

# Apartment Residents Monitoring, Management and Security

**Yogita Narule, Aryan Kashyap, Ayush Katare, Kashish Goel,  
Dhananjay Kasture, Sumedh Kate**

*Department of Engineering, Sciences and Humanities, Vishwakarma Institute of Technology,  
Pune, Maharashtra, India.*

*Department of Engineering, Sciences and Humanities, Vishwakarma Institute of Technology,  
Pune, Maharashtra, India.*

*Department of Engineering, Sciences and Humanities, Vishwakarma Institute of Technology,  
Pune, Maharashtra, India.*

*Department of Engineering, Sciences and Humanities, Vishwakarma Institute of Technology,  
Pune, Maharashtra, India.*

*Department of Engineering, Sciences and Humanities, Vishwakarma Institute of Technology,  
Pune, Maharashtra, India.*

*Department of Engineering, Sciences and Humanities, Vishwakarma Institute of Technology,  
Pune, Maharashtra, India.*

[yogita.narule@vit.edu](mailto:yogita.narule@vit.edu), [aryan.kashyap21@vit.edu](mailto:aryan.kashyap21@vit.edu), [ayush.katаре21@vit.edu](mailto:ayush.katаре21@vit.edu),  
[jaibhagwan.kashish211@vit.edu](mailto:jaibhagwan.kashish211@vit.edu), [dhananjay.kasture21@vit.edu](mailto:dhananjay.kasture21@vit.edu), [sumedh.kate21@vit.edu](mailto:sumedh.kate21@vit.edu).

## **Abstract**

*In today's world, worrying about the safety and security of our own people has led individuals lose their freedom to lead a cheerful life. While home invasion crimes are at its peak, the demand for sustainable home security solutions has considerably increased. Despite such huge demand, this field is not that looked upon. To fill this lack, we propose a novel approach in the form of a website that aims to resolve this issue. The website is packed with unique capabilities which are very important for securing a residential space. We hope that our project contributes for the betterment of the society.*

**Keywords:** Admin, dlib, Face Recognition, Machine Learning, OpenCV, Security, User, Website.

## 1. Introduction

The first thing you desire when you look at your family and your home is their safety. And thus, the idea of advanced apartment security system comes into picture. Web is a resource that is widely and steadily usable across many platforms. Considering the above-mentioned advantages, it was decided to go for developing a website to solve the problem. This research aims at understanding and solving different aspects including constant monitoring, maintaining a track record of every activity happening, face recognition system and all the factors that in a way affect the safeguarding of a residential space.

During the course of this research, we have also identified some areas that were not looked upon earlier and a genuine attempt has been made to shed light on them. This project aims at creating a website that will be able to differentiate users according to their defined roles and provide certain specific functionalities to them as decided. As this issue affects the day-to-day life of individuals, a lot of research has been carried out and we have tried our best to solve each and every detail. We suggest that this website can be a complete solution to the problems faced in this field.

## 2. Literature Review

In any kind of research, it is very important to examine all the related work in that particular field. This section of the paper has investigated what has been done with respect to securing residential spaces using technology. Already present solutions such as Mygate and other applications were thoroughly examined. The features they provided were taken into consideration as they must be present in the proposed solution. The restrictions faced by the users while using such services were given emphasis on and all the necessary measures were discussed to solve these issues. Along with that, a number of research articles were studied related to security, their scope and also on different technologies which helped us to finalize what all tools that we need to utilize for the creation of the website.

## 3. Methodology

Existing Methodology:

Till now, the method of maintaining a register to keep a record of every activity happening around is prevalent in many of the apartments of our country. This is an inappropriate process as registers can be damaged and can purposefully tampered quite easily. Moreover, once the register gets filled it has to be replaced with new one and this goes on for ages consuming a lot of space and creates a challenge for the management of all the registers.

In this particular section, the detailed steps and methodology outlined for the completion of the research have been discussed.

