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Smart Digital Door Lock for the Home Automation

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ABSTRACT: The term smart home is often used to describe a home that uses a home controller to integrate multiple home automation systems. The most popular home controllers are those that connect to a Windows-based PC. In our project, we introduce part of smart home equipment using Bluetooth and Android app on mobile phone, so that it will be easier and better to use. However, the smart door lock industry is very expensive, but it will increase personal security, which affects the popularity of the smart door. To solve this problem, we have developed a security door lock system suitable for office use. Connects Wi-Fi enabled devices. The built-in camera in the device is connected to the network. If someone needs to enter through the door, they have to press their finger first. If the operator is authorized, a signal is transmitted from the Bluetooth device to the Nano microcontroller, allowing the engine to open the door and displaying the "Authorized Person" message on the LCD screen. If the recipient is not authorized, the OTP notification is sent to the authorized recipient's Android app. Authorized personnel then monitor the guests online via Wi-Fi cameras. The authorized person then sends a signal to the Arduino UNO microcontroller about the input port as requested. This automation system has many advantages, including simplicity, ease of use, and enhanced security, making it more useful for modern smart homes and businesses. By eliminating the reliance on traditional keys and using Bluetooth technology, users can easily access the controls while enjoying the convenience of controlling the lock from an Android smartphone.

I. INTRODUCTION

In recent years, advances in technology have revolutionized various aspects of our daily lives, and home automation is no exception. One area that has seen significant progress is door lock automation, which increases security and convenience for homeowners. The door lock automation system using Bluetooth based Android smartphones has proven to be a popular and cutting-edge solution for solving the problems of traditional key based locks. This innovative system uses the power of Bluetooth technology, widely available in modern Android smartphones, to provide seamless access control and monitoring capabilities. This system has two phases of monitoring. First, the person is asked for a fingerprint. If the fingerprint matches, the person is authorized. Then the signal is transferred to the Arduino UNO microcontroller via the Bluetooth device and the door is opened via the motor. If the person is unauthorized, then the OTP is sent to the authorized person's Android app and the guest can be viewed through the Wi-Fi online camera. Then the signal is sent to the Arduino UNO microcontroller via Bluetooth to access the door. Combining convenience, security and remote access capabilities, this technology offers homeowners a modern solution to effectively manage access to their properties. The main goal of this project is to develop a smart door lock system where an administrator or owner of an apartment or building can manage and send digital signal to other persons in order to allow them to access an apartment, building, or specific room in a building by using their NFC equipped smartphone or a NFC smartcard. The door microcontroller is controlled using the Android App. Android App interface with door microcontroller through Bluetooth. The Bluetooth technology operate over unlicensed 2.4GHz frequency, it can link digital devices within a range of 10m to 100m at the speed of up to 3Mbps but it depending on the Bluetooth device class. Home networking can also offer peace of mind. Whether you're at job or on holiday, the smart home will aware you to what's going on, and security system can be built to offer some help in emergency situations. For example, not only would a house owner be woken with warning of a fire alarm, the smart home would also release doors, call the fire department and light the pathway to safety. A simple electromagnetic relay, such as the one taken from a car in the first picture, is an adaptation of an electromagnet. It consists of a coil of wire surrounding a soft iron core, an iron yoke, which provides a low reluctance path for magnetic flux, a moveable iron armature and a set, or sets, of contacts; two in the relay pictured. The armature is hinged to the yoke and mechanically linked to a moving contact or contacts. It is held in place by a spring so that when the relay is de-energised there is an air gap in the magnetic circuit. In this condition, one of the two sets of contacts in the relay pictured is closed, and the other set is open. Other relays may have more or fewer sets of

contacts depending on their function. The relay in the picture also has a wire connecting the armature to the yoke. This ensures continuity of the circuit between the moving contacts on the armature, and the circuit track on the Printed Circuit Board (PCB) via the yoke, which is soldered to the PCB. When an electric current is passed through the coil, the resulting magnetic field attracts the armature, and the consequent movement of the movable contact or contacts either makes or breaks a connection with a fixed contact. If the set of contacts was closed when the relay was de-energized, then the movement opens the contacts and breaks the connection, and vice versa if the contacts were open. When the current to the coil is switched off, the armature is returned by a force, approximately half as strong as the magnetic force, to its relaxed position. Usually this force is provided by a spring, but gravity is also used commonly in industrial motor starters.

II. LITERATURE SURVEY

Ketan Rathod [1] : This project discusses the development of a Bluetooth-based home automation system using an Android smartphone. The authors describe the system's hardware and software in detail, with a particular focus on door lock automation. It describes the Bluetooth communication protocol and describes the Android application development process to manage various home automation tasks. This article also describes security considerations for the system.

Lubhansh Kumar Bhute [2] : This conference paper presents the smart door lock based on the Internet of Things (IoT) and integrated with a mobile application. The authors recommend using Bluetooth technology to enable users to control the door lock from an Android smartphone. This article provides an in-depth look at the system architecture, mobile app interface, and user authentication for secure access.

