INTELLIGENT ACQUISITION SYSTEM FOR PRODUCT CARRIAGE

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*Abstract-*The project introduces a comprehensive smart intelligent acquisition system of product carriage incorporating arduino uno microcontroller, sensors, GSM communication, and IP camera monitoring to revolutionize product delivery services. The system features an infrared (IR) sensor for precise product counting inside the box and a proximity sensor for detecting nearby the person, a coupled with DC motor operated through relays for secure door open and close access. Real-time status updates are displayed on an LCD screen, ensuring user awareness. In the event of unauthorized access, an alarm system promptly notifies relevant parties. Crucially, integration with an IP camera enables live video monitoring of the product vicinity, enhancing surveillance capabilities. Additionally, a GSM module facilitates remote communication, enabling authorized personnel to receive SMS and call alerts upon detecting the delivery person via the ultrasonic sensor. This feature streamlines coordination between delivery personnel and authorities. The incorporation of IP camera monitoring adds an extra layer of security and oversight, ensuring comprehensive surveillance of the environment. This research contributes to advancing smart infrastructure for efficient and secure product management, with potential applications spanning various sectors requiring automated monitoring, communication, and surveillance functionalities.

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Keywords—**Arduino uno, LCD Display, IR Sensor, GSM, Object Sensor, Relay. DC Motor.**

I. INTRODUCTION

This product introduces a comprehensive intelligent acquisition system of product carriage incorporating Arduino Uno microcontroller, sensors, GSM communication, and IP camera monitoring to revolutionize mail delivery services. The system features an infrared (IR) sensor for precise person counting and an ultrasonic sensor for detecting nearby individuals, coupled with a DC motor operated through relays for secure product Carriage access Real-time status updates are displayed on an LCD screen, ensuring user awareness. In the event of unauthorized access, an alarm system promptly notifies relevant parties. Crucially, integration with an IP camera enables live video monitoring of the intelligent acquisition vicinity, enhancing surveillance capabilities.

A GSM module facilitates remote communication, enabling authorized personnel to receive SMS and call alerts upon detecting the delivery person via the ultrasonic sensor. This feature in streamlines coordination between delivery personnel and authorities. The incorporation of IP camera monitoring adds an extra layer of security and oversight, ensuring comprehensive surveillance of the intelligent acquisition environment. This research contributes to advancing smart infrastructure for efficient and secure mail management, with potential applications spanning various sectors requiring automated monitoring, communication, and surveillance functionalities. With potential applications spanning various sectors requiring automated monitoring, communication, surveillance functionalities, the proposed system promises to revolutionize the way mail is handled and delivered.

II. LITERATURE REVIEW

Swarup Kumar Mitra et al., (2016) The system proposed is a door unlocking system containing multiple doors any of which can be used to access a certain zone e.g. a laboratory or library. The system is implemented using a central server which contains a central database gathering all the information about the authorized personnel. The hardware components required are RFID reader, passive RFID tags, wireless transmitter & receiver (433 MHz) and an Arduino microcontroller. Software assistance of Arduino IDE and Processing Development Environment (PDE) are required for control. There is also provision for real-time monitoring of users' activities i.e. entry and exit. This is made possible by automatic synchronization of the system with a secured webpage via internet.

Anish Sagar Naidu et al., (2022) In the present times, security is the primary concern for any household.

Automatic door control comes as a technological boom that works on sensors in providing security. Home automation is digitized, replacing the physical switches which have limited applications. This product provides a study on the design, technology, advantages, and applications of automatic door control. The role of various sensors involves different technologies to control the door automatically. The information is then communicated to the house owner via Bluetooth or Wi-Fi. These Smart systems enable high level security without our physical presence. This article proposes a method by which the door of the house can be openeautomatically for the authorized person based on face and voice recognition when the owner is not at home.

S. Subash et al., (2019) Voice controlled hardware applications are ruling the modern era. Most of the home appliances are expected to be automated through voice. This project illustrates an alter method of voice processing by combining MATLAB and ARDUINO. With this a voice is being processed and a door lock system is operated through Arduino. FFT is used to detect the voices. In this the FFT compares pitch of the given input voice and the sample voice stored in the database. Through this project any application can be added at the output. This project mainly deals with opening and closing a door lock for personnel use.