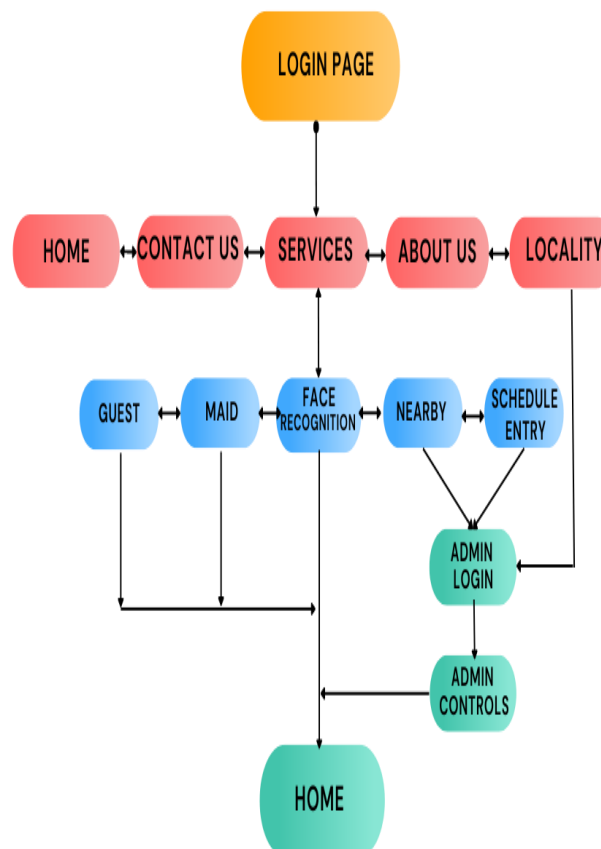
Survey –

First of all, we went out to discuss the problem with people living in different apartments and also talked about our solution. We took their feedback seriously and tried our best to solve those issues.

### Tools Used –

As we were going to make a website, there was no requirement of hardware materials. Instead of that, software tools such as HTML, CSS, PHP, Bootstrap, Python, OpenCV were used. Visual Studio Code was utilised as the Integrated Development Environment as it supported every tool required.

### System Architecture –



**Figure 1. System Architecture of the website**

**Index page:** As the name suggests, this is the first page of our website containing the links to all the other pages.

**Home page:** This page is the most basic page of the website highlighting the basic use of website.

**About Us:** This is the page showing the vision and objectives of the project. This also includes the description of the team members.

**Locality:** This page contains the details of all the concerned persons in case of any emergency. The list can be updated. Further additions can also be made.

**Services:** This page would be the gateway for the user to login into his account. It would have three options “Guest”, “Maid”, “Business” depending upon what kind of user data has to be inserted.

**Contact Us:** This page would cater all the queries that user would have regarding the website. This page would give an option to the user to directly reach out to us for any assistance.

**Face Recognition Module:** As the name suggests, this is a module that we have developed that can identify users in a second with the help of face recognition system. A dataset of images will be processed by the system studying face patterns enabling it to differentiate between users. With this, it will be very difficult for forging identities enhancing security. This is one of the most important features integrated with the website.

Firstly, the image is loaded in the dataset, then with the help of “face\_recognition” module, facial features are encoded. This is a unique module offered by python, containing the necessary algorithm for the face recognition system. The module utilizes features from a C++ library named “dlib”. This library contains a Machine Learning Algorithm based on Linear Support Vector Machine along with HOG. To capture the live image, OpenCV has been used as it gets the access of the webcam and sends for further processing. After this, the stored encodings of a person are matched with what the live recording has processed and if they get matched the user displays his/her name and throws “Unknown” if not matched. This makes face recognition a very important feature of the website as it is able to distinguish between true residents of a particular residential area.

**Admin Dashboard:** Another beneficial feature added to the website includes a separate dashboard for the Administrator who can only update some key activities of residential places like, Guard Patrolling Timings, Tracking Record of Maintenance and others.

