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Smart Security System Access with Intrusion Detection

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ABSTRACT: Security has become a major concern in present society. In general, several security systems are deployed to avoid unauthorized persons entering personal or restricted areas. The traditional security locks are unable to give proper security to the user due to several limitations. This system aims to overcome such consequences and provide strong and real-time secured access through alternative modern technologies like password systems, and facial recognition by abstracting, comparing, and recognition techniques. The use of these is to provide access only to an authorized person. This system uses integrates various modules for safety purposes. As well, the cloud stores, compare, and analyze the information.

KEYWORDS: Security, Face recognition, Password, Safety, Modules, Cloud.

I. INTRODUCTION

There is a drastic development in technology nowadays, so humans became digitally dependent to secure homes. Round the Globe, everything is interconnected with smart devices. So, it is essential to upgrade existing systems to make them even smarter. As we all have fear of unauthorized people entering our house, we thrive to employ smart security systems to provide more security when compared to traditional lock systems. We can achieve safety needs using locks that can either be electronic or mechanical. Mostly, old-fangled locks are heavy and unsustainable and are also dependent on tools. Hence electronic locks are preferable.

This security system primarily aims to minimize the safety threats occurring in society. To Safeguard homes, the technologies we used are Facial Recognition,Password systems along with authentication.In face recognition technology, to recognize a human, the scanned face will be compared with faces that are stored in the database. The primary step in face recognition technology is face detection where only the facial part is identified regardless of the background. Many algorithms involve face detection, feature extraction, and face recognition. The camera module is used to capture the image for detection and recognition. A password can also be called a passcode. It is a string of numbers (sometimes a combination of numerals and alphabets) for authentication purposes. A keyboard is used to enter a password. A predefined password must be matched with the entered password to get access. The Internet of Things is used to describe the interconnection between objects.

Facial recognition detects and identifies the image. Due to some minor issues, even if the authorized person's face is not recognized then the person uses a password lock system to unlock. In this case, the captured image of the person is sent to the owner through the mail. The lock is opened only when the password entered by a person matches the user's password. If the password matches, then anauthentication of approval or rejection for accessing the person into the house is done through an app using IoT (only when entered password is correct) by the owner. Even if the entered password is correct, the person is allowed into the house only when approved by the owner through the app.

II. LITERATURE SURVEY

K. Umamaheswari and P. Mahitha: Security has been a Primary bother forearthlings intending to avert the intrusion of an unauthorized person. Biometric authentication and voice password door locking systems impart high-level security. Finger ridges of an individual are distinctive and do not match with others. similarly, the voice of a person cannot be accurately impersonated. An authorized person may be granted door access with his voice passcode and thumb impression. The door will be opened only when both factors are satisfied. [1]

S.Sivakumar and R.G.Bhavani: Today, security is given a lot of importance in both workplaces and homes. Automated access control solutions make it possible for users to safeguard their spaces as well as keep track of any intruders. The system generally sends homeowners verification messages for the detection of intrusions or uses facial recognition software. By doing so, only persons listed in the owner database will be granted permission, thereby reducing the likelihood of intrusion. [2]

M. S. Hadis, E. Palantei, A. A. Ilham, and A. Hendra: The use of Internet of Things technology (IoT) has developed to the extent that almost every aspect of a person's life makes use of IoT technology to enhance the quality of life. The system uses low-power Bluetooth technology that works for almost all gadgets. The design of the systemalso includes the security and comfort features of the user. As such, it indirectly contributes to the United Nations Convention on the rights of people with disabilities. [3]

S. Shavi: Access control systems are an essential link in the chain of security in our day-to-day lives. This system uses a numeric keypad mounted outside the door to control the locks. Entering the right password through the keypad will allow an authorized person to gain access to the locked area. Passwords entered by the user must match those that are stored in thememory to open the door. Each time a correct password is entered, a relay switch opens the door lock, allowing access. The door then automatically shuts after a predetermined interval of time. Once the relay/door closes automatically, access is denied. For greater user-friendliness and efficiency, the module also provides an LCD interface.[4]

