



Automatic Door Opening with Face Recognition and Temperature Detecting Device

Dr. Shabina JameerModi,
Computer Science and Engineering Department
Satara, Maharashtra, India
Email – shabina.sayyad@kbpcoes.edu.in

Tarannum. R. Shaikh^{2*},
Computer Science and Engineering Department
Karmaveer Bhaurao Patil College of Engineering
Engineering
Satara, Maharashtra, India.
Email: tarannum.sayyed@kbpcoes.edu.in

Sunita V. Mane^{3*},
Electronics & Telecommunication Department
Karmaveer Bhaurao Patil College of
Engineering
Satara, Maharashtra, India.
Email: sunita.mane@kbpcoes.edu.in

Abstract –

In this pandemic period, social distancing is essential to avoid the spreading of the Covid-19 disease. Also, vaccination is one of the critical aspects. According to that, there is an innovate idea of a project which fulfills all the above aspects such as Social Distancing, Physical touch, Vaccination details, and also Temperature detection.

During this Covid-19, people were suffered a lot, so on a social and noble cause, it's our responsibility to think and develop products that will help us to prevent this disease as much as possible, which is going to be our primary goal and also by using advanced technologies like face recognition and temperature measuring device, so there is need to make our model much more efficient and trustworthy.

In today's era, security has played a pivotal role in many of our places, like offices, institutions, libraries, laboratories, etc., to keep our data confidential so that no other unauthorized person could access them. This project presents a face-recognition-based door opening system that provides security and can be used for many banks, institutes, organizations, etc. For verifying the authentication, there are various methods like passwords and RFID, but this method is the most efficient and reliable. Temperature is sensed by the sensor and is validated for security purposes. If the temperature matches, then a camera is open, and after face-Recognition, the door will be get opened automatically.

Keywords – Face Recognition; Temperature sensor; Cloud; Raspberry pi4; Web-App;

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I. INTRODUCTION

Now the topmost priority of any organization is to secure the organizations, educational institutions, political and government in terms of personal identity and forgery issues; also, the demand for going smart is continuously

increasing. Although the risk and security issues related to this category of systems may be enormous, the inclusion of a more general privacy and security model in the design phase will reduce many risks that are classified as moderate. Monitoring door entrance is a vital issue,



considering it as the only means of structure access. So, an efficient and precise door security system is crucial to secure our assets and properties.

Nowadays, manual or traditional methods of things are evolving to intelligent access control. It is necessary to change our traditional ways of accessing things to modernize processes of smart connectivity; this will provide enhanced security and eliminate the existing drawbacks. Security separates access and threats, and access control includes majorly three main components: identification, authentication, and authorization; thus, there is necessary to actualize this component on the door system for better security and control. As far as the traditional door is concerned, its access requires keys, and the existing method needs a password mechanism using the keypad, pattern, card, or identification ID. The Data Flow Diagram of Proposed system is as follows

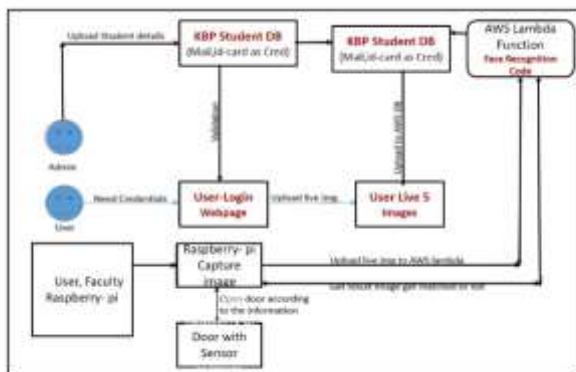


Fig 1: Data Flow Diagram

II. LITERATURE SURVEY

Last few years, most industries have been working on machine learning, artificial intelligence, big data analytics, and IoT-based projects; the primary moto of all these is to make things easy and intelligent. There became a need for digitalizing with a lot of security tools by these our daily life locks become innovative and also introduced the waves movable So, everyone needs to keep the high-security password, and it should be in a high programmed manner. The next level of security used a password as an authenticating tool. This system stores the password of authenticated users for validation. A system using password authentication provides considerable protection to the users as it acts as a

secret of authorized users. This system also has a pitfall in that passwords can be acquired by an unauthorized user continuously trying all the possible combinations. Who is also one of the hundreds of attempts made to provide security?