**Query Disposal System:** This feature helps the users to direct their queries to the administrator so that they can relax at home and demand for the solution of the problem they are facing.

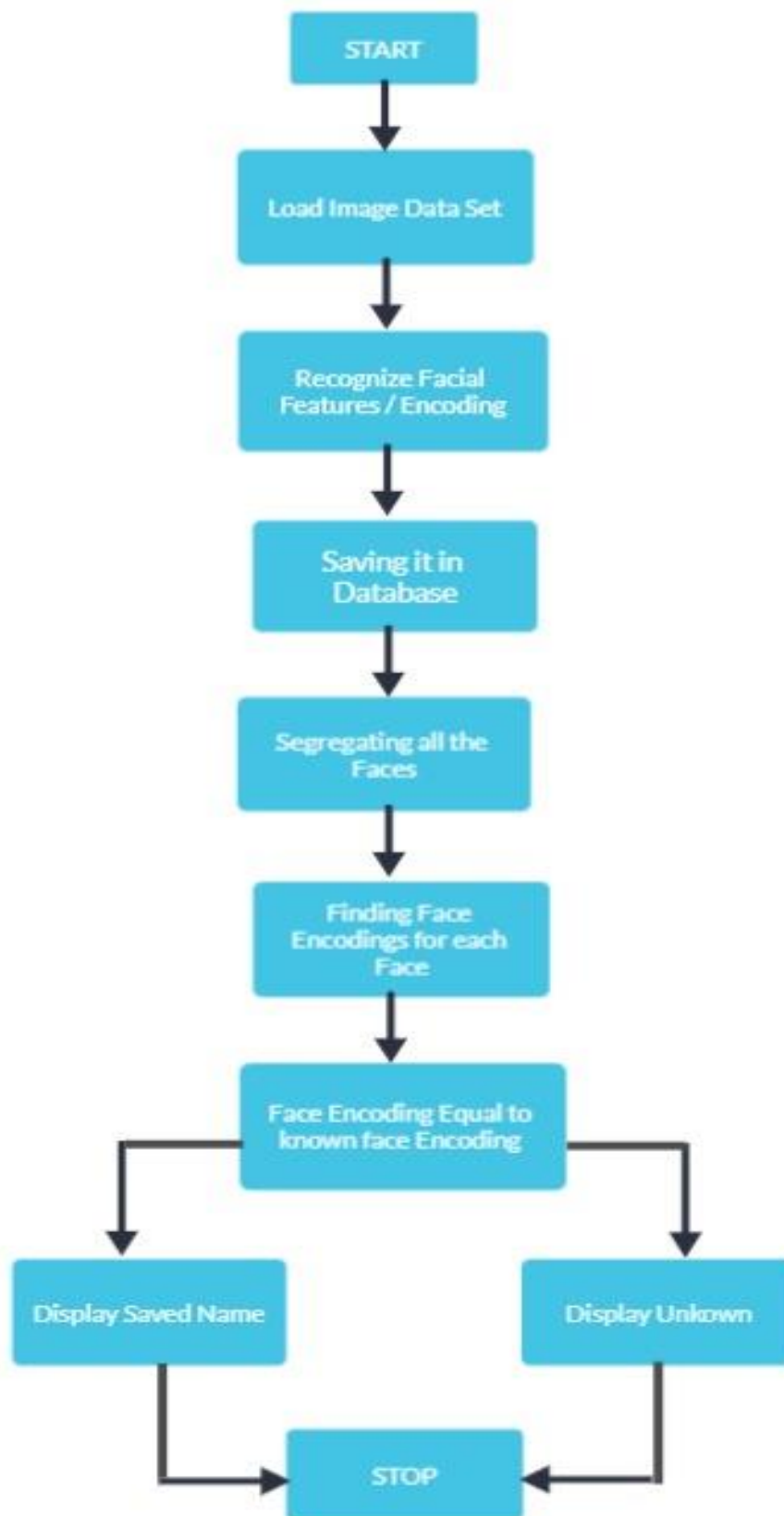
**Scheduling Entries:** A very promising feature we have added to the project is that the user will be able to schedule an entry for any unknown person not residing at that particular place informing the security guards earlier about it by just a click on the website. This might be for any guest or any kind of delivery.

