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IoT Based Finger Print Door Lock system using Node MCU

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ABSTRACT — Throughout our modern generation and we are concerned about several technologies. However, the primary and vital issue that everyone faces is privacy and security at our homes, offices, schools, and many more places that want security but do not get it. The current manual locking system looks like a casual lock but can be easily opened with well-known illegal methods. The better option is to use a biometric lock; it is more secure than others because it uses a fingerprint to open the door, which is our unique identity. So in this paper, we will be going to see all the implemented methods that are used to make IoT-based Fingerprint Door Lock systems using.

NodeMCU

Where we used a fingerprint module, NodeMCU, and servo motor.Keywords — security, IoT technology, fingerprint module, wifi module, servo motor

I. INTRODUCTION

As technology is evolving unimaginably, we need an ever-developing security system for our homes. There are many options to secure our home, but there are specific associated issues; for instance, if we lock our door with a casual market lock, we must carry a key everywhere. Everyone wants a reliable device that can provide better security. Someunexpected situation wherea person locks himself in the room leaves the key inside or loses the keys are very annoying where we cannot do anything but wait for someone with the keys. Therefore we ask if there is any reliable solution. The answer is "YES." This is our IoT-based fingerprint door unlocking system. Nevertheless, how can we say it is more secure than an existing one?

A second problem arises when any of our relatives or a friend comes to our residency and wants to enter our home but cannot do so because none of the official residents are physically present at the house; with the help of IoT technology which will be used to contact the server and control our main door, we can open the door without our physical presence at our residence.

So in this project, we are implementing IOT Technology to develop an intelligent security system using a fingerprint module with the help of NodeMCU.

II. LITERATURE REVIEW

Paper named, Smart Door locking system using Arduinoproposed by Kartik A. Patil, NiteenVittalkar, Pavan Hiremath, and Monoj A Murthy mentioned that Finger Print sensors can scan readily fingerprint using sensors and there are some examples are mobile devices[1].Paper named Fingerprint Doorlock and home security system (2021) using Arduino and IOT authors Mohamad Farid, Mohammad Ramlan, and LilywatiBakar proposed that using a Particular sensor we can take a photo of an intruder standing next to the door using the sensor and send it to the user [2].From respective paper, Some features are mentioned in this research paper like fingerprint enabled door lock system is very flexible and customizable also it is more accurate than other system is in the market because it is more secure than other one[3]. The Paper named IOT based door Digital Door lock author mention that as per this research paper the system that uses multi-access authentication presented it used IoT technology to share data and receive command form the web, every data stored in the IoT servers. Also, they mentioned some limitation in their paper like it is a very costly product for A single door lock system and also it needa high power supply to operate it. IoT Based Finger Print Door Lock system using Arduino[4]. Arduino-based home automation using IoT (2018),In this research paper author Lalit Mohan Satapathy, and Samir Kumar Bastia mentioned IOT that is the Internet of thing, they discuss about the concept of internet-connected thing at home and how easy life is then devices communicate with each other using ML

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and IOT[5]. Automated Door Lock system using Arduino, Author mentioned About the Component they are used in their project Like Arduino Uno R3, microcontroller keypad module motor driver module. This project will take less time compared to others. Also, they mentioned major limitation of the system is its inability to automatically detect the presence of a person outside in the hall even when the door is locked [6].

III. METHODOLOGY/EXPERIMENTAL

A.Components

We are using four hardware components that are mentioned below**:**

1)Fingerprint Module: This is used to take fingerprint input from the user, save it and send data to NodeMCU to check whether this print is available. For this project, we used the R307 model.

fig 1: front view of fingerprint module used. (R307)

Fig 2: Back view of fingerprint module used (R305)

2)Wifi Module (node MCU): Our system's CPU controls all the connected components. It is effortless to handle. It uses TCP/IP protocol to communicate with the internet and works on the 2.1 GHz frequency. We shall give a command over the internet, and then it will react accordingly to it; as per our project, we are using IoT technology, so all need to connect it to the internet.

Fig 3: Nodemcu used for our project.

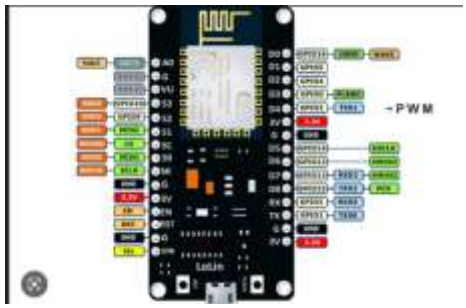

Fig 4: Nodemcu pinout diagram.

