Human Following Robot Using Arduino UNO

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Abstract: For a robot that performs autonomously, the communication between the person and the robot is the most important factor. A robot that functions fully autonomously should not only complete the jobs that are desired of them but also somehow establish a connection between themselves and the person operating them. A lot of research has been done on these kinds of robots. In order for a robot to communicate and interact with the person, it should also be capable of following that particular person. The primary goal of our work is to design and fabricate a robot that not only tracks the target but also moves towards it while doing the tracking. The object has to be unique for the robot to recognize it and carry out the objective. Protecting the robot from collision with the object is another problem that needs to be tackled so in order to do this, a ultrasonic sensor is used. All the control of the motors is carried out by the controller.

Keywords: Arduino, DC gear motor, Infrared sensor, Microcontroller, Ultrasonic sensor, Robot.

I. INTRODUCTION

In this 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’. A robot that can be used in shopping which carries items, and follow human without any remote. A robot that can be used in the hospital to bring medicine. The human following robot has many works like work as trolley structure 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. A 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 camera, 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:

2.1 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 PIN 10 of Arduino. Likewise, the motor driver(L293D) has 16 pins, first, 1,8,9 and 16 pins of the motor driver are connected to +5volt 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 drivers pins.

2.2 Software
To make the hardware parts work or run, it should be programmed through the required software like Arduino IDE. The microcontroller at first will not be having any program, we need a software to upload the program on microcontroller. To implement the task all three section are taking and giving information. Sensor module parts it senses data and provide it to the microcontroller chip. Microcontroller part software take all data from the whole 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 UNO, we have to use Arduino IDE software to write and upload program in microcontroller.
III. MODELING AND ANALYSIS

Components Required for our project is listed and shown below

- Arduino UNO
- Motor Driver Shield
- Wheels(4x)
- TT Gear Motor(4x)
- Servo Motor
- Ultrasonic Sensor
- Infrared Sensor(2x)
- Li-on Battery
- Battery Holder
- Male and Female Jumper wire
- Sun Board
- DC Power Switch
- Tools Needed

![Arduino UNO](Fig 1 Arduino UNO)

![Motor Driver Shield](Fig 2 Motor Driver Shield)

![Ultrasonic Sensor](Fig 3 Ultrasonic Sensor)
Fig 4 TT Gear Motor and Wheels

Fig 5 Servo Motor

Fig 6 Male and Female Jumper wire
IV. RESULTS

We have successfully made the human following robot which is used to follow humans. This robot uses ultrasonic range sensors and Infrared sensors. Ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. The test was performed on the both ultrasonic sensor and infrared sensor that the sensor was working accurately within the range of 8 - 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 communication of Arduino, motor driver shield, servo motor and various components.

This robot took a lot of time to complete this project. We were faced lots of problems regarding the program code and circuit connections, as there were more numbers of error in the code which was further rectified and lastly it works. Motors driver’s connections got interchanged which was rectified and our robot works perfectly. Finally, after the lots of effort and time our Human Following Robot.
V. APPLICATION

Looking deeply into environment or our surroundings, we will be able interpret that “YES” 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 changing, the robot can act as a human companion as well.

Some other applications of this robot are:
- Can assist in carrying loads for people working in hospitals, libraries, airports, etc.
- Can service people at shopping centers or public areas.
- Can assist elderly people, special children and babies.
- Can follow a particular Vehicle.

VI. CONCLUSION

In the world the robotics generation is coming. In this Human 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 used in many areas like hospitals for more accuracy and fast work in any emergency cases, in shopping 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.

REFERENCES