**Testing:**

This section of the report includes the extensive testing that has been carried out by us to ensure no stone is left unturned. The testing is based on the following parameters:

1. Whether the frontend of the website is working properly.
2. Whether the backend of the website is working properly.
3. Whether the input data is properly stored in the localhost database server.
4. Whether the Face Recognition System is able to identify and differentiate between people.
5. Whether the users are able to schedule entries according to their convenience and no one else can change them.

6. Whether the administrator is able to observe all the activities happening in the residential space.
7. Whether the user is able to send his/her queries using the website to the administrator.



**Figure 2. Flowchart for face recognition**

Here are some images that show the perfect functioning of the features of the website.

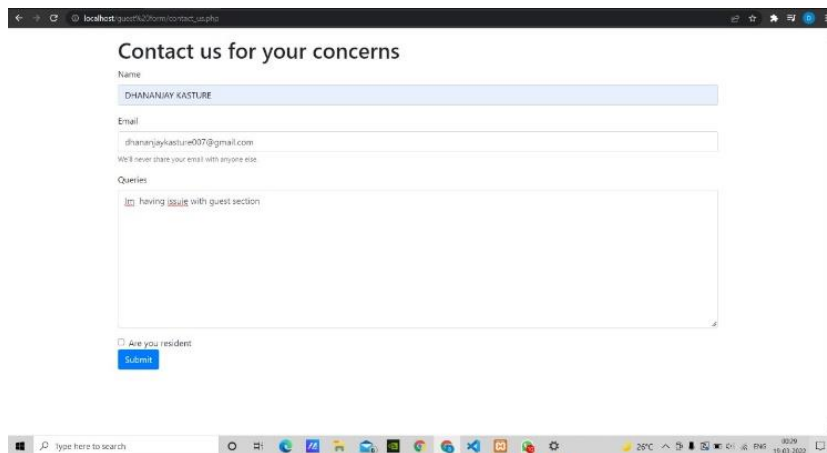


Figure 3. Frontend of “Contact Us” page