Gyanendra K Verma, Pawan Tripathi: In their proposal, they presented a passive type of RFID-based door locking system. Activation, authentication, and validation of the user and unlocking the door in real time are done via passive RFID technology. Three separate spaces are used in this system, each with a central database. The secure areas are located in different areas of the building. Their system incorporates hardware and software. They used RFID readers, tags, USB connections, and connecting cables among other components. [5]

Ajinkya Kawale: This project's main goal is to create a safe locking system based on fingerprint scanning. In this project, a microcontroller has been utilized in conjunction with an interface circuit to open and close a security lock based on a fingerprint that is saved in the microcontroller itself, ensuring that only authorized individuals have access to the security lock. [6]

Afzal Hussain, Muhammad Hasnain, Muhammad Faseeh-Ul-Haq, and Faizan Hussain: This system proposed a solution that is mainly focused on security parameters using facial recognition by detecting and recognizing a face in front of a camera. An electromagnetic lock is used to unlock the door when the face is recognized which can be used in homes, offices, and different places. [7]

Kailash Manger, Hari maya Gurung, SunainaBiswakarma, Sushmita Sharma, Kesangkit Tamang: They proposed a door locking system based on password using Arduino. It can be implemented in various places like homes, banks, and many more. The motor, keyboard are interfaced with Arduino. If the password entered is correct then the door is opened, else "incorrect password" message will be displayed. [8]

III. A TWO-STAGE SECURED SYSTEM FOR INTRUSION DETECTION

In this system, we proposed to design a smart security system that can be used to access only authorized persons and prevent unauthorized individuals from entering thehome. We integratedtechnologies like facial recognition, and Password along with authentication to achieve this. In this Proposed System, the modules used are theCamera, Keyboard, Raspberry Pi, DC motor, Relay, and battery. The camera module captures theuser's face. A person can enter the house using faciarecognition technology only if the captured person's face is stored in the database, or else the person cannot access the house. Another alternative for a person to enter the house is using a password. The keyboard is used to receive a password from the user. In the system, here a person enters a password through the keypad. If the password is matched with a predefined password, then authentication will be sent to the owner through IoT and a person can enter the house if the owner approves the entry.

IV. BLOCK DIAGRAM
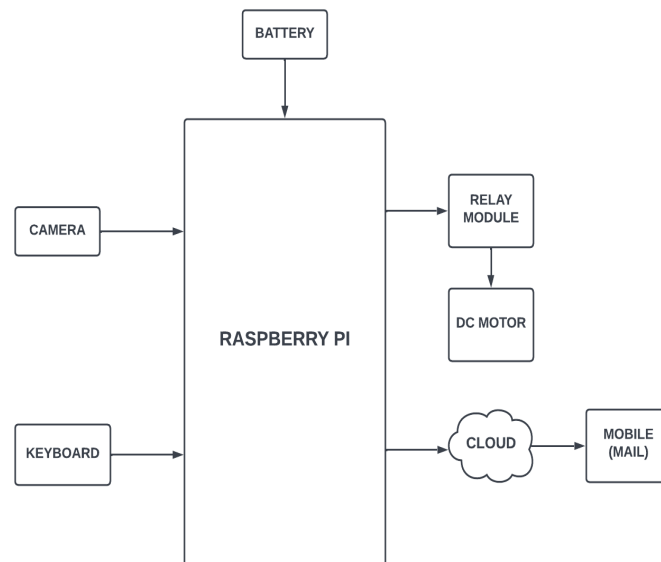
The Block Diagram of the Proposed System consists of:

1. Raspberry Pi
2. Battery
3. Camera
4. Keyboard
5. Cloud & Mobile
6. Relay
7. DC Motor

In this block diagram, the Keyboard, Camera is connected to Raspberry Pi to function as input modules to the microcontroller. DC Motor is interfaced with the microcontroller through relay module to function as an output i.e., opening the door. The power supply to the microcontroller is given through the battery(5v), whereas a 9v supply is given to the relay. Approval or Rejection authentication is sent to the owner's mobile (Mail) via IoT.

