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Human Following Robot Car

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Abstract—Automation helps reduce human effort and improve efficiency in daily life. This project focuses on developing a smart human-following robot to assist in carrying goods in places like malls, hospitals, stations, homes, and industries. The robot is built using an Arduino UNO, IR sensors, an ultrasonic sensor, motor driver, and DC motors.The system works in three stages: sensing, processing, and action. IR sensors detect the human's direction, while the ultrasonic sensor measures distance. The Arduino processes this data and controls the motors to move the robot accordingly. The robot follows the person, maintains a safe distance, and stops when needed or when obstacles are detected.The results show that the robot can successfully follow a human with good accuracy in controlled environments. However, it has limitations in crowded areas, under strong sunlight, and in handling complex obstacles.

INTRODUCTION

In today's rapidly advancing world, automation has become an essential part of daily life, helping to reduce human effort and increase efficiency. People often face difficulties while carrying luggage or goods in places such as shopping malls, hospitals, railway stations, homes, and industries. These challenges create a need for a smart system that can assist humans in an easy and effective way.To address this problem, a human-following robot is developed. This robot is designed to automatically follow a person without the need for manual control. It uses sensors and a microcontroller (Arduino UNO) to detect the presence, direction, and distance of a human. Based on this information, the robot moves accordingly while maintaining a safe and constant distance.The system is simple, cost-effective, and efficient, making it suitable for practical applications. By reducing physical effort and improving convenience, this project demonstrates how automation can be used to solve real-world problems in everyday environments.

SOFTWARE

ARDUINO IDE:

The **Arduino IDE (Integrated Development Environment)** is the main software used to write, edit, compile, and upload programs to Arduino boards like the **Arduino UNO**. It provides a simple and user-friendly interface, making it easy for beginners and professionals to develop embedded system projects.

The Arduino IDE is based on **C++**, but it uses simplified syntax, so users don't need deep programming knowledge. It includes a built-in code editor where you can write programs (called sketches), a compiler to check errors, and an uploader to transfer the code to the Arduino board using a USB cable.

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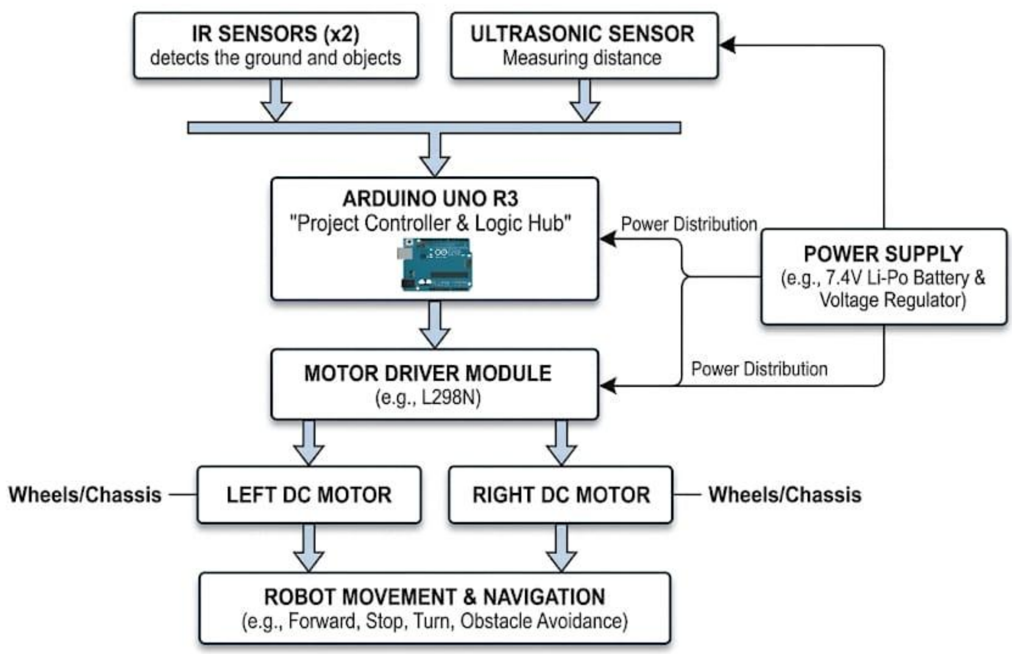
In a project like a human-following robot, the Arduino IDE is used to write the logic for reading sensor data (IR and ultrasonic sensors) and controlling the motors. It plays a key role in processing inputs and generating outputs, making the robot function properly.

IMPLEMENTATION

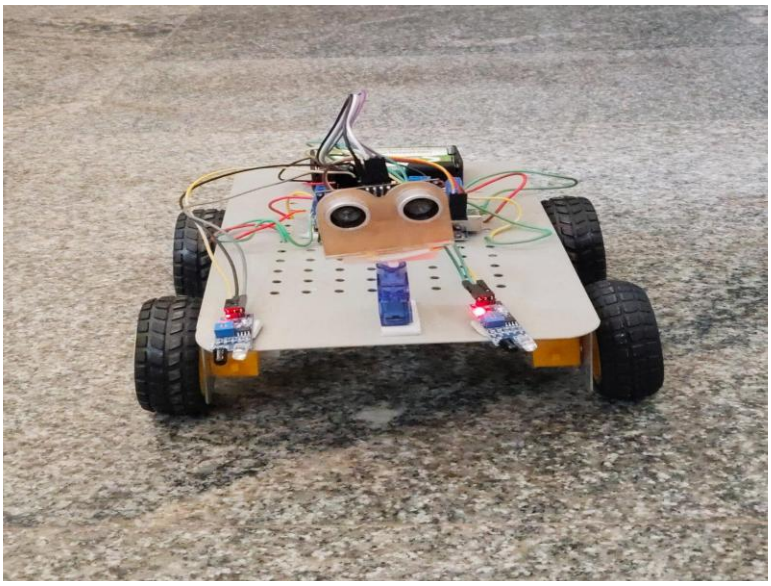
Arduino IDE is an open-source software platform used to write, compile, and upload programs to Arduino boards such as Arduino Uno. It provides a simple and user-friendly interface where coding is done using C/C++ based language. The IDE includes a built-in compiler and serial monitor, which help in testing, debugging, and monitoring the performance of the program during execution.In this project, the Arduino IDE plays an important role in controlling the robot by sending commands to the motor driver L293D. The L293D is a dual H-bridge motor driver IC that allows the Arduino to control the direction and movement of DC motors. Since the Arduino cannot directly drive motors due to low current output, the L293D acts as an interface between the Arduino and motors.
The program written in the Arduino IDE processes the input signals received from sensors such as IR or Ultrasonic sensors. Based on these inputs, the Arduino sends control signals to the L293D, which in turn drives the motors accordingly. This enables the robot to move forward, backward, left, or right, depending on the position of the human being followed.
Overall, the combination of Arduino IDE and L293D makes it possible to achieve smooth motor control, efficient processing, and accurate movement of the human following robot car

BLOCK DIAGRAM



It is an autonomous robotic system that can detect and track a human and move accordingly while maintaining a safe distance. This project is designed using a Arduino Uno, which acts as the brain of the system. The robot uses sensors such as IR sensors to detect the direction of the human and an ultrasonic sensor to measure the distance between the robot and the person. Based on the sensor inputs, Arduino processes the data and controls the movement of the robot using a motor driver and DC motors.

RESULT



CONCLUSION

The completion of this Human Following Robot Car demonstrates a successful implementation of a multi-layered sensing strategy to achieve autonomous tracking. By integrating IR sensors for immediate proximity detection and an Ultrasonic sensor for precise distance measurement, the robot can effectively identify and follow a human target while maintaining a safe buffer zone. The inclusion of a Servo motor to rotate the ultrasonic sensor proved critical, as it expanded the robot's field of view beyond a fixed point, allowing it to "scan" and re-acquire the target if they moved out of the direct line of sight. This combination of components ensures the robot is not only reactive to movement but also spatially aware of its surroundings.

Ultimately, this project highlights how basic electronic components can be synchronized to perform complex navigation tasks. While the current system excels at following a target in clear paths, it provides a scalable architecture for future enhancements. Potential upgrades could include more advanced 360° media integration for remote monitoring or real-world capture tools to document the robot's environment. This project serves as a practical validation of robotics principles, successfully bridging the gap between raw sensor data and intelligent mechanical movement

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