Nishad N. Gupte and Mihir R [3] : The aim of this master's study is the design and realization of a door lock system connected to an Android phone using Bluetooth. The author describes the process of creating an Android application to control the hardware configuration, Bluetooth communication protocol, and door lock. The report also evaluates the performance of the system and discusses the security features used to prevent unauthorized access.

Rahul Satoskar and Akarsh Mishrac [4] : In our project, people can enter through the closed door at home or outside anytime and anywhere using the atmega-32 microcontroller, Bluetooth app and webcam, the owner can voluntarily control it at any time, this form is part of the smart home security system. This article introduces a design that allows entering a building without having to remember the door lock code.

Agbo David, Madukwe Chinaza [5] : Compared to other systems, security protection is reduced because all access is in the hands of the system owner. The door lock system can be accessed anytime and anywhere, so this article is useful for people with physical disabilities who can enter the house.

Hashem Alnabhi, Yahya [6] : presented the paper Smart Door Locking System. Bluetooth technology is used to power this smart door locking system. To lock or open the door, it uses a specified password technique. IoT Based Door Access Control System Using Face Recognition. This device employs the ESP-32 camera to capture the user's image and applies a facial recognition algorithm. It's a multimode device that can be controlled through fingerprints or Face Recognition. It's a multimode device that can be controlled through fingerprints or Face Recognition. It has two modes of operation: Normal and Advanced. Along with the lock, the door has been created in such a way that it does not lag in terms of security.

Shahid Sohail, Sajid Prawez [7]: presented the paper "Android Based Smart Door Locking System. The procedure is based on a preprogrammed passcode. It improves security to prevent unathletically damaging and imposture by hackers. D.Arul Preethi, R.Nagarajan, and S.Kannadhasan presented the paper Sound Based Door Locking System Using Arduino. This device senses the user's frequency and reacts accordingly.

R. Das, and G. Tuna (2021), [8] : Smart IoT-based Facial Recognition Door Lock System A smart IoT-based facial recognition system is a proactive approach that can take immediate action upon a security threat. The system recognizes the face of that person nearby the door and compares it with the faces uploaded to the database. A message and email with an intruder image will be sent to the owner in the event that an unknown person enters the building. This system uses Raspberry Pi, a Pi camera that is installed near the door to recognize an intruder's face, Direct Current (DC) motors

connected through relays to open the door, Light-Emitting Diodes (LED) to indicate whether the door is open, and a GSM module is used to send texts to the registered mobile number.

Haroon Iqbal, and Sameena Naaz [9] : Microcontroller-based Password Enabled Door Lock System Microcontroller-based Password Enabled Door Lock System is an electronic security system that can detect an intruder and report it to the security personnel. The construction of an electronic digital lock using a microcontroller based on security information using a fourdigit pass key. This operation involves opening the door, closing the door, changing the password, and alerting when entering the wrong password.

Chunnu Khawas, and Pritam Shah [10] : Through web camera which is located in front of the door, images are captured and pass towards owner's smartphone through the cloud, so the owner can easily view the live feeds and give access The research objectives are achieved by using a micro-controller that interfaces the ATMEGA328P microprocessor with all the other components in the circuit. In the end, the circuit has activated by the relay and triggers the alarm. The passwordprotected lock system is designed previously using a microcontroller known as an 8051, accompanied by a 4*3 keypad for entering the password. A comparison is made between the entered password and the predefined password. If the password is correct, the door will be unlocked by rotating the door motor and the status of the door will be displayed on Liquid Crystal Display (LCD). On the other hand, when the password is incorrect, the door remains locked and a message appears on the LCD that reads "Password incorrect". The information will be stored in the database.

III. CONCLUSION

The door lock automation system using Bluetooth-based Android smartphones is a modern efficient solution for increasing security and comfort in residential and commercial spaces. Through this project, we have successfully developed a system that allows users to control door locks using their Android smartphones using Bluetooth technology to create a secure and reliable connection between the devices and the locking mechanism. Overall, the Bluetooth-based Android smartphone door lock automation system is a promising solution that offers a number of benefits for modern access control. If implemented with proper security measures and regular updates, it can significantly improve the overall security and convenience of access to the premises. A safe locking/unlocking system based on a keypad and Arduino is proposed in this paper. Adding a password on the Arduino side improves the security of the system. As a result, the "Smart Door Locking System utilizing Arduino" is a modern take on the traditional door lock. The innovation generated by the lock system with no more direct touch between the user and the lock is the end of the topic of smart Lock utilizing Arduino. This system is very cost-effective and easy to install and is designed under different modes which makes it useful. The Smart locking system has great potential. It will allow users to forget about their traditional key and to use only their mobile device to get access to the needed area. The system will be developed in the future to provide more extensions and to be as mobile as possible.

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