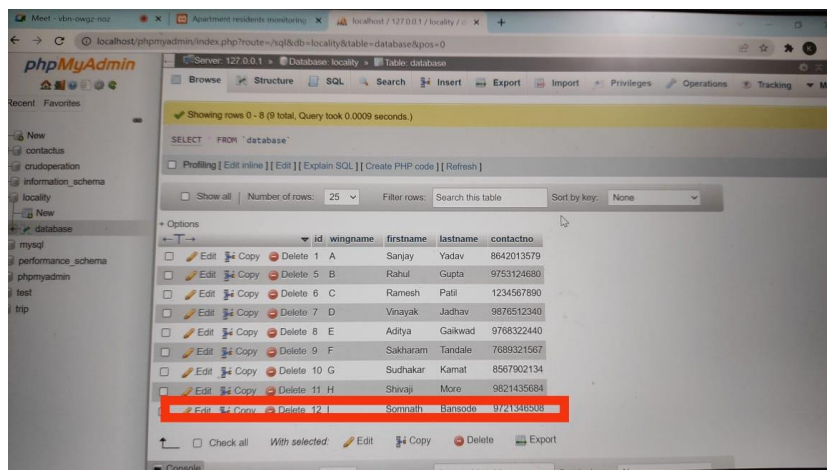


Figure 4. Database indicating entry at “Locality” page

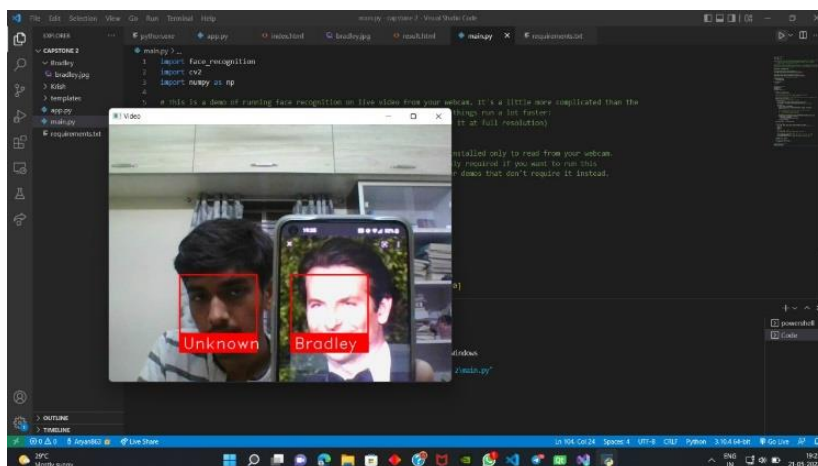
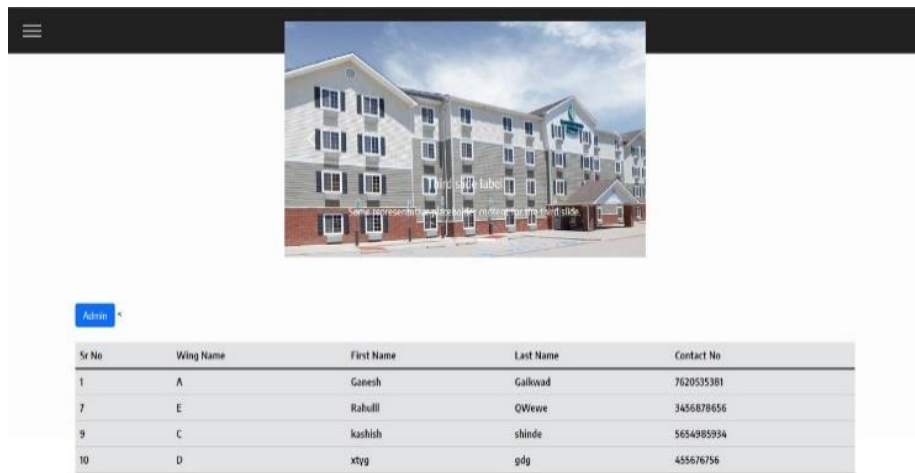


Figure 5. Face recognition system



Sr No	Wing Name	First Name	Last Name	Contact No
1	A	Ganesh	Galkwad	7620535381
7	E	Rahulil	QWerre	3456878656
9	C	kashish	shinde	5654985934
10	D	xytg	gdg	455676756

**Figure 6. Role-based application**

## 4. Results and discussions

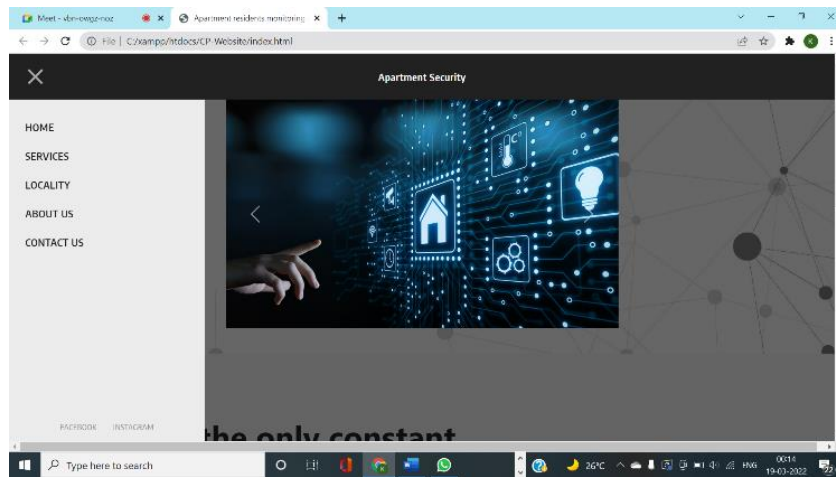
This section involves measuring the feasibility or evaluating the success of the proposed solution. The surveys that were conducted made it clear that the use of modern technologies has been very restricted in the field of apartment security. So, it was decided to build a website related to security solutions which is user friendly at the same time, as there has not been enough exposure to the people for operating it. We have been quite successful in completing this target as emphasis has been given to make the website better and easy to operate.

