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Fastener Lock

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Abstract: ***This paper report describes the development of an Internet of Things (IoT) application based upon Digitizing a smart door lock for making it connected to the internet and to provide secure access only to the authenticated person. The project's objective is to build an application for "optimized locking and unlocking a device using mega controller" IoT Lock Protection System, which will help a lot of people. in decreasing a work by managing some technologies. It uses a wireless device to send a signal to the door from a cell phone. This lets the user unlock a door from inside or outside a house with a Wi-Fi range if the user is outside the house this lets the user communicate with the person standing outside the door with the help of a camera and speaker located on the door.***

Keywords: ***Smart lock, Internet of Things, technologies, secure access, authenticated person.***

I. INTRODUCTION

Several control strategies have been improved over the years to avoid risk to unauthorized individuals. The primary purpose of supplying our house, education, workplace, and building locks is to guarantee the protection of our life and properties. It is, therefore, necessary to provide a convenient way to achieve this aim. The automatic door mechanism has been a common function in several various styles in buildings and residences. And every day, the creation of an efficient electronic system that provides protection is becoming mainstream. Home security has been a major issue because of the increase in crime rate and everybody wants to take proper action to prevent unauthorized use. This gives rise to the need for a security system which can prevent unauthorized access to high-security zones such as locker room of banks, casinos, garage, military sites, etc. To date, many Security Systems such as RFID [1] OTP based system [2], biometrics [3], GSM-based [4], Bluetooth based [5], social networking sites based [5], speech recognition [7] is used to prevent unauthorized access. Security is about the protection of our lives and belongings. Ensuring the safety of peoples and their valuable things is very important for the prevention of illegal handling. Therefore, it is especially necessary to concentrate on door lock protection or door protection to avoid more issues in the area monitored. Even with the use of mechanical locks, the crime, robberies get happened since such locks were easily broken. So, there's a need to create some kind of locks that can't be accessed easily. To overcome the limitation of using Bluetooth signal (maximum range of 100 m), researchers also introduced a popular technology called a Wi-Fi-based home control system [8]. In a Wi-Fi-based home control system, a dedicated webserver and personal computer have been used, which is complex and not flexible. GSM based cellular network has been applied in home appliances management system for longer range communication than Wi-Fi [9]. The paper “Access control of door and home security through the internet” [10] describes the system for controlling the door lock via the internet. Smart Lock has technology and service integrated into a home network to easily be accessed remotely in upgrading a lifestyle of clients [11]. Where connectivity around low-power ESP8266 Wi-Fi as a device on phones and computers utilizing the MQTT protocol is made simpler and much more reliable [12]. As a backup or option, we are providing an OTP system. Through various analysis, it's proven to validate that OTP Lock offers a fast and efficient unlocking experience which is highly secure, and successfully helpful in minimizing the crime rate as OTP offers the physical security of traditional door lock system without the need to carry extra keys. The one-time-password scheme enables better experience among the client. The author in [13] has used the OTP technique in his paper where their experiments show 100% accuracy with 1.33 kbps of average data rate is achieved up to 20m of the distance between a Mobile and a lock. So, the proposed system allows authorized homeowners to monitor and control the entry and exit system remotely using the android or web app.

II. CURRENT METHODOLOGY

Door lock security systems are classified based on the technology mentioned below:-

1) *Password Based System:* The locks based on the Password system are also known as Integrated Combinational Lock. These Locks are designed in a manner that it will not open until and unless the correct set of predefined combinational digits are entered through a keypad.[14] For operating this device, GSM/CDMA module can be used. The latest security system [15] is designed where the locking security system can be enhanced and evolved with the help of RF and GSM wireless technology by using a 4-digit password that provides authentication and security.