Alena Plasilova et al., (2022) One such instance is logistic with the increasing popularity and need for online shopping, the e-commerce sector is growing - which goes hand in hand with the logistics industry. This concept combines various elements and creates a multi-purpose smart city solution that can be easily integrated into different systems. It introduces new ways to receive and send packages, integrates as a part of a smart household, sends notifications, and can be used to collect valuable data. During the current coronavirus outbreak, this solution would prove to be useful in reducing interpersonal contact and thus help eliminate the transfer of the disease. Our calculations show great potential for such innovation.

Mohd Zain Md Ludin et al., (2021) The number of online shopping rocketed due to the COVID-19 pandemic outbreak and movement control order (MCO) enforced by the Malaysian government. The current situation contributes to the volume of the parcel that needs to be delivered by delivery companies in Malaysia. The case of unattended parcel delivery, parcel lost, and failed delivery attempts had caused a lot of trouble to the household and the delivery company. The Mobile Application Development Life Cycle (MADLC) methodology is adopted as a guideline in the project development. Every parcel delivery will be detected by the ParcelRestBox device, and the notification will be sent to ParcelRestBox mobile application to alert the user. Thus, this ParcelRestBox system is beneficial if it can be used by the household or adopted by property developer to equip newly developed property in smart city area in Malaysia.

III. Proposed Methodology

This product introduces a comprehensive intelligent acquisition system of product carriage that leverages the Internet of Things (IoT) paradigm, integrating an Arduino Uno microcontroller, various sensors, GSM communication, and IP camera monitoring to revolutionize mail delivery services shown in figure 3.1. The system incorporates an infrared (IR) sensor for precise person counting and an ultrasonic sensor for detecting nearby individuals, coupled with a DC motor operated through relays to ensure secure product carriage access. Real-time status updates are displayed on an LCD screen, providing users with continuous awareness. In the event of unauthorized access, an alarm system promptly notifies relevant parties. Crucially, integration with an IP camera enables live video monitoring of the intelligent acquisition vicinity, enhancing surveillance capabilities. A GSM module facilitates remote communication, enabling authorized personnel to receive SMS and call alerts upon detecting the delivery person via the ultrasonic sensor, thereby streamlining coordination between delivery personnel and authorities. This research significantly advances smart infrastructure for efficient and secure mail management.
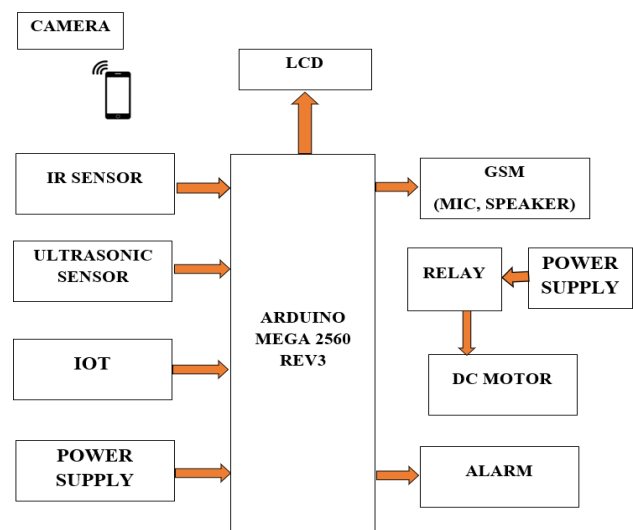
The block diagram concept constitutes a sophisticated acquisition system for product carriage, as depicted. The primary objective of this project is to detect human presence and subsequently transmit messages and phone calls to designated users. Additionally, it encompasses the task of monitoring product inventory levels and facilitating manual control over the door's opening and closing mechanisms. The system comprises two distinct power sources: one for the kit and another for the DC motor, both operating at a voltage of 5V. The input power supply, initially at 230V, undergoes

conversion to 5V through the utilization of two components a stepdown transformer and a power supply board. The stepdown transformer features primary and secondary windings, with the primary winding receiving the input supply independently from the secondary winding.