2)Breadboard: The Breadboard is used to check andmanipulate multiple connections at once in the circuit.

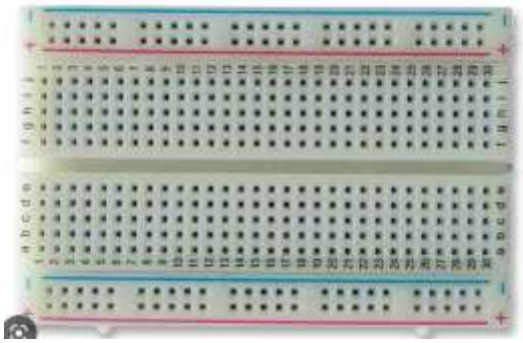

Fig 5: Photo of a breadboard.

4) Servomotor:-It is used as a door lock or latches which rotates 180 degrees for the door to be opened.

Fig 6: Servo motor with pins

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B.Pseudo Code:

The flowchart of code execution will look like this,

1. Enroll your fingerprint and save it to the Fingerprint sensor's memory.
2. Scanning the fingerprint.
3. Check if the fingerprint is from group A or B

a.)If from group A: No need for permission, the door will be unlocked as the system will consider him/her a resident.

b.If from group B: Notification will be sent to the house owner for requesting access for the nonresidential person waiting at the door.

4. If the match is neither from group A nor from group B, no access will be given**.**

IV. RESULTS AND DISCUSSIONS :

The result of this project would be:

1)When the resident may have forgotten his/her keys inside and has chances of being locked outside, they could easily access the door without the worry of a keymaker using their phone.

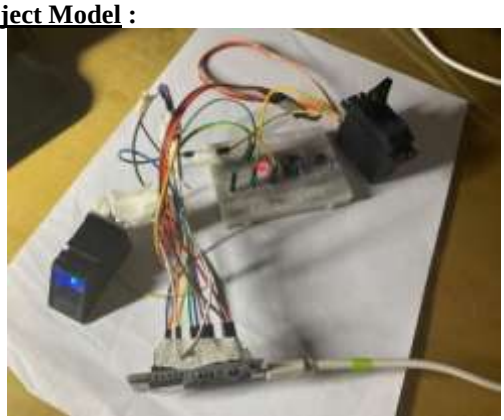
2)When the fingerprint match is found from the above two groups following results will get:

A) if the match is found from group A then no permission will be asked, and the house owner will easily access the door without any keys

B) If the match is found from group B a direct message will be sent to the owner from the cloud messaging system that "stringvariable(name of the fingerprint's owner) is trying to access the main door, would you like to give access?" and the owner will get the option yes or no into his phone device.

3)Home residents being able to give remote access to a recognized person to open the main door without anyone being at the residence and avoiding manual intervention

Project Model :



V. FUTUTRE SCOPE/CONCLUSION

Theentire model and the implementation of the biometric door lock system are upgradeable and modifiable. Our fingerprint-based lock system is designed to recognize fingerprints quickly with high precision, providing complete integration with users and greater security. Suppose fingerprinting doesn't work in some situations. In this case, you control and unlock the door with your mobile phone. With deployment costs in mind, we planned to create a system that would be affordable for both large and small businesses. Additional features are added to the system, such as So if you can use it to control multiple doors, you can't use even one lock. Systems are being developed to store many prints without the use of computers, but they require more parts than ever before. To ensure proper hardware security measures, the entire mechanism must be located inside the door panel or opposite the door. You can create a system for batteries or use solar charging. One of the main advantages of this method is its flexibility. This allows you to develop a variety of other systems. We also add some other sensors to make it more secure by adding a proximity detector. You can even add a camera to take pictures of people entering your door on your doorstep. Every fingerprint is unique, so the sensor is ready to recognize all fingerprints during testing. Allows better control over access to local locations

This method has some drawbacks. Being a closed system complicates changes in the hardware. Also, because they require a lot of power to function for control, they can be difficult to continuously power from batteries. It becomes unusable due to a power outage. In this case, you can connect the system to IPS or add a rechargeable battery to the system.

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