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Intelligent Door Lock Mechanism

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Abstract –

Our daily life revolves around the concept of automation, and automated things are said to be beneficial because they reduce human intervention. Our idea revolves around developing and implementing a smart door lock system that can be used in rental properties/homes/safe deposit boxes, so only authorized personnel can access it. Security is such a big concern these days that existing technologies such as simple keys are no longer foolproof. Our smart door lock system requires the owner to set a PIN every time the space is rented to a new guest. The guest unlocks the door with his one-time password (OTP) you just need to This is convenient for both the location owner and the guests renting the location. Create secure and easy-to-use smart door locks in hotel-like buildings using one-time password (OTP) and SMS processing.

Keywords— auto-lock system, chat bot, pin generation, smart door lock, OTP-based door lock, IoT

I. INTRODUCTION

Short-term rentals of rooms and households now include an exchange of keys between the tenant and the apartment owner. Not only is this a waste of time for both parties, it also poses a security risk as keys can be lost or guests can make copies of their keys. Security has become a serious threat these days and people are choosing more secure resources. Many robberies have been recorded. So you can use this smart locking system to eliminate the weakness of the traditional locking system which is the key. The system can generate a new password each time a guest rents a space, giving her an extra level of security. This system can be upgraded to alert the police in the event of an attempted break-in and completely disable the entire locking system. A guest enters a PIN into the system to enter a room or guest house. This her PIN is valid throughout the guest's stay. If a guest wants to change her PIN, they can do so simply by interacting with the chat bot. On the other hand, the property owner can operate the lock-her mechanism and view entry/exit logs via the app. is also possible to obtain details such as guest's check-in or check-out dates, their mobile number, activity log of entry and exit etc.

Using a physical key to lock or unlock the door is the most natural way of and everyone is familiar with. The physical key is a well-tested and well-known technology, but it has its weaknesses. Only one unique key is allowed per lock. Different locks have different keys. Additionally, carrying a large number of keys is a burden and increases the likelihood of stolen, misplaced, or lost keys. Our goal is to develop a secure access control solution that replaces physical keys and allows access to doors.

Proposes a solution using a smartphone's digital key, enabling wireless and automatic unlocking via Bluetooth. This design facilitates implementation and key distribution, and devices operate autonomously. This improves security and eliminates the need to carry physical keys.

II. LITERATURE SURVEY

In [1], the authors described a home automation system based on WiFi networks that provides features such as alarm-based door locks, mosquito detection, device remote control, and smart water tanks. In [2] he proposed a smart house system where doors are unlocked based on live feeds. In [3], the authors proposed an intelligent door lock system that works even during power outages. In [4], the author designed a door lock mechanism using ZigBee and his RFID technology. In [5], the author uses a local area network to implement intelligent door locking functionality. In [6], the authors used Bluetooth technology to establish a connection between a visitor's smartphone and hardware to implement a door opening function. It is designed to accommodate people with disabilities. In [7] the author designed a smart her-home her system that allows owners to remotely control various devices. The system was developed with disabled and elderly people in mind. In [8], the authors proposed a system in which guests access the facility by pressing a switch and are granted access based on a facial recognition system. In [9], the author used the short-range wireless communication function of smartphones for access control.

The rest of the paper looks like this: Section III describes the system architecture of the system. Section IV describes how the system works and a snapshot of the results. This is followed by Section V's conclusions, followed by a list of references.

III. SYSTEM ARCHITECTURE

A. Block Diagram

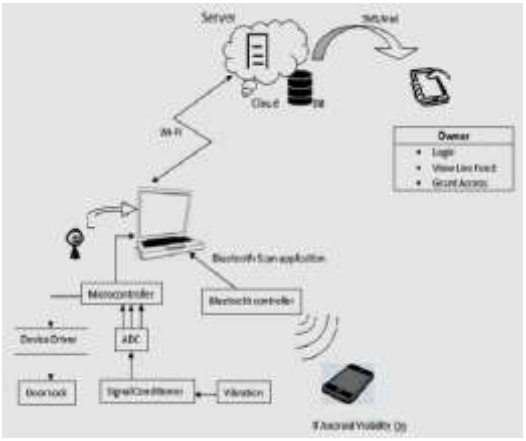

Fig. 1. System Architecture.

B. Node MCU Module

We used node MCU and ESP8266 processor microcontroller because the whole system is based on open source IoT platform. It is an integral part of the overall system. Generate a PIN and send it to the lessee to update the database. It also handles other system components such as the locking mechanism, which consists of a door lock motor (servo motor), keypad (4X3 matrix keypad) and LCD display (16x2 alphanumeric display). The locking mechanism has various commands such as: B. Command to unlock the door after successful verification of the entered PIN. Node MCUs are connected to servers and databases via built-in WiFi technology..

