GOVERNMENT COLLEGE OF ENGINEERING

YAVATMAL

PROJECT REPORT

ON

HUMAN FOLLOWING ROBOT

SUBMITTED BY

1. TUSHAR GAIKWAD
2. AFTAB SHAIKH
3. RUTUJA DOMB

GUIDED BY

PROF. YOGESH CHAUDHARI

DEPARTMENT OF ELECTRONICS

AND TELECOMMUNICATION ENGINEERING

(2022-2023)

GOVERNMENT COLLEGE OF ENGINEERING YAVATMAL

<u>CERTIFICATE</u>

This is clarify that of 3RD Year Electronics and Telecommunication students have submitted their

Seminar report on

during academic session 2022- 2023 as a part of project work prescribed by Government College

Of Engineering Yavatmal for partial fulfilment for the Degree in Electronics and

Telecommunication.

The Project work is the record of students own work and is completed satisfactorily.

PROF. YOGESH CHAUDHARI   PROF. PRACHI BHAGAT

GUIDED BY   **HEAD OF DEPARTMENT**

ABSTRACT

A robot which can help us in many fields like carrying items, work with more accuracy in lesser time in every kind of works. A robot that can help us in a hospital or bringing medical items in any emergency case will be more helpful for a doctor in emergency cases. This type of robot having so many benefits and it will be helpful in the future. This type of robot can be close to humans is much possible. This useful project is made to attempts to follow the right human or obstacle. In this robot, Infrared sensors are used to move the robot in both the direction and ultrasonic sensor for both the forward and reverse direction. We used the Arduino Uno microcontroller as the brain of this project. This robot is driven with four Dc motors and it is controlled by a motor driver shield with ATmega L293d . The main objective of designing this useful project is to make our life better and luxurious. In this project robotic car sense the human by IR sensor automatically and follow the human and obstacles. This type of robot will be more useful and it will be a trend in the future. Keywords: Arduino, DC gear motor, Infrared sensor, Microcontroller, Robot

Humanoid robotics is an emerging research field that has received significant attention during the past years and will continue to play an important role in robotics research and many applications of the 21st century and beyond. In this rapid moving world, there is a need of robot such a "A Human Following Robot" that can interact and co-exist with them. Because of its human following capability, these robots can work as assistants for humans in various situations and it can also acquire or monitor certain information associated with the human subject. In this paper we present a prototype that uses Arduino Uno along with basic sensors such as ultrasonic and IR sensor. All the processing is carried out by the microprocessor while the control of the motors is carried out by the controller. This robot can further be modified by using many technologies such as Bluetooth, PixyCamera etc. Keywords: Artificial Intelligence, Human following, Human tracking, IR Sensor, Arduino Micro Controller.

INTRODUCTION

In this high technology, a robot must be able to detect and follow humans. A robot that can detect and follow human or obstacle within a specific range is called 'Human Following Robot'. Robots are used to change people's lives and make people's life luxurious. A robot that can use in shopping time which carries items, and follow human without any remote more useful.A robot that can use in the hospital to bringing medicine with more accuracy and fast. The human following robot has many works like work as trolley,strecture in hospital, and a small basket with a car and so on.

Now in this changing world, people are started to lives with robot-like humans following robots for their luxurious life. This project named called human following robot because it can follow humans with the help of IR sensors and can co-exist with humans and help humans in any kind of work with more accuracy and in lesser time. The human following robot can use in the defense sector also to carry weapons for the soldiers. This type of robot can sense obstacles and humans automatically and it can use in the future in our cars. An human following robot can be modified in the future with more developed components and can make it more advance. This robot can be enhanced by structure by adding more components like camara , tracking device and make it more beautiful and workable . This robot will be more trend in our future.

Motion Elements:

Wheel

A drive wheel is a motor vehicle wheel that transmits force, causingthe vehicle to move.

Castor Wheel

Castor is an undriven wheel that is designed to be attached to the bot- tom of a larger object (the "vehicle") to enable that object to be moved

DC Motor

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy when electricityis applied to its leads. If the direction of the electricity is reversed, the motor will spin in the opposite direction.

Connectors, Power, Tools & Accessories Elements :

Jumper/ Connecting cables

Male-to-Female:
Single / Group of Electric wires with connector or pin at each
end. It is used to interconnect the components. Female ends are
used to plu

Male-to-Male:
The difference between these wires is in the endpoint of the
wire. Maleends have a pin protruding and can plug into
things.

AA Battery

AA batteries are multi-purpose alkaline batteries ideal for reliably
poweringeveryday devices. You can use it in regularly used devices
such as portablegames consoles, watches, shavers, motorized
toys, flashlights, and toothbrushes.