The functioning of the website is perfect. After clicking on a certain tab or button, the website is performing the required tasks and giving us the desired result. Moreover, the testing that was carried as discussed earlier has been really successful. As shown in the figures, whatever data is being inserted by the user is successfully being stored in its dedicated database. The face recognition system is working really well making it easier for the users to identify a person, making it an integral part of the website. This provides a validation to the efficiency of the research.

The main findings of the project include:

1. People are ready to accept the technological change and are able to fulfil the respective tasks without any difficulty.
2. A more economical solution needs to be provided for small scale apartments.
3. The project idea must be integrated with storing the CCTV visuals in the same system for enhanced monitoring.

These results pave way for new technological enhancements in this field as it has a huge scope. This also is a sign for common people that they need to adapt the new technologies in each and every field time to time.



**Figure 7. “Home” page of the website**

## 5. Conclusion

This project consisting of a website when implemented is more effective than just a normal setup having a register to note things. This user-friendly website will enable the users to have a better sense of all the happenings around them. The system has performed very well on different parameters and is working efficiently. Also, it is really important to discuss the findings that arose during the completion of this project and work on them. Overall, the research aims to bring about a revolution in the field of apartment security by an efficiently working website that caters solution to every problem faced in this regard. Moreover, it is necessary to be open to feedback from the experts as well as the people using the project to improve regularly.

Though this research was very successful on the grounds of for what it was meant to be, there is always a scope of improvement. Below-mentioned are some of the features that we have identified which can be implemented in future:

1. To build an application with same features to make the project in a more compact design.
2. To enable voice-controlled modulation for users to skip the time-consuming typing process.
3. To build a feature for automatic addition of new faces into the database.
4. To add a user-based alert notification system.

## Acknowledgments

We would like to extend our sincere gratitude towards our capstone project guide Prof. Yogita Narule for helping us during the course of this project. The guidelines by her played a very vital role in the completion of this project. We would also admire the contributions from Prof. C.M. Mahajan (Head, Department of Engineering, Sciences and Humanities) and everyone at Vishwakarma Institute of Technology for giving us this opportunity. Lastly, we would like to thank each and every individual who helped us in the success of this project.



## References

- [1] *Pierre Geneves, Nabil Layaida, Vincent Quint, "On the analysis of Cascading Style Sheets (CSS)", (2012), pp. 809-818.*
- [2] *Katrien Verleye, Arne de Keyser, "Customer engagement in technology-based and high-contact interfaces", (2016), pp. 1-22.*
- [3] *S Chitnis, N Deshpande, A Shaligram, "An investigative study for smart security solutions: Issues, Challenges, Countermeasures", (2016), pp. 61-68.*
- [4] *Tarun Gupta, 15 elements of a great website design, article, 2019.*
- [5] *Karim Arrhioui, Samir Mbarki, Oualid Betari, Sarra Roubi, Mohammed Erramdani, "A Model Driven Approach for Modeling and Generating PHP based Applications", (2017).*
- [6] *Philipp Wagner, "Face Recognition with Python, (2012), pp. 16-83.*
- [7] