconds(10);

digitalWrite(trigPin, LOW);


/* Read the echoPin. pulseIn() returns the duration (length of the pulse) in microseconds */

Long duration = pulseIn(echoPin, HIGH);


/* Calculate the distance: Distance = Speed * Time

   Speed of sound is 343 metres per second = 0.0343cm per micro second */

distSum += 0.0343 * (duration / 2);


delay(100);
}
Int distance = distSum / n;
Return distance;
}
```

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4. ADVANTAGES, DISADVANTAGES AND APPLICATIONS

Advantages

- Code compatibility and expandability across different Arduino boards
- Cost is less as Arduino is open source
- The schematic of Arduino is open source. So for future enhancement of the project the board can be extended to add more hardware features
- Ultrasonic sensor has large range and can be used in any lighting conditions

Disadvantages

- They Lead Humans to Lose Their Jobs. …
- They Need Constant Power. …
- They're Restricted to their Programming. …
- The Perform Relatively Few Tasks. …

Applications

- It Can assist in carrying loads for people working in airport libraries.
- It can serve people at shopping centre by carrying goods.
- It can assist elderly people ,special children.
- It can used as a bodyguard for humans.

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5. CONCLUSION

The successful implementation of the prototype of the human robotic Following is illustrated on this paper. This robot has no longer only the capacity to discover but additionally the next ability. Throughout the prototype it was additionally saved in thoughts that the operation of the Robotic need to be as a success as possible. Assessments are completed in special conditions to discover errors inside the set of rules and to correct them. The distinct sensors related to the robot supplied extra gain. A human based robot is a automobile system this is capable of stumble on, Circulate, and trade the robot's position

at the problem inside the best manner to stay in its path. This project makes use of Arduino, an engine of different varieties of sensors to attain its aim. The venture challenged the group to collaborate, connect, and growth know-how of electrical device, machinery systems, and their integration with systems. Robots designed to track a person the usage of an Arduino microcontroller. It could comply with someone.

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