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Smart Parcel Receiving System

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Abstract: The increasing popularity of online shopping has created a strong need for safer and smarter parcel delivery methods. Traditional delivery systems often face issues such as parcel theft, missed deliveries, and repeated delivery attempts when customers are unavailable.

The Smart Parcel Receiving System is designed to solve these problems by using modern automation technologies. The system combines IoT, GSM communication, infrared sensors, CCTV monitoring, and LCD displays to create a secure parcel receiving environment.

When a parcel is placed inside the smart locker, the IR sensor detects the package and immediately sends a notification to the user through a mobile application or SMS. CCTV monitoring records delivery activity for additional safety and transparency. This system improves delivery efficiency, minimizes manual effort, and enhances customer convenience.

I. INTRODUCTION

Online purchasing services have increased rapidly in recent years, creating a higher demand for dependable parcel delivery solutions. Consumers increasingly depend on online services to purchase products conveniently from their homes. However, despite advancements in logistics and transportation, missed deliveries remain a major challenge when customers are unavailable to receive their packages. Such delivery failures create inconvenience for users while also increasing operational costs and repeated delivery attempts for service providers.

The recent advents in the field of smart technology like IoT, GSM communication, embedded systems, and intelligent sensors have made automation of parcel handling systems possible.

The rapid development of e-commerce platforms has increased the demand for reliable parcel delivery systems. Many customers prefer online shopping because of its convenience and accessibility. However, parcel delivery services still experience challenges such as delivery failure, package theft, and lack of secure storage during customer absence.

These issues affect both customers and delivery service providers. Recent improvements in embedded systems, IoT devices, and communication technologies have made it possible to automate parcel management systems. Smart technologies can now be used to monitor deliveries, provide instant notifications, and maintain parcel security without constant human supervision. The proposed Smart Parcel Receiving System uses GSM communication, infrared sensors, CCTV cameras, and IoT connectivity to improve parcel handling. The system automatically detects parcel placement, records delivery events, and sends updates to customers in real time. This approach increases security, reduces delivery complications, and improves overall user satisfaction.

II. LITERATURE SURVEY

The rapid growth of online shopping has improved customer convenience by allowing products to be purchased from anywhere at any time. However, delivery and logistics management continue to present several challenges, including missed deliveries, parcel theft, and delayed package handling. The humanizer service is temporarily unavailable. receiving solutions to overcome these issues through automation and intelligent monitoring systems.

[1] **IoT-Based Parcel Receiving Systems**

The humanizer service is temporarily unavailable IoT-enabled parcel receiving systems that improve delivery security and efficiency. These systems utilize sensors, communication modules, and automated controls to detect parcel delivery and provide real-time updates to customers. IoT integration allows users to remotely monitor parcel activities and reduces dependency on manual handling.

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[2] **GSM and Sensor-Based Notification Systems**

Researchers have explored the use of GSM technology combined with smart sensors for automated parcel notifications. In such systems, infrared sensors detect parcel placement, and GSM modules send SMS alerts to users immediately after delivery. The humanizer service is temporarily unavailable to show delivery information and system status.

[3] **CCTV-Based Parcel Monitoring**

To enhance delivery security, many smart parcel systems incorporate CCTV surveillance. These systems continuously monitor delivery operations and record footage for verification and safety purposes. IoT-enabled CCTV monitoring also allows users to access live delivery information remotely through mobile applications.

[4] **Smart Lockers and Secure Storage Systems**

Automated parcel lockers represent another important advancement in parcel management. These lockers use authentication methods such as OTP verification, RFID tags, or password protection to ensure that only those who have authorization to stored parcels. Such systems reduce failed deliveries and improve package safety.

[5] **Cloud-Based Parcel Management**

Cloud computing has become an important component in smart parcel monitoring systems. Cloud-based platforms enable centralized storage of parcel data and provide customers with remote access to delivery information through mobile applications. These systems improve scalability, accessibility, and communication between customers and delivery providers.

[6] **AI-Driven Parcel Verification Systems**

AI approaches have also been introduced in parcel receiving systems for intelligent package verification and image-based recognition. AI-powered systems improve delivery accuracy and can detect suspicious activities during parcel handling, thereby enhancing overall system security.