C. Smart phone Android App

An Android phone has an Android app installed that is activated with the Firebase database service. This application is intended for location owners only. With the help of this app, the owner can view the door lock status whether the door lock is open or closed. You can also disable the lock completely if you prefer using the main switch button next to the door name in the app. Apart from that, it provides owners with additional features such as viewing entry/exit logs, allowing location owners to view upcoming bookings, and guest booking details by providing check-in and check-out dates. can be entered into the system. phone number and her name. All booking details entered by the place owner are stored in her Firebase database and later used by her Arduino board during the pin generation and routing process.

D. Chat Bot Service

This innovative service allows the user of the system to install a specific application, or the user device to be connected to the system via Bluetooth, or other door locks where the device must be on the same Unlike the system, the whole system will be unique. Network via WiFi. This chatbot service allows guests to operate the locking mechanism without having to install a third-party app or be connected to the same network as the system, thus reducing the hassle.

It's a Python-based chat bot service that can be added to users' devices using existing user apps, such as Facebook's Messenger app or the popular messaging app Telegram. This service allows users to request a new PIN in case the original PIN is compromised. It also overwrites the updated pin instead of the original pin in the database.

E. Server and Database

The Firebase database is another key component of the system. You are responsible for storing all important data in our database, such as owner login information and guest reservation information. A server, on the other hand, acts as an intermediary between the Firebase database and other system components. Responsible for transferring and receiving data and commands from owner apps, Node MCU modules, and chat bot services.

IV. WORKING OF THE SYSTEM

The smart locking mechanism is primarily operated by two entities. That is, property owners who install this system in their rental properties, and guests who rent properties equipped with this system. Let's explain how the system works from the perspective of both parties. Refer Figure 2

A. Owner Side

Property owners must install the Android application when installing this system on their property or other rental properties. Allows interaction with the system as needed. First, the owner must create an account and register in the system. The home screen of the application shows the name of the door and the main switch next to it. A master switch allows the owner to disable the lock if desired. By default, the switch position is set to "ON", indicating that

the locking system is enabled. The application also includes a calendar where the owner can view upcoming reservations, his activity, and detailed information such as phone number, reservation name, and check-in and check-out dates for new reservations. These details are stored in the Firebase database his Arduino uses when generating the PIN. Apart from that, the owner can also see a log that stores the time and date of guest entry and exit. An owner login page view is shown in Figure 3. Figure 4 shows the view of the main page as seen by the owner. A calendar view is shown in Figure 5.

B. Guest Side

When guests who rent the space arrive on check-in day, they press the standard '#' key on the door keypad to operate the locking system. See Figure 6 for details.

Now the Arduino module that handles all locking mechanisms checks the database for posts on that particular date. If a reservation exists, the Arduino module will generate a PIN for her that will be valid for the guest's entire stay (from check-in to departure date) and send it to the server.

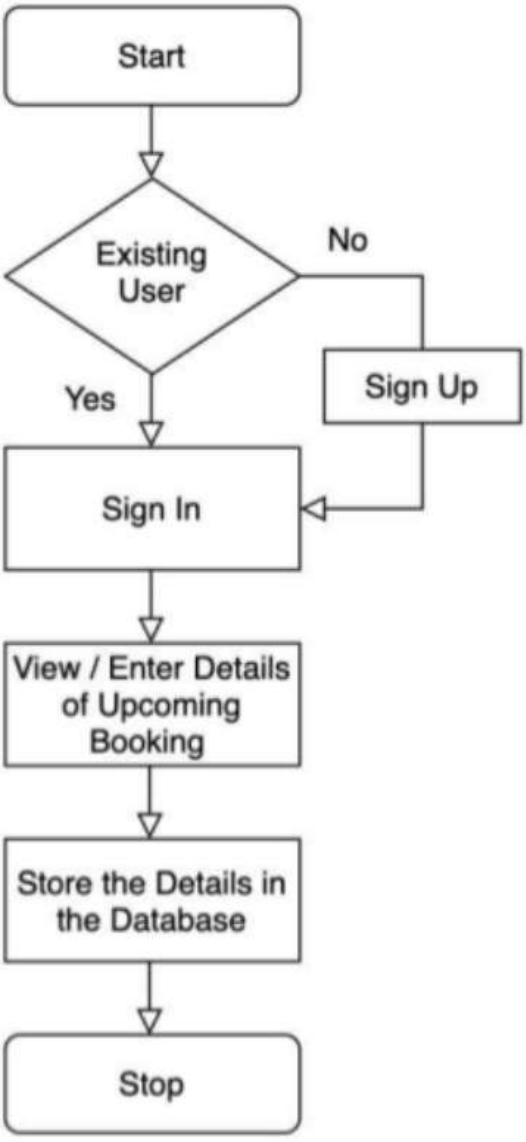

Fig. 2. Owner side App Flow diagram.

The server stores this PIN in its database and sends it via SMS and email to the registered guest's mobile number. The guest then uses this PIN to access the property. The Arduino module then checks this pin and, if the check is successful, opens the door for the guest. It also saves the guest's entry date and time in the database.

Fig. 3. Owner side Login page in the App.

Fig. 4. Owner side Main page in the App.

Fig. 5. Owner side Calender page in the App.

We also added some special functions for handling some common events. This not only improves security, but also makes the system easier to use.

An unauthorized person may attempt to access your facility. To prevent this, we added a flag to disable the lock if the user entered her pin incorrectly more than 5 times. In such a condition, the Arduino module will disable the lock and notify the facility owner. This event also sets the owner application's master switch to the off position, indicating that the lock is disabled. Once the event has been resolved, the owner can re-enable locking simply by moving the application's master master switch back to the "on" position.

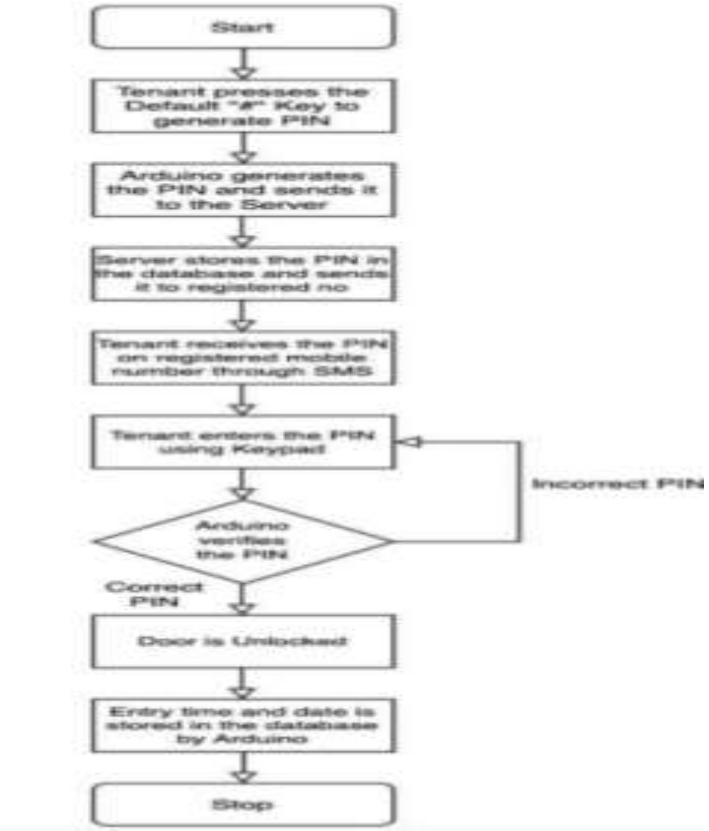

Fig. 6. Guest side Flow diagram

In some cases, the PIN used to access the property is accidentally exposed to the renter's luggage carriers and cleaning staff. Guests can request a new PIN to maintain security of their belongings and location. This is done by interacting with the Chat Bot. Chat Bot can be accessed through a pre-installed

messaging app that may be present on the guest's mobile phone. B. Facebook Messenger app or Telegram messaging app. A guest can request a new girlfriend PIN by sending the command "/new pin" to the chat bot. After receiving this message, the Chat Bot will generate a new PIN and send it to the guest. On the backend, the new pins are overwritten in the database instead of the old ones. See Figure 7.

V. CONCLUSION

Therefore, in this document we have put a revolutionary twist on the traditional door look system. We used her Android application for building owners and her Chat Bot for guests to automate the process of locking doors and eliminating the need to change keys. pin. Our proposed system fully leverages the capabilities of the IoT environment to monitor and authorize access. Our proposed system fully leverages the capabilities of the IoT environment to monitor and authorize access. Also, unlike other systems on the market, our system does not require guests to install an application to interact with the system or be connected to the same network as the system using Bluetooth or WiFi. there is no. A legitimate user after successfully verifying her PIN entered by the guest

Fig. 7. Example of the Chat Bot Message View.

This improves the usability of the system and the overall security of the facility where the system is deployed.

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