V. **FLOW CHART**
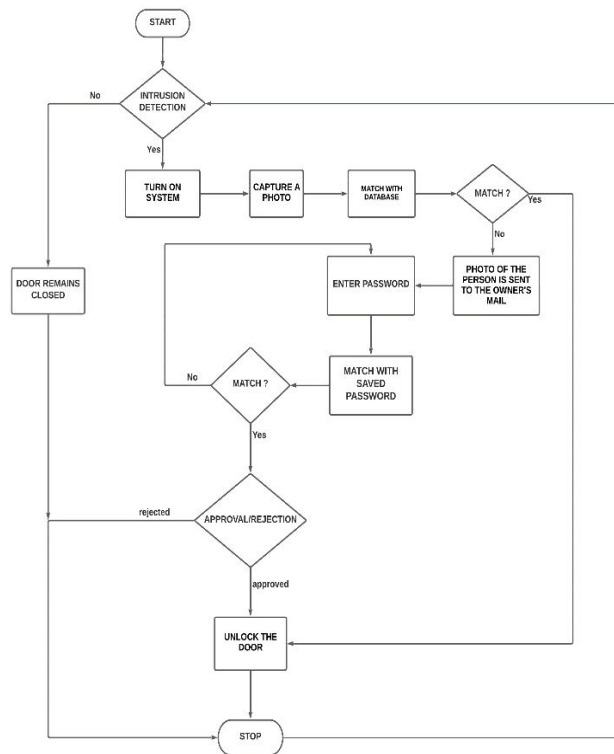
Firstly, System gets turned on when there is intrusion detection. Else, the door remains closed.A photo is captured using a camera module and if the photo matches with the database, then the door gets unlocked. Else the photo of the person is sent to the owner's mail.If facial recognition does not work, a password is entered. If the password matches, then authentication is sent to the owner for approval or rejection. If entered the correct password and the owner approves then the door is unlocked. Else if thepassword is entered wrong or the owner rejects then the door remains closed.

VI. **CIRCUIT DIAGRAM**

The circuit diagram of "Smart Security System Access with Intrusion Detection" consists of Raspberry Pi, camera, battery, dc motor, pc or laptop, and relay.
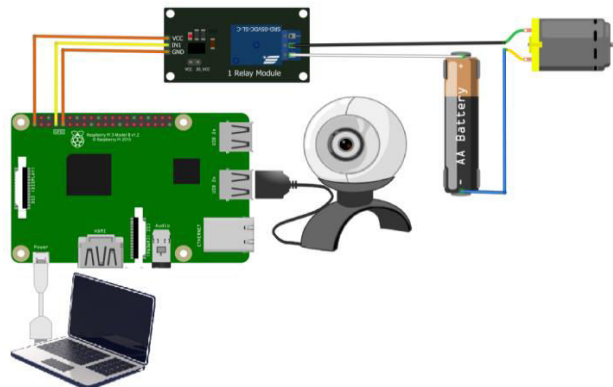
The GND pin of a relay is connected to a Raspberry pi 3 GND pin, Laptop is connected to the power port of a Raspberry pi through a type B cable, the camera is connected to one of the USB ports of the Raspberry Pi, NO (normally open) pin of relay module is connected to the battery, another terminal of the battery is connected to pin 2 of DC motor, Common pin of relay module is connected to pin 1 of DC motor.