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2) *Biometric Based:* The Fingerprint recognition system has evolved to its next step that is the palmtop recognition system. This system operates on the image of a palmtop.[16] The system works by partitioning the captured image of a palmtop to identify the image of the right person. This system reduces the probability of errors in other human recognition methods and also solves and clarifies the problems raised in the fingerprint recognition system. The Biometric Based systems were useful in bank lockers. Vein Detector and Iris Scanner also provides accurate results.[17]
3) *GSM Based:* There is an immense amount of door lock security system where GSM is used for communication. GSM Based System is used for sending SMS. For Detecting any obstacles this system requires various sensors. Further in this system it will gather data from the sensors and will settle on a choice and with the help of the GSM Module, an SMS is sent to the respective number.[18]
4) *Smart Card Based System:* In a smart Card-Based system the entire control activity is controlled by a microcontroller. In this system, the user would be permitted to enter only with the valid card of smart RFID.
5) *Door Phone Based System:* In the Door Phone-Based System the user can enter the door with the help of a telephone set. The latest system for this is based on a Video Door Phone Surveillance which is used to identify the visitors developed by ChauHuang Wei et. al. [19]
6) *Bluetooth Based System:* Bluetooth Based system works with the feature of Bluetooth available in smart devices. The framework used in Bluetooth is even more simple and productive for appropriate utilization. These systems are usually based on the Arduino Platform. In this system, the hardware is generally the combination of an android smartphone and Bluetooth module. [20]
7) *OTP Based System:* In OTP Based system a one-time password is generated and is sent to the registered phone number of the user whenever the user requests for the facility of access to the entryway. Then the user must enter the correct received OTP through a keypad and if the entered digits are accurate the door will open. In the case of the unavailability of phone users must answer the Security Questions Correctly. [21]
8) *Combined System:* The Door Lock System which consists of RFID, FINGERPRINT, PASSWORD, and GSM technology containing door locking Frameworks. This system is used to unlock the door in a Real-time manner.[22]

III. PROPOSED METHODOLOGY

This Research paper entitled Fastener Lock enlightens the concept of higher security with the use of rapidly increasing technologies. When a person arrives home or stands in front of the door that has Fastener Lock installed in it, he would initially Scan the face using camera. As soon as the face scanned notification will be pop-up on user phone, an image of that particular person would be captured with the help of a Camera Module. In this module push button will be used as a switch, inserted in a breadboard, one wire would be connected with GND and another will be connected to GPIO pin. Whenever the bell will be pressed, Live Streaming of that person will be captured and stored in RPI and would be immediately sent on an android application.

The android application would be developed especially for the users of Fastener Lock and no intruder would have any sort of access available for that. This would increase the security for one's House, Office, or Lockers, which is one of the most important aspects of having a Lock. The installation process would be established with the help of Linux commands. The user needs to add the contact details while the installation process, the data will be saved.

After receiving the video of a visitor standing by the door, it will be upon our user to identify the one as a guest or an intruder. GUI of our application would be designed to make it easy and least time consuming for the user to access it and open or close the doors as soon as possible. If the User identifies its visitor door as someone, he wants to enter his property he can simply press the button of "open" on his android application and if the one by door is considered an intruder then the user can simply press "close" on his application. The Fastener Lock would also provide the feature of two-way communication between our user and its visitor with the help of Microphone and speaker that would be installed in it.

There are few places or parts of the City where the internet connectivity is not constantly available due to severe network issues and this can make the user suffer for not having an excess to enter his property and may cause few problems for them, to minimize the possibility of any sort of issue to be faced by the user, Fastener Lock would also provide a feature of sending the OTP offline with the help of GSM Module.

The requirement for this project includes a Raspberry pi model 3B+ having the SD card(8gb) which has a Raspbian OS, a switch, a camera module of 5Mp, Speaker, Microphone, Keypad, also an android phone with installation of an android app developed for Fastener Lock. It also requires a power supply of 1.5A to even 2A, a USB cable. The coding would be completed in python having a python IDE version 3.6. There is a requirement of necessary modules and Libraries.

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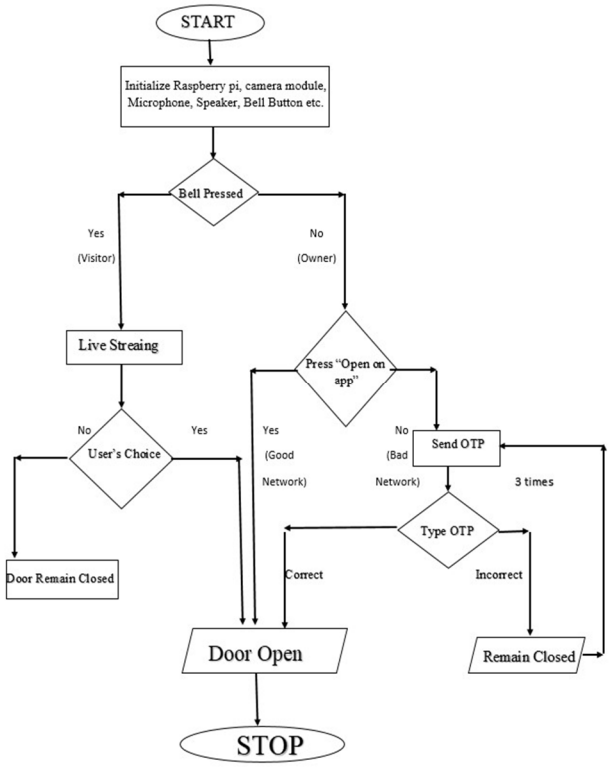

Fig 1. Flow Chart of Fastner lock

IV. CONCLUSION

Thus "Android Based Smart Door Locking System" is, therefore, a new predecessor to the traditional door locking system. This system is very cost-effective and easy to install and is designed under different modes which makes it useful. The system provides different modes of operation (Single User, Multi-User, Multi-Level), which makes the system more attractive, useful and more security.