[7] **IoT-Based Smart Logistics**

Modern logistics systems increasingly rely on IoT technologies, GPS tracking, and wireless communication to monitor delivery vehicles and parcels in real time. These technologies help optimize delivery routes, reduce transportation delays, and improve logistics performance

[8] **RFID-Based Parcel Authentication**

The application of RFID technology adopted for parcel identification and tracking. RFID tags attached to parcels enable accurate authentication and secure access control, reducing the possibility of package theft or misplacement.

[9] **Summary of Literature Review**

The literature survey indicates that smart parcel receiving systems significantly improve delivery security, operational efficiency, and customer satisfaction. Technologies such as IoT, GSM, AI, CCTV monitoring, RFID authentication, and cloud computing collectively help towards the growth of intelligent parcel management solutions. Future research may focus on energy-efficient designs, advanced automation, and intelligent monitoring mechanisms to further improve system performance.

III. PROPOSED METHODOLOGY

The Smart Parcel Receiving System is designed to automate parcel handling and improve delivery security using integrated smart technologies.

- The system utilises IoT technology, GSM communication, CCTV monitoring, IR sensors, and LCD displays for intelligent parcel management.
- The primary objective is to reduce missed deliveries and improve package safety.
- When a parcel is placed inside the smart box, the IR sensor automatically detects its presence.
- The CCTV camera records the delivery process for verification and security purposes.
- The GSM module sends real-time SMS alerts and notifications to customers.
- The LCD display provides delivery status and system-related information.
- Customers can remotely monitor parcel activities through smartphones or web-based applications.
- The system helps prevent unauthorised access, parcel theft, and delivery failures.
- Overall, the proposed system offers a secure, efficient, and user-friendly parcel receiving solution.

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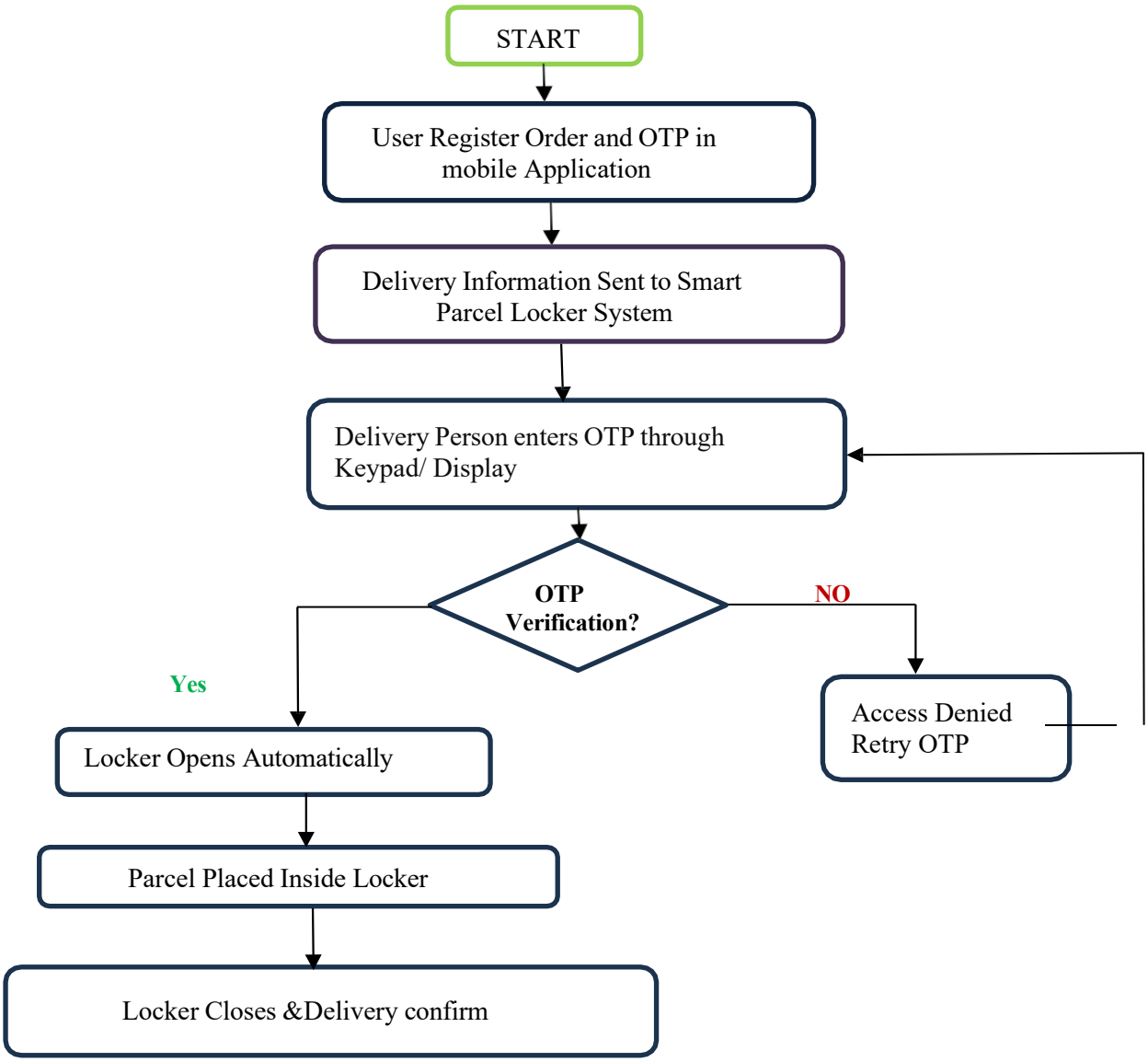
IV. SYSTEM DESIGN