III. SYSTEM ARCHITECTURE

A system architecture is a model which, in turn, is called a conceptual model that includes the structure, behavior, and total views of a proposed system. Defining the description of the architecture of a system is nothing but a formal definition, and it represents the entire system, organized in a way that supports reasoning about the structures and behaviors of the system.

3273

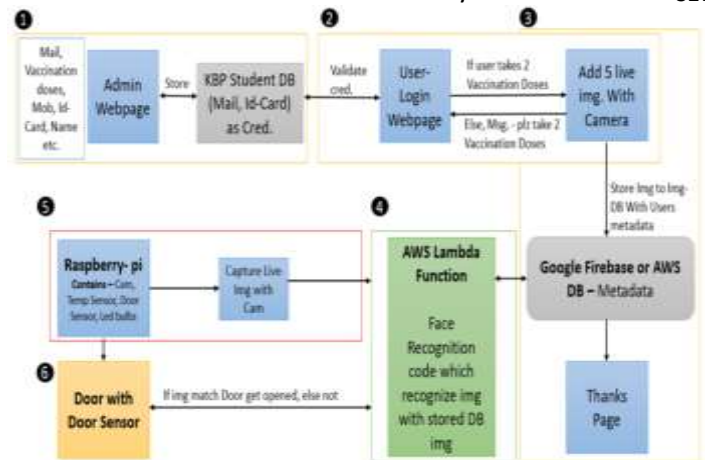


Fig 2: System Architecture

The proposed system includes both internal as well as external intrusion detection mechanisms, which have a total of four modules,

- Web-App
- Cloud
- Face Recognition
- Raspberry pi and Temperature sensor

Rough Design of Product -



Fig 3: Design of the product



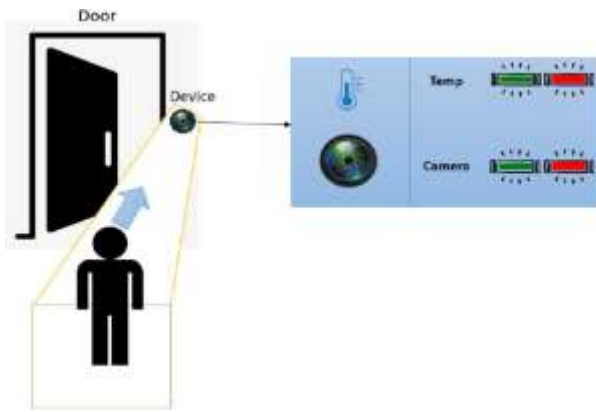


Fig 4: Implementation to site

• **Web-App –**

HTML was primarily used as the primary language for developing web pages. CSS, also known as Cascading Style Sheets, is used primarily for adding styles/enhancing the UI of the webpages. It is a language used to style an HTML document.

PHP or Hypertext pre-processor is a popular general-purpose scripting language suited to web development. It is one of the popular as well as powerful tools for making dynamic & interactive web pages.

PHP is mainly used to establish a strong connection between the client and the server. MySQL Connector is used along with the PHP to scan and access the HTML fields filled by the user & store them somewhere in the database. PHP is faster than other scripting languages, and this is the main reason for using PHP. It is also used to manipulate databases. The combination of PHP & MySQL Connector gives an unmet option to create just a powerful web-based platform. MySQL connector is strong and capable enough to perform all MySQL queries onto the database.

It's nothing but simply a web-based application in which every user has their username and password, and the site admin provides these credentials.

The admin page is nothing but the registration page which the admin needs to fill in the metadata/information of users like Name, Email, Branch, Category Vaccination doses, etc. This information is stored in AWS MySQL Database with high security.

In the Web-based application, the details of vaccination from the users, and according to that, it redirects those users to upload live images page where users can only upload their images with a

camera. Now, these images are stored in the AWS S3 bucket.

And suppose users have not completed their two covid-19 vaccination doses. In that case, he gives a 'Complete your Vaccination Doses or submits your vaccination certificate to your college admin' message if you already did.

