I. 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.

II. 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 chasis 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 ofArduino. 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 shild. And now, similarly motor2 is connected to 3 and 4 pins of the motor driver shild , 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

III. MODELING AND ANALYSIS

Components :

The human following robot has the following main components are:

1. Arduino Uno
2. L293D Motor driver
3. Infrared Sensors
4. Ultrasonic Sensor
5. Servo Motor
6. Four DC Geared Motors
7. Four wheels
8. Robot Chasis
9. Jumper wires
10. 18650 batteries
11. Switch
12. Tools Needed

Arduino Uno

Fig.1: Arduino Uno

IC L293D motor driver

Fig.2: L293D Motor driver Ic

Infrared Sensor

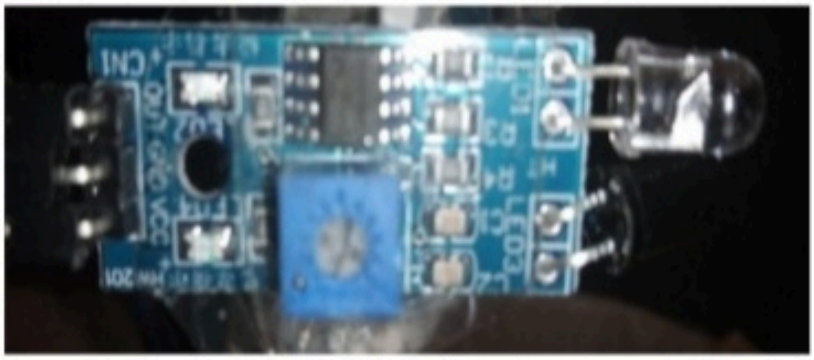


Fig.-3: infrared sensor

Ultrasonic Sensor (HC-SR04)

Fig-4: Ultrasonic Sensor

DC Gear Motor

Fig.-5: DC Motors

Wheel

Fig.-6: DC Motor Wheels

18650Battery

Fig.7: 18650 battery

Switch

Fig.8: Switch

Tools Needed

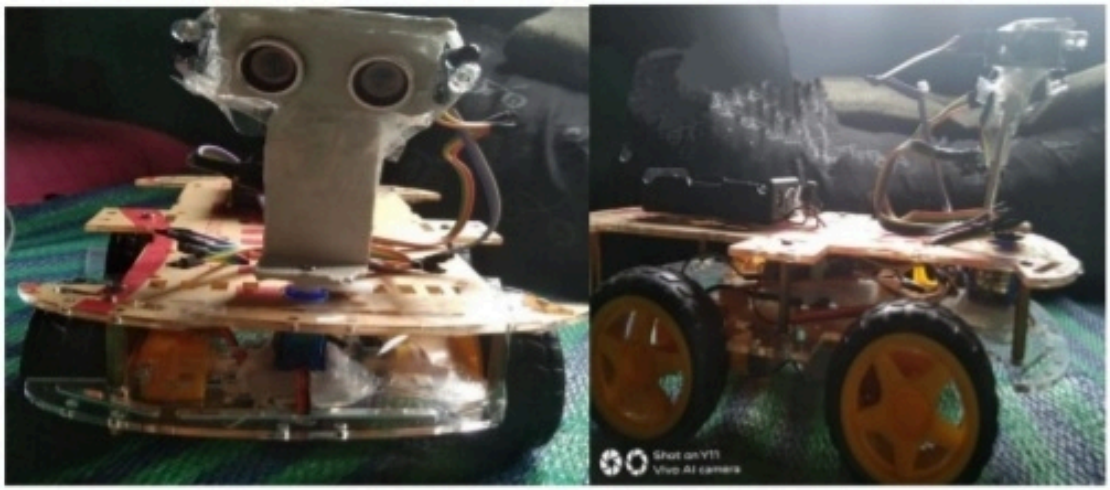
Some tools names are given below:

1. Soldering Iron
2. Glue gun
3. Cutter
4. Knife
5. Screwdriver
6. Tweezer
7. Wire Strippers
8. Needle nose Pliers

IV. RESULTS

We have successfully made the human following robot which is used to follow objects as well as humans. This robot uses ultrasonic range sensors and Infrared sensors. The test was performed on the both ultrasonic sensor and infrared sensor that the sensor was working accurately within the range of 10 cm. An ultrasonic sensor is used to move the robot forward and backward. Infrared sensors are used to move the robot in the left or right direction accordingly. Then we test the serial communication of Arduino, motor shield, and various motors .

This robot took a lot of time to complete this project. We were faced lots of problems regarding the program code, as there was huge numbers of error in the code which was further rectified it and lastly it works. Motors drivers connections got interchanged which was rectified and our robot works perfectly fine. Finally, after the lots of effort and time our objective was achieved which was to implement a good Human-Robot interaction.



V. CONCLUSION

In the world the robotics generation is coming. In this Object Following Robot, we can add a GSM module that will give us the location of the robot, or we can add wireless remote controls to our robot to work as a remote controller or to work as an automatic object following the robot. My project can be use in many areas like hospitals for more accuracy and fast work in any emergency cases , in shpping malls to carry items , we can attach various sensors and cameras to get more features. This project challenged the group to co-operate, communicate, and expand understanding of electronics, mechanical systems, and integration with programming . In this way, we completed this project by believe that our project will be helpful in future and it will help human to do any kind of works & hence my purpose will be successful.

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VI. REFERENCES

[1] 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.

[2] Y. Matsumoto and A. Zelinsky, "Real-time face tracking system for human-robot interaction," in 1999 IEEE International Conference on Systems, Man, and Cybernetics, 1999. IEEE SMC '99 Conference Proceedings, 1999, vol. 2, pp. 830– 835 vol.2.

[3] H. Takemura, N. Zentaro, and H. Mizoguchi, "Development of vision-based person following module for mobile robots in/outdoor environment," in 2009 IEEE International Conference on Robotics and Biomimetics (ROBIO), 2009,

[4] N. Bellotto and H. Hu, "Multisensor integration for human-robot interaction," IEEE J. Intell. Cybern.Syst., vol. 1, no. 1, p. 1, 2005