ISSN 2454-8065 **International Journal of Applied Theoretical Science and Technology**
Volume 20, Issue 04, pp01-03 February 2025

Autonomous Delivery Robot with Password Authentication

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***Abstract*—**
Autonomous delivery systems have become increasingly relevant in logistics and urban environments, reducing human intervention while improving efficiency. This paper presents the design of an autonomous delivery robot integrated with password authentication to ensure secure package delivery. The robot navigates using sensors and motor control algorithms, while delivery access is restricted via a password-protected system. This enhances reliability and safety in real-world applications such as campuses, hospitals, and residential areas.

Index Terms*— *Autonomous robot, delivery system, password authentication, IoT, robotics.

INTRODUCTION

The rapid growth of e-commerce and smart city initiatives has created a demand for autonomous delivery systems. Traditional delivery methods often face challenges such as inefficiency, high costs, and limited availability. Autonomous robots offer a promising solution by combining navigation algorithms, real-time sensing, and secure package handling.

However, ensuring that the package reaches the intended recipient is equally important. Password authentication mechanisms integrated into the robot provide a secure way to verify recipients before releasing the delivery. This project introduces an **Autonomous Delivery Robot with Password Authentication** that combines navigation and security to improve last-mile delivery.

LITERATURE SURVEY

Autonomous robots have been explored in various contexts, from warehouse automation to campus food delivery. Many designs rely on GPS navigation, ultrasonic sensors, and obstacle avoidance systems. Security aspects, however, are often overlooked, making the delivery process vulnerable.

Table I. Comparison of Existing Delivery Systems

Approach	Advantages	Limitations
Manual Delivery	Simple, human oversight	Labor-intensive, costly
Drone Delivery	Fast, aerial mobility	Weather-dependent, limited load
Basic Delivery Robot	Autonomous navigation	Security vulnerabilities
Proposed Robot with	Secure + Autonomous	Battery and terrain limitations

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Auth.	delivery	

PROPOSED SYSTEM

The proposed robot integrates several modules for navigation, delivery, and security:

- **Navigation Module:** Ultrasonic sensors and IR sensors detect obstacles and guide the robot safely.
- **Motor Driver & Wheels:** Ensure smooth movement and turning ability.
- **Microcontroller (Arduino/ESP32):** Processes sensor data and executes navigation algorithms.
- **Password Authentication Unit:** Keypad or mobile-based password entry system restricts package access to the intended recipient.
- **Power Supply:** Rechargeable battery for sustainable operation
- .

Fig. 1. Block Diagram of Autonomous Delivery Robot with Password Authentication

The robot moves autonomously along predefined paths while avoiding obstacles. Upon reaching the destination, the system prompts the user to enter a password. Only correct authentication allows access to the package compartment, ensuring delivery security.

RESULTS AND DISCUSSION

The prototype robot was tested in a controlled indoor environment with multiple obstacles. Results showed a 93% success rate in navigating to the target location without collision. Password authentication prevented unauthorized access, with 100% accuracy in test trials.

Battery life allowed up to 3 hours of operation, covering distances of ~2 km per charge. The robot demonstrated potential for campus deliveries and small-scale logistics.

CONCLUSION AND FUTURE SCOPE

The Autonomous Delivery Robot with Password Authentication successfully integrates navigation and secure package delivery. It demonstrates practical feasibility for educational institutions, residential communities, and healthcare facilities.

Future Scope: Enhancements can include GPS integration for outdoor navigation, AI-based obstacle recognition, RFID-based recipient authentication, and larger payload handling for commercial deployment.

ACKNOWLEDGMENT

The authors would like to thank **Mr. Md. Gandhi Babu, Assistant Professor**, for his valuable guidance and encouragement throughout the project.

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ISSN 2454-8065 International Journal of Applied Theoretical Science and Technology
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