VII. RESULTS AND DISCUSSION
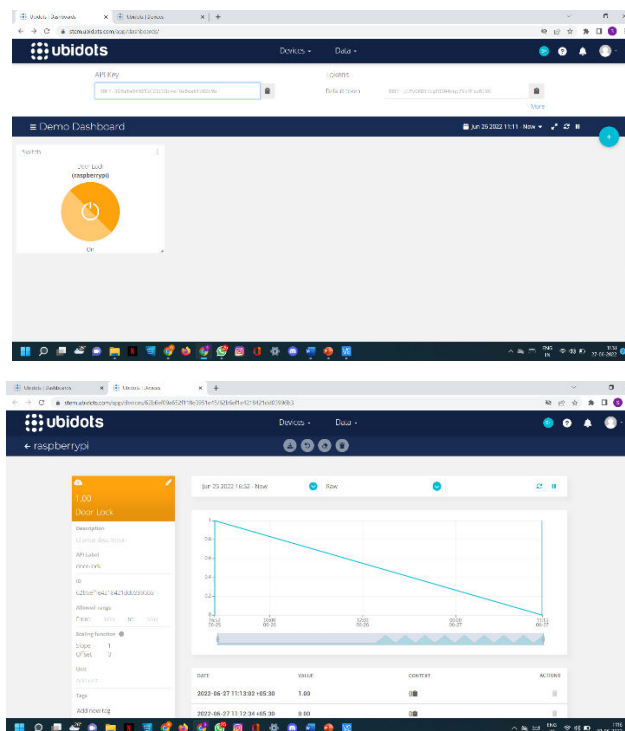
The above are the results of an ubidots app to provide access to a person when entered the correct password by the user.
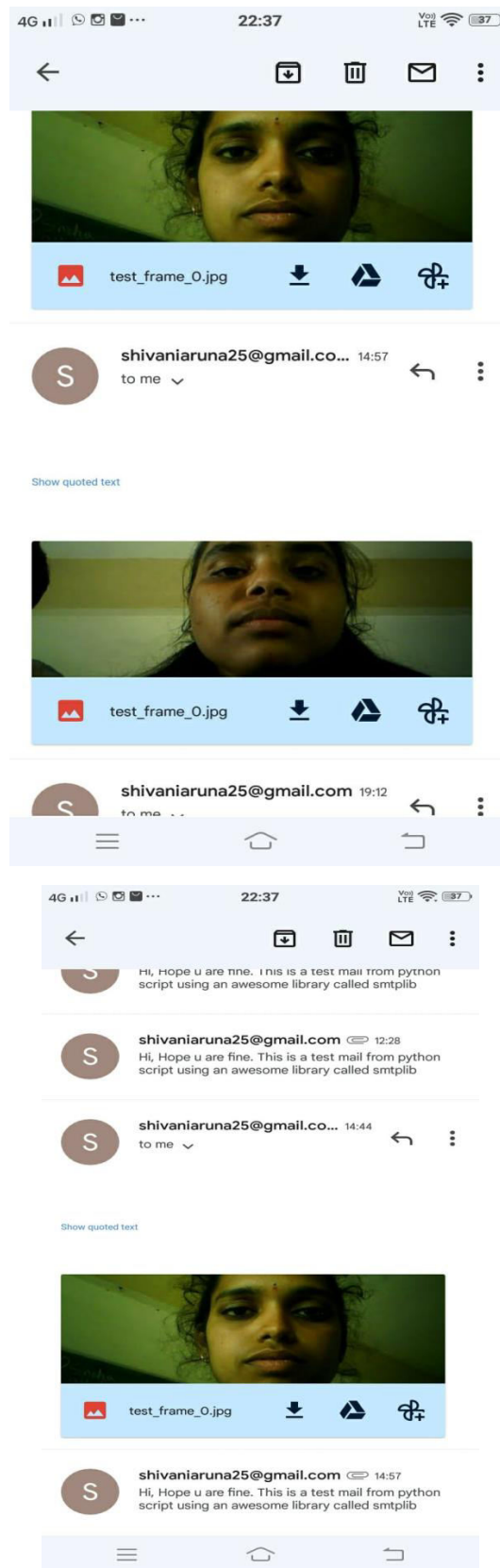
The above are the results of images of an unknown person that were sent to owner's mail.

VIII. CONCLUSION

This proposed system provides maximum security for a person to enter the house in a digital way. The data of an individual i.e., the face of a person is stored in the cloud which is used to compare and provide access to the home. Face recognition is employed using raspberry pi as primary security. Entry into the house can also be accessed using the password. Upon entering the correct password, authentication is done by the owner using an app by IoT. Thus, the created system is reliable and also gives enough flexibility to meet the prerequisites.

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