V. WORKING PRINCIPLE

The Smart Parcel Receiving System combines both hardware and software components to ensure efficient operation.

The hardware section includes components such as Arduino UNO or NodeMCU, GSM modules, IR sensors, CCTV cameras, LCD displays, Wi-Fi modules, regulated power supplies, and a smart parcel storage unit. These components work together to detect parcels, monitor deliveries, and securely manage parcel storage.

On the software side, the system is developed using Arduino IDE and Embedded C programming. IoT platforms and mobile applications are also integrated to enable remote monitoring and system control.

The working process begins when a delivery person places a parcel inside the smart receiving box. The IR sensor detects the parcel and sends a signal to the microcontroller. Once detection occurs, the CCTV camera records the delivery activity for security verification. Simultaneously, the GSM module sends an alert message to the customer confirming successful parcel delivery. The LCD display updates the current delivery status and other relevant information.

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Through IoT connectivity, users can monitor parcel activities remotely using smartphones or web applications. This automated workflow minimises missed deliveries, enhances parcel security, and improves overall delivery efficiency.

VI. IMPLEMENTATION

- Arduino UNO or NodeMCU acts as the central controller of the system.
- IR sensors are used to detect parcel placement within the smart box.
- CCTV cameras monitor and record delivery operations.
- GSM modules send SMS notifications to customers after successful delivery.
- LCD displays provide real-time delivery information and system status.
- IoT integration enables remote monitoring through smartphones and web applications.
- A regulated power supply ensures stable and reliable system operation.

VII. ADVANTAGES

- Reduces the occurrence of missed parcel deliveries.
- Enhances parcel security and minimises theft risks.
- Enables remote parcel tracking and monitoring.
- Customers receive instant alerts immediately after successful parcel delivery.
- Offers a user-friendly and convenient interface.
- Improves the overall efficiency of parcel delivery services.

VIII. FUTURE SCOPE

- The system may be further improved with the help of Artificial Intelligence for intelligent package verification.
- Facial Recognition Technology may be adopted for security purposes.
- Cloud Storage may be incorporated for efficient handling and monitoring of data.
- Applications may be upgraded by integrating live video streaming
- Solar Energy Systems may be incorporated for energy efficiency.
- Voice assistants may also be incorporated for easy interactions with users

IX. CONCLUSION

The Smart Parcel Receiving System provides an advanced and automated approach to modern parcel management. By integrating technologies such as IoT, GSM communication, CCTV monitoring, and IR sensors, the system effectively addresses issues related to missed deliveries and parcel security.

The Smart Parcel Receiving System offers a modern and reliable solution for secure parcel management. By combining IoT technology, GSM communication, sensors, and surveillance systems, the proposed model improves parcel safety and delivery efficiency.

The system reduces manual effort, minimizes missed deliveries, and provides real-time updates to users. Overall, this smart solution enhances customer satisfaction and supports the growing demands of e-commerce delivery services.

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