AA battery holder

It is a simple case with terminals, for holding the batteries.
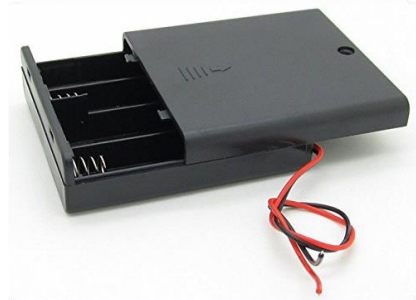

Control Elements:

IR Sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer thanthat of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation.
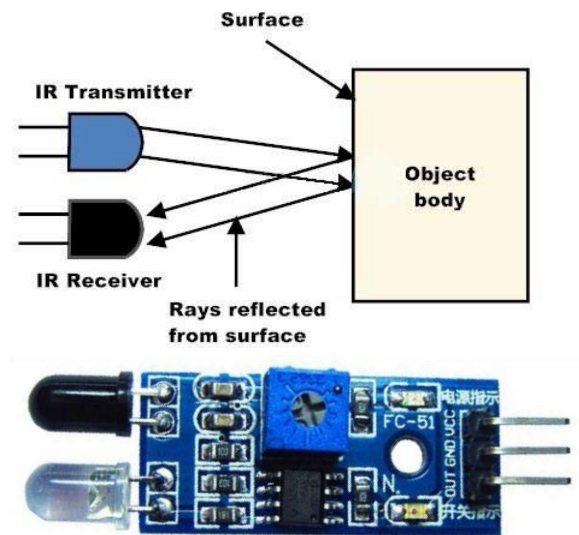
Arduino UNO

The Arduino UNO is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328AVR microcontroller.It is a board based microcontroller (small computer on a chip) with facilities for processing data and I/O (input and output) pins for receiving and sending signals to devices. It can be powered and programmed using a computer or mobile phone.
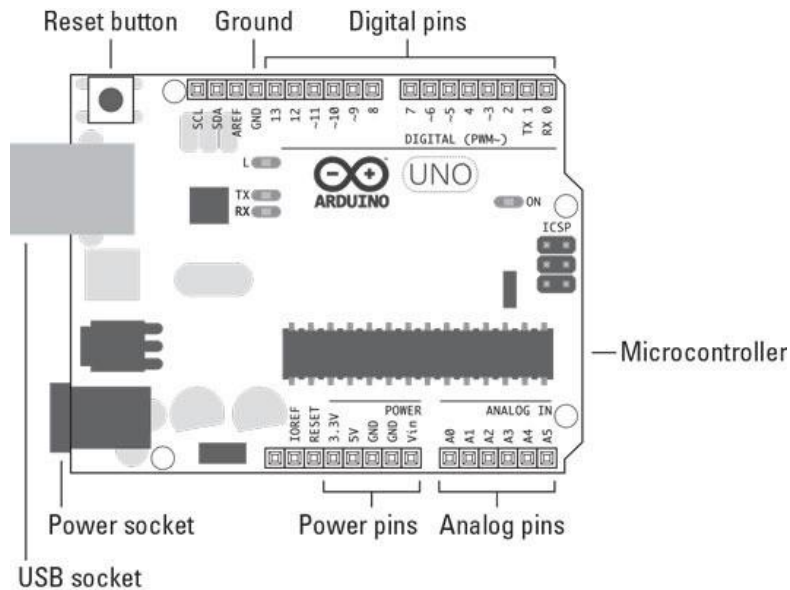

Features:

- Microcontroller: ATmega328
- Operating voltage: 5 V
- Input voltage (recommended): 7-12 V
- Digital I/O pins: 14 (of which 6 provide PWM output)
- Analog input pins: 6
- DC current per I/O pin: 40 mA
- DC current for 3.3V pin: 50 mA
- Flash memory: 32 KB (ATmega328) of which 0.5 KB is used by the bootloader
- SRAM: 2 KB (ATmega328)
- EEPROM: 1 KB (ATmega328)
- Clock speed: 16 MHz