A. Arduino Board

Arduino is a single-board microcontroller to make using electronics in multidisciplinary projects more accessible. The hardware consists of an open-source hardware board designed around an 8-bit Atmel AVR microcontroller, or a 32-bit Atmel ARM. The software consists of a standard programming language compiler and a boot loader that executes on the microcontroller. Hardware design information is available for those who would like to assemble an Arduino by hand. It was estimated in mid-2011 that over 300,000 official Arduinos had been commercially produced.

Arduino is open source hardware: the arduino hardware reference designs are distributed under a creative commons attribution share-alike license and are available on the arduino web site. layout and production files for some versions of the arduino hardware are also available. The source code for the IDE is available and released under the GNU General Public License, version.

B. LCD Display

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal. An LCD consists of two glass panels, with the liquid crystal material sand witched in between them. The inner surface of the glass plates is coated with transparent electrodes which define the character, symbols or patterns to be displayed polymeric layers are present in between the electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle.

C. IR Sensor

An Infrared sensor (IR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field. Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall. All objects emit what is known as black body radiation. It is usually infrared radiation that is invisible to the human eye but can be detected by electronic devices designed for such a purpose.

"Infra" meaning below our ability to detect it visually, and "Red" because this color represents the lowest energy level that our eyes can sense before it becomes invisible. Thus, infrared means below the energy level of the color red, and applies to many sources of invisible energy.

D. GSM

GSM (Global System for Mobile Communications: originally from Groupe Special Mobile) is the most popular standard for mobile telephony systems in the world. The GSM Association, its promoting industry trade organization of mobile phone carriers and manufacturers, estimates that 80% of the global mobile market uses the standard. GSM is used by over 1.5 billion people[2] across more than 212 countries and territories.[3] Its ubiquity enables international roaming arrangements between mobile network operators, providing subscribers the use of their phones in many parts of the world. GSM differs from its predecessor technologies in that both signaling and speech channels are digital, and thus GSM is considered a second generation (2G) mobile phone system. This also facilitates the wide-spread implementation of data communication applications into the system.

E. Object Sensor

A proximity sensor is a smart device designed to detect the presence or absence of nearby objects without physical contact. It operates based on various principles such as infrared, ultrasonic, capacitive, or electromagnetic fields. These sensors are widely used in various applications, including smartphones, automotive systems, industrial machinery, and home automation.

In smartphones, proximity sensors are commonly utilized to detect when a user holds the device near their face during a call. Automatically turning off the display to prevent accidental touches. They also play a crucial role in gesture recognition and ambient light adjustment. The sensor's ability to accurately measure distance or presence enhances user experience by enabling intuitive interactions and improving device functionality. As technology advances, proximity sensors continue to evolve, becoming more precise, energy- efficient, and versatile, thereby contributing to the advancement of smart devices and automation systems.

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F. Relay

A relay is an electrically operated switch shown in figure 4.8. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example, a low voltage battery circuit can use a relay to switch a 230V AC mains circuit.

G. DC Motor

In any electric motor, operation is based on simple electromagnetism. A current- carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

IV.Result

This project presents the development of a home security system utilizing . Internet of Things (IoT) technology integrated with a GSM module for remote monitoring and control of door access. The system enables users to remotely open and close doors through a mobile application, enhancing convenience and security for occupier. The combination of IoT and GSM technology allows for real-time notifications and alerts in the event of unauthorized access attempts or door openings, providing peace of mind to users.Remote control of door access through the mobile application.Real-time notifications and alerts via SMS in the event of unauthorized access.Enhanced security and convenience for occupier.

V. Conclusion

In conclusion of smart intelligent acquisition system for product carriage presents a significant advancement in mail delivery services, offering enhanced security, efficiency, and adaptability to modern technological needs. By integrating advanced technologies such as Arduino Uno microcontroller, sensors, GSM communication, and IP camera monitoring, the system provides real-time monitoring, automated security measures, and remote communication capabilities. This comprehensive approach addresses the limitations of traditional mail delivery systems, ensuring secure and efficient handling of mail in various settings including residential areas, commercial establishments, office buildings, and university campuses. With its ability to detect intrusions, provide instant alerts, and offer remote access, the smart intelligent acquisition system for product carriage not only improves mail security but also streamlines delivery operations and enhances overall mailroom efficiency. Overall, the implementation of this system promises to revolutionize the way mail is managed, ensuring a safer, more efficient, and technologically advanced approach to mail delivery services.

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