Website Link
<https://vishwajeet44.ml/index2.html>



Fig 5: Screenshots of Website

• **Cloud –**

The Cloud Computing module includes the Internet-connected remote servers used not only to store the data but also to manage the data and then process the data without using local servers or computers. Cloud computing and cloud services are increasingly common technologies utilized by organizations to add flexibility, efficiency, and innovation.

In this paper, AWS is used because it's known for high secure Cloud Platform which provides more



services for security purposes like Elastic Load Balancer (ELB), AWS Shield, AWS WAF (firewalls), AWS Guard Duty, and many more. AWS Cloud works with pay as you go model, so you only need to pay for those instances which you use for a specific time.

AWS VPC is a Virtual Private Cloud isolated from other networks. Our AWS VPC has two public subnets & 2 private ones.

Furthermore, Internet Gateways are created and attached to VPC public subnet, which can be accessed through the Internet. After

Creating the VPC and Subnet, also made two Route Tables, one for

Public Subnet and Second is for Private Subnet. In which decision of routing of the traffic will be decided according to our requirements.

AWS RDS provides Database Service in which create different databases like MySQL, MongoDB, Aurora, Maria-DB, etc. Here **MySQL** databases is used for implementation. First, it started with Subnet Group for our database. In that, it added our previously created Subnets. After that a separate Security Group for the required database, and finally, it gets created a MySQL Database in which users' details are stored.

Here the use AWS S3 is considered to store the live images of users. AWS S3 Bucket provides more features like S3 lifecycle, Encryption, Access Policy, Bucket versioning, etc.

For pushing images to S3 here, uses a python script that has code to move all objects to AWS S3 with the help of the python Boto-3 library. And also, for pulling the images in Raspberry pi, use the python pull image code script.

AWS Architecture -

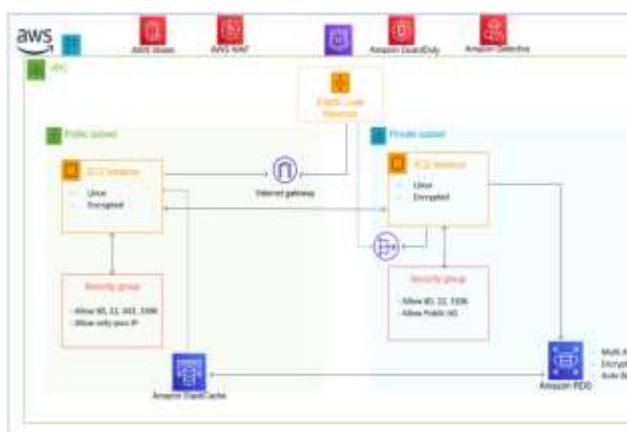


Fig 6 : AWS Architecture

● **Face Recognition –**

For face recognition, now most people are familiar with face recognition technology through the Face ID to unlock mobile phones like iPhones, considering this is the only application of face recognition. But typically, facial recognition does not rely on a massive database of photos to determine an individual's identity. For identification and recognition, one person is the sole owner of the device while limiting access to others.

Machine learning is the method to use to solve isolated problems that have only one step in estimating the price of a house, generation of new data based on the live data, and telling if an image contains a specific object. The Problems can be solved by selecting any one machine learning algorithm, feeding in data, and getting the result. The library which is used for Face Recognition performs the following steps –

Step 1: *A face detection* module

To detect and locate the image of a face, a camera is used alone or maybe in a crowd. In the image after analysis, it shows the person looks straight ahead or maybe in profile.

Step 2: *A face analysis* module

After the detection module, the captured face image has to be analyzed. Many technologies are used as facial recognition technology, which relies on 2D instead of 3D images; the reason is that it more appropriately matches the 2D vision either with public photos or with the available database. The software reads the geometry of our faces correctly.

Step 3: *Converting the image to a data* module

Based on the person's facial features, the process of face capturing transforms the analog information that is a face into a set of digital information that is data. Your face's analysis is essentially turned into a mathematical formula. The numerical code is called a Face print. Similarly, the thumbprints are unique, and each person has their faceprints.