Arduino Uno Cable

Arduino contains a mini/micro or type B USB port that can be used to connect to a PC via the regular USB port, and the connection is done viaa USB Cable.
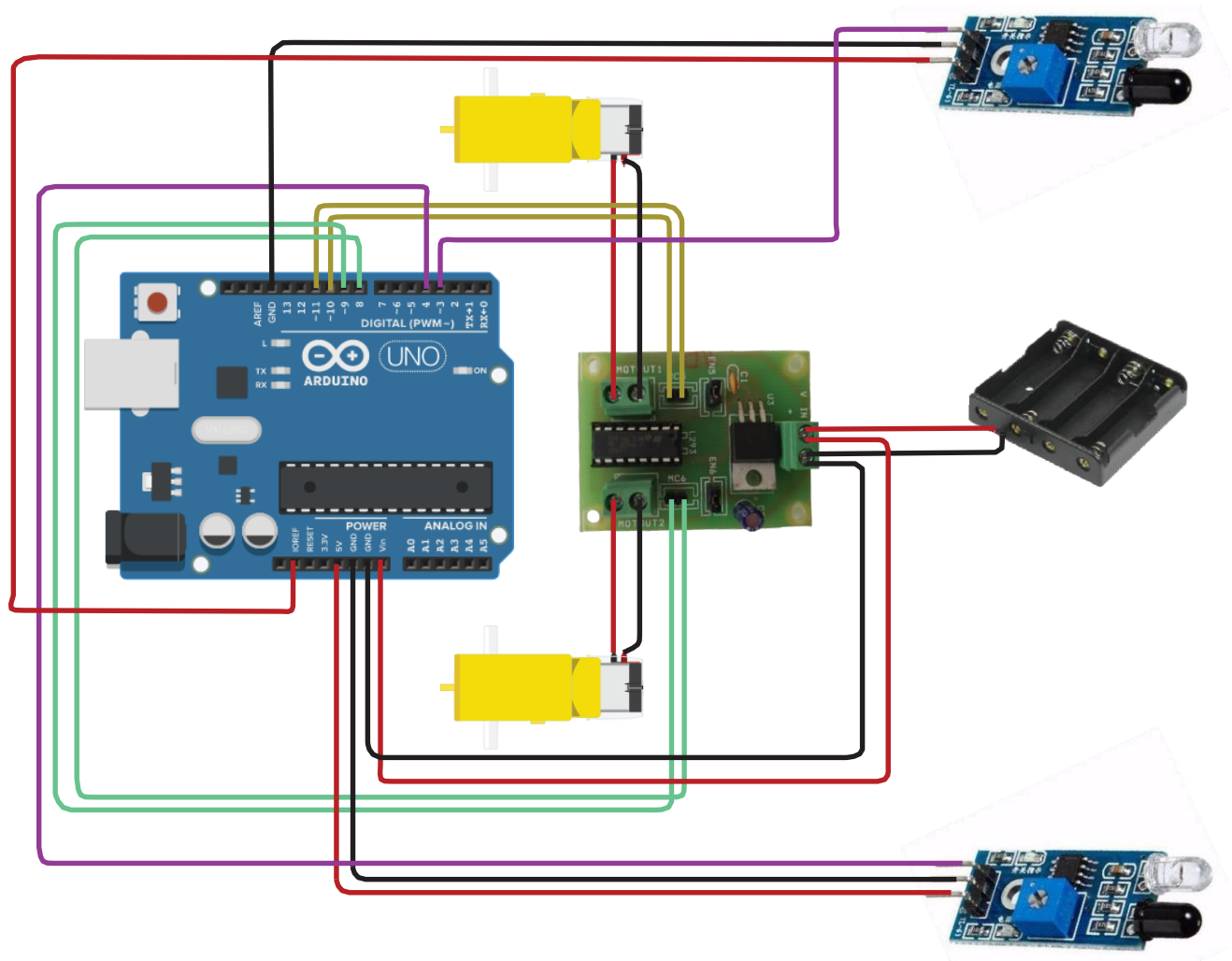

L293D Motor Driver
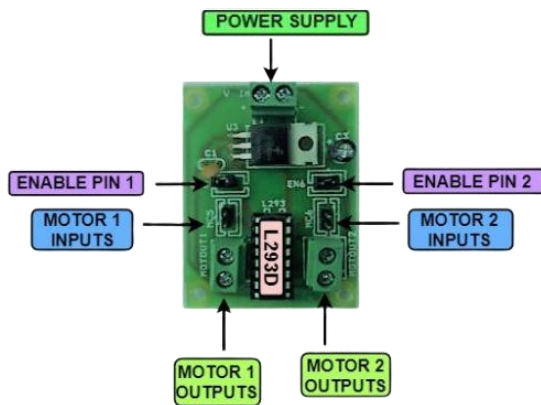
The Motor Driver is a module for motors that allows you tocontrol the working speed and direction of two motors simultaneously. This Motor Driver is designed and developed based on L293D IC. L293D is a 16 Pin Motor Driver IC.

Circuit Diagram

Components required

1. MDF Chassis – 1
2. BO Motors - 2
3. BO Wheel - 2
4. Castor Wheel - 1
5. Arduino UNO – 1
6. Motor Driver -1
7. IR sensor - 2
8. AA Batteries - 4
9. Jumper Connectors - 12
10. Arduino UNO cable - 1

CODE

```
#define MLa 8    //left motor 1st pin
#define MLb 9    //left motor 2nd pin
#define MRa 10   //right motor 1st pin
#define MRb 11   //right motor 2nd pin

int IR_Left= 3;
int IR_Right= 4;

void setup()
{
 pinMode(IR_Left, INPUT);     // IR1 DO pin
 pinMode(IR_Right, INPUT);    // IR2 DO pin
 pinMode(MLa, OUTPUT);     // Motors pins
 pinMode(MLb, OUTPUT);
 pinMode(MRa, OUTPUT);
 pinMode(MRb, OUTPUT);

}

void loop()
{
 if (digitalRead(IR_Left) == HIGH && digitalRead(IR_Right) == HIGH) {     // Stop
  digitalWrite(MLa, LOW);
  digitalWrite(MLb, LOW);
  digitalWrite(MRa, LOW);
  digitalWrite(MRb, LOW);

 }
 if (digitalRead(IR_Left) == LOW && digitalRead(IR_Right) == HIGH) { // will move in the left direction
  digitalWrite(MLa, LOW);
  digitalWrite(MLb, LOW);
  digitalWrite(MRa, HIGH);
  digitalWrite(MRb, LOW);

 }
 if (digitalRead(IR_Left) == HIGH && digitalRead(IR_Right) == LOW) { // will move in the right direction
  digitalWrite(MLa, HIGH);
  digitalWrite(MLb, LOW);
  digitalWrite(MRa, LOW);
  digitalWrite(MRb, LOW);

 }
 if (digitalRead(IR_Left) == LOW && digitalRead(IR_Right) == LOW) {   // move in the forward direction
  digitalWrite(MLa, HIGH);
  digitalWrite(MLb, LOW);
  digitalWrite(MRa, HIGH);
  digitalWrite(MRb, LOW);

 }
    }
```

WORKING AND DESIGN

when you come near to the robot starts to follow you. there are 2 wheels in the robot. and 2 motors attached to the chassis. now there are two sensors on the robot two <u>Infrared sensor</u> which arranges like one sensors left and right . and when you put your hand near to the Infrared sensor the robot will start forward.

If you turn your hand to the left side the **Arduino robot** moves on the left side, and if you put your hand in the right the robot will move in the right direction. so, how the whole system works we will talk about this.

when you put your hand in from of the infrared sensor then the sensor detects you and sends this information to the Arduino. there is some distance prefix in the Arduino so if your hand is away from the sensor it will not read that. and if your hand is near to the sensor it will read it.

APPLICATIONS

Looking deeply into environment or our surroundings, we were be able interpret that there is a need of such robot that can assist humans and can serve them. Such a robot can be used for many purposes. With a few modifications, the robot can act as a human companion as well. The tasks these kind of robots can perform are limitless including assisting in carrying loads for people working in hospitals, libraries, airports etc.

FUTURE WORK

There are many interesting applications of this research in different fields whether military or medical. A wireless communication functionality can be added in the robot to make it more versatile and control it from a large distance. This capability of a robot could also be used for military purposes. By mounting a real time video recorder on top of the camera, we can monitor the surroundings by just sitting in our rooms. We can also add some modifications in the algorithm and the structure as well to fit it for any other purpose. Similarly it can assist the public in shopping malls. So there it can act as a luggage carrier, hence no need to carry up the weights or to pull that. Similarly, ample amount of modifications could be done to this prototype for far and wide applications

CONCLUSION

A successful implementation of a prototype of human following robot is illustrated in this paper. This robot does not only have the detection capability but also the following ability as well. While making this prototype it was also kept in mind that the functioning of the robot should be as efficient as possible. Tests were performed on the different conditions to pin point the mistakes in the algorithm and to correct them. The different sensors that were integrated with the robot provided an additional advantage. The human following robot is an automobile system that has ability to recognize obstacle, move and change the robot's position toward the subject in the best way to remain on its track. This project uses arduino, motors different types of sensors to achieve its goal. This project challenged the group to co operate, communicate, and expand understanding of electronics, mechanical systems, and their integration with programming

REFERENCES

- **https://create.arduino.cc/projecthub/mircemk/diy-arduino-human-following-robot-24f758**

- **https://ijarsct.co.in/Paper1025.pdf**

- **https://techatronic.com/human-following-robot-using-arduino/**

- **https://ieeexplore.ieee.org/document/9404758**

- K. Morioka, J.-H. Lee, and H. Hashimoto, "Human-following mobile robot in a distributed intelligent sensor network," IEEE Trans. Ind. Electron., vol. 51, no. 1, pp. 229–237, Feb. 2004.