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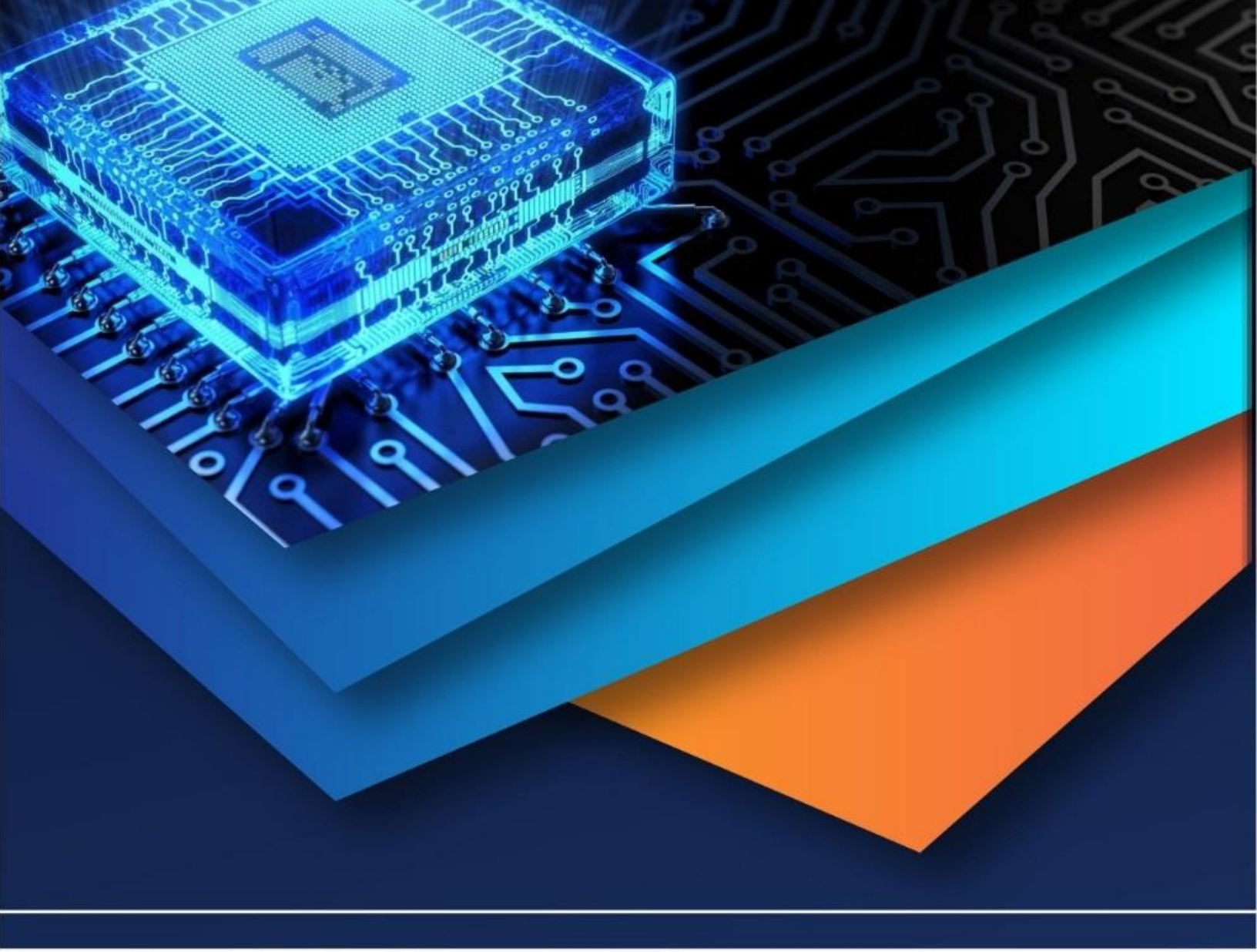

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