Step 4: *Finding a match* module

This module compares the faceprint against a database of other known faces. For example, the FBI can access 650 million photos drawn from various state databases. On Facebook, any



pictures tagged with a person's name become a part of Facebook's database, which may also be used for facial recognition. If your faceprint matches an image in a facial recognition database, then a determination is made.

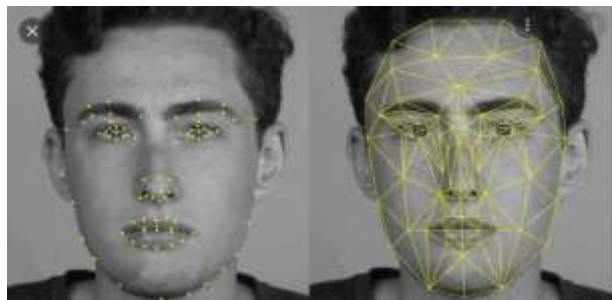


Fig 7: Facial Recognition Image

- **Raspberry pi and Temperature sensor–**

Raspberry Pi is the name of a series of single-board computers.

The Raspberry Pi, 4 Model B, is the latest version of the low-cost Raspberry Pi computer. The Pi isn't like your typical device; in its cheapest form, it doesn't have a case and is simply a credit-card-sized electronic board -- of the type you might find inside a PC or laptop, but much smaller.

Now all over the world, people are using the Raspberry Pi to learn the programming part and enhance their programming skills. Also, with the knowledge, they can develop many hardware-related projects and implement the home automation system; for implementing the industrial-based application, the Kubernetes clusters and Edge computing are used.

Raspberry Pi's cost is significantly less, and the computer uses the Linux operating system. It also provides a set of GPIO (general purpose input/output) pins that allow you to control electronic components for physical computing and

explore the Internet of Things (IoT).



3276



Fig 8: Raspberry-pi

In this project, the Raspberry pi4 device is considered. With the help of this device, which perform various tasks like Temperature Scanning and Face recognition. One button with that Temperature sensor starts working and measuring the user's temperature. If the temperature satisfies our given condition, the camera will open and capture the user's image and recognize the present pictures in the Raspberry pi4 device. If the image matches the present ideas, then Raspberry pi will get the call door sensor, and if all the above conditions are satisfied, then only the door sensor opens the door.

It is coded one script in python, which pulls the objects from AWS S3 Buckets and stores them in the Raspberry pi device; which added this script in



the 'bashrc' file of Raspberry pi, which will execute when the Raspberry pi device is turned on. This device is fixed near the door, and the door sensor of this device is attached to the key of the door.

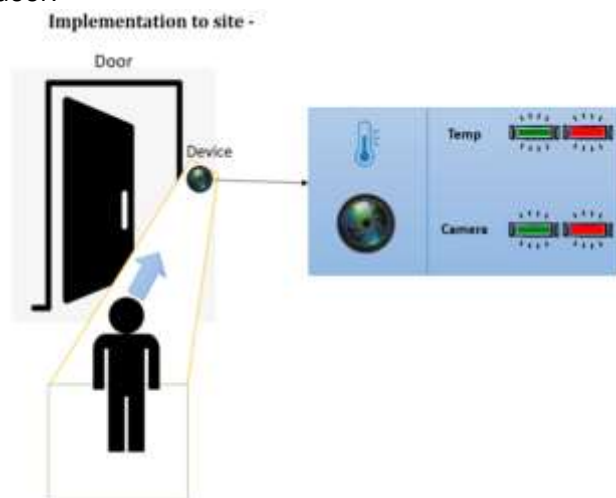


Fig 9: Final Model of Proposed Work

IV. Advantages

1. The customers want to ensure their health and safety during this pandemic time.
2. And also, his time is necessary hence it can apply it anywhere in public areas like schools, colleges, Hospitals, etc.
3. And our project is 1st of its kind hence no like that device available in the market.
4. Fully Automated
5. Touchless and Secure keyless access

Limitation

1. Continuous power supply
2. Required Internet connection
3. Sometimes it finds difficult for accurate face-matching (Camera angle)

V. Conclusion

To make a product that can be helpful in various places like schools, Colleges, and Malls.

And also, it is fulfilling the covid-19 related precautions for extreme situations because it gives us keyless and touchless access. It's automated, consumes less user time, and reduces the person's workload.

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