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IOT Base Voice Control Robot

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ABSTRACT

The implementation of a Bluetooth and Camera Based Smart Service Robot using Arduino UNO R3 presents an innovative solution for material transportation in offices and hospitals. Traditional manual transportation of files, laptops, water bottles, and medical appliances requires human effort and consumes time. This proposed robot addresses these issues by automating the carrying process using wireless control and camera monitoring. The robot is controlled through Bluetooth HC-05 using a smartphone application. An ESP32 Camera module is integrated for live video streaming and monitoring. Arduino UNO R3 acts as the main controller, while the L298N motor driver controls four DC gear motors for movement. The robot is designed to carry loads between 2 kg to 2.5 kg efficiently. The total robot weight is approximately 10 kg to 12 kg with a four-wheel chassis for stability and balance. This smart service robot can be effectively used in offices for carrying files, laptops, and bottles, and in hospitals for carrying medicines and appliances.

KEYWORDS: *Smart Service Robot, Bluetooth Controlled Robot, Arduino UNO R3, ESP32 Camera Module, Wireless Control System, Material Transportation Automation, L298N Motor Driver, DC Gear Motors, Mobile Application Control, Live Video Streaming, Office Automation, Hospital Assistance Robot, Embedded Systems, Robotics and Automation.*

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INTRODUCTION

Automation and robotics are becoming important in modern workplaces and healthcare systems. In offices, employees spend valuable time carrying files, laptops, and documents from one department to another. Similarly, in hospitals, staff members frequently transport medicines, water bottles, and medical tools. These repetitive tasks consume time and manpower. To solve this problem, a Bluetooth and Camera Based Smart Service Robot is developed. This robot is capable of carrying lightweight materials up to 2.5 kg and can be controlled wirelessly using a mobile phone.

The robot uses Arduino UNO R3 as the control unit. Movement commands are sent through the HC-05 Bluetooth module. The ESP32 Camera provides live surveillance, allowing the operator to monitor surroundings while controlling the robot. Four DC gear motors provide strong movement and support heavy robot body weight.

This project combines robotics, wireless control, and smart monitoring technology for office and hospital service applications.

PROBLEM STATEMENT

1. **Manual Transportation:** In offices and hospitals, files, laptops, medicines, and other items are carried manually from one place to another. This process consumes time and increases workload on staff members.
2. **Delay in Delivery:** Important files, medical tools, or water bottles may not reach the required location on time due to busy staff or human delay.
3. **Need for Smart Assistance:** Modern workplaces require smart and efficient systems that reduce manpower and improve productivity through robotic assistance.
4. **Delay in Delivery:** Important files, medical tools, or water bottles may not reach the required location on time due to busy staff or human delay.
5. **Safety and Monitoring:** Manual carrying may create risks of dropping sensitive items like laptops or medical equipment. A monitored robot with camera support can improve safety.
6. **Staff Fatigue:** Repeated carrying of materials causes physical tiredness and reduces the efficiency of employees and hospital workers during working hours.

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OBJECTIVE

1. To design and develop a smart service robot using Arduino UNO R3.
2. To implement Bluetooth wireless control using HC-05.
3. To integrate ESP32 camera for live video monitoring.
4. To carry office and hospital materials up to 2.5 kg.
5. To provide stable movement using four-wheel drive system.
6. To reduce human effort and save time.

SYSTEM ARCHITECTURE

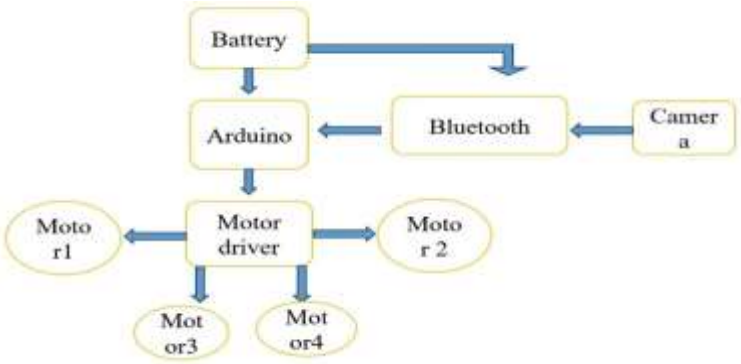

Figure 1: System Architecture

COMPONENTS

1. Arduino UNO R3

It is the main controller of the robot. It receives signals from Bluetooth and controls motors according to commands.

2. Lithium Iron Battery

It provides power supply to the entire robot system. It is rechargeable and gives long backup time.

3. DC Gear Motors

These motors are used for movement of the robot wheels. Gear motors provide high torque to carry load easily.

4. Bluetooth HC-05 Module

It is used for wireless communication between smartphone and robot. It receives commands like forward, backward, left, right, and stop.

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5. ESP32 Camera Module

It provides live video streaming and monitoring. It helps the user to view surroundings while controlling the robot.

6. L298N Motor Driver

It controls the speed and direction of DC motors. It acts as an interface between Arduino and motors.

7. Wheels Chassis

It **supports** the robot body and provides balance during movement. Four wheels improve stability while carrying load.

8. Jumper Wires

These wires are used for electrical connections between components.

9. Smartphone

It is used as a remote controller to send Bluetooth commands to the robot.

WORKING PRINCIPLE

1. User connects smartphone with HC-05 Bluetooth module.
2. Commands such as Forward, Backward, Left, Right, and Stop are sent from mobile app.
3. Arduino UNO receives signals from Bluetooth module.
4. Arduino controls L298N motor driver.
5. Motor driver rotates four DC gear motors.
6. Robot moves in desired direction.
7. ESP32 camera sends live video to operator.
8. Robot carries files, laptop, bottle, or hospital items safely.

ADVANTAGES

1. Easy wireless control
2. Live camera monitoring
3. Reduces manual workload
4. Saves employee and hospital staff time
5. Stable 4-wheel movement

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APPLICATIONS

1. Personal assistant and support disabled person
2. Carrying files , laptops ,water bottles
3. Carrying medicines, surgical tool
4. Industrial robot for simple task

FUTURE SCOPE

1. Add obstacle avoidance sensors
2. Voice control feature
3. Mobile app with advanced controls
4. Smart Assistant Features

CONCLUSION

The implementation of a Bluetooth and Camera Based Smart Service Robot using Arduino UNO R3 is an effective solution for office and hospital transportation tasks. The robot can carry loads up to 2.5 kg and is controlled wirelessly through Bluetooth.

The ESP32 camera provides live monitoring, making the system smarter and safer. With a stable four-wheel design and strong DC gear motors, the robot can easily move materials while reducing human effort.

This project demonstrates how robotics can improve efficiency, productivity, and convenience in offices and hospitals.

REFERENCES

1. (S. Deepak Kumar) Department of Production Engineeering Birla Institute of Technology Mesra Ranchi, Jharkhand, India-835215
2. M.Gupta, R. Kumar, R. K. Chaudhary and J. Kumari, "IoT Based Voice Controlled Autonomous Robotic Vehicle Through Google Assistant," 2021 3rd International Conference on Advances in Computing, Communication Control and Networking

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(ICAC3N), Greater Noida, India, 2021, pp 713-717, doi:10.1109/ICAC3N53548.2021.9725526.

3. M. Sunitha, P. V. S. S. Datta Vinay, V. S. N. Lokesh and B. D. Kumar, "IP Based Surveillance Robot Using IOT," 2020 Fourth International Conference on I-SMAC (IoT in Social, Mobile Analytics and Cloud) (I-SMAC), Palladam, India, 2020, pp. 337-342, doi: 10.1109/I- SMAC49090.2020.9243519.
4. M. Basha, K. Vamshi, K. Bhavana and M. Bhavitha, "Command Control Robot using Internet of Things on Field Programmable Gate Array," 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC), Coimbatore, India, 2020, pp. 1068-1073, doi: 10.1109/ICESC48915.2020.9155989.

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