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Human Following Luggage Carrying Robot

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Abstract: *The potential for human-following robots to revolutionize a variety of industries, including retail, security, and healthcare, has led to an increase in their popularity in recent years. This study summarises the state of the art in research on human following robots, highlighting the many development methods and approaches. The study also pinpoints potential future possibilities for the advancement of human-following robots, such as the incorporation of artificial intelligence and machine learning strategies, advancements in sensor technology, and the investigation of novel uses for these machines.*

Keywords: Autonomous, Embedded System, RSSI, Bluetooth Low Energy

I. INTRODUCTION

Robots that can track and follow human targets in a variety of environments are called human-following robots. These robots are made to maneuver through challenging settings, dodging hazards and adjusting to environmental changes while keeping a safe distance from the person they are pursuing. Detection and localizing the human target under observation is one of the fundamental tasks for a robot. Robotics has received a lot of interest recently since it can help people with many daily tasks, such as carrying bags at a grocery store or train station or giving tours in museums or foreign locations. Different robotic sensing systems for localizing human movements rely on acoustic, ultrasonic, and optical image sensors. The inability of acoustic and ultrasonic sensors to differentiate between human targets and other things, however, limits their utility.

1.1 Problem Statement

We all have experienced problems while traveling because of heavy luggage. Even with trolley bags, luggage seems to be heavy to carry at airports, railway stations, and bus stands.

II. LITERATURE SURVEY

Mentioned are some of the literature surveys from previously published papers

Method 1 -

- The method used to calculate the location is triangulation.
- The distance between the emitter and each antenna will be calculated using the RSSI method.
- The use of three antennas will provide high accuracy. The robot will transmit and receive signals via. a Bluetooth module. Thus, the robot can be used as an autonomous vehicle or it can be controlled.

Method 2–

- Motor driver is coupled with a servo motor at the face of the robot to have circular motion for the functioning of other sensors on the robot which helps to locate and determine the presence and the distance at which the human is located.
- The IR sensor placed at the head of the robot helps to determine the presence of any object in front of it by emitting infrared radiations and detecting its reflection.

Method 3 –

- A person-follower robot is an autonomous robot that is able to follow the colour by using an android camera and continuously capture the image by using image processing technology.

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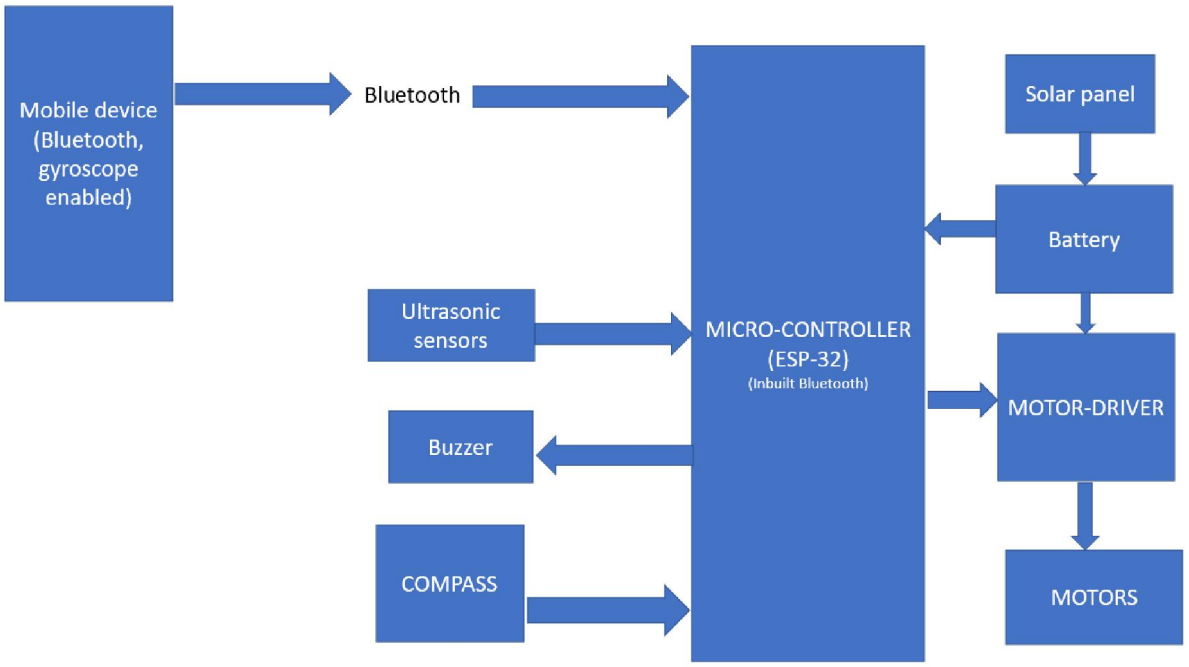
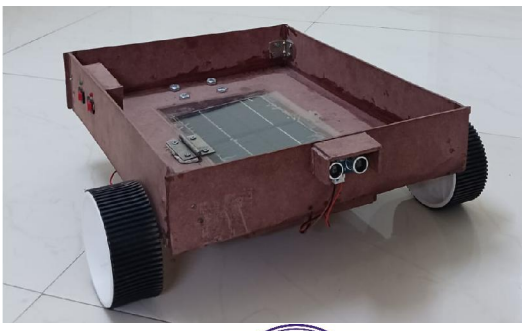
- Android device will take decision according to the captured image and send it to the AVR atmega32 controller through HC05 Bluetooth module and another technology is using HC-SR04 ultrasonic sensor.
- If any obstacle comes in between the person and robot, it will stop the robot immediately.

III. BLOCK DIAGRAM



Explanation

In this project, we have developed a robot that follows a human within its detecting range. The user with a mobile device consisting of Bluetooth and a gyroscopic sensor is connected to the system's microcontroller (ESP-32) via Bluetooth through an app interface. It shares significant information such as azimuth angle (helps in locating the mobile device. The system majorly consists of components such as Microcontroller (ESP-32), Ultrasonic sensors(HC05), Buzzer, Compass(Magnetometer HMC5883L), Motor driver(L298N), DC Motors (300rpm), along with the batteries (lithium-ion 12V 2.6Ah) and solar panels (12V 100mA) for power supply. The motor driver consists of two L298N chips that can individually control the DC motors. The ultrasonic sensor helps determine any obstacle within its path and alert using a buzzer. Compass helps the system to determine its own direction. All these components are connected to the microcontroller on a PCB board. The microcontroller uses the RSSI technology to determine the distance between the system and the mobile device. The program is responsible for the response of the robot to various inputs is transferred to the microcontroller. On supplying power to the machine, we can witness the working of our Human Following Robot under different conditions.



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IV. CONCLUSION

An implementation of a human following robot is illustrated in this report. This robot does not only have object detection capability but also tracks and follows the person. The tracking is basically performed using RSSI technology and azimuth angle. The different sensors were integrated with the robot which added an additional advantage. The robot can also be controlled remotely using a smartphone via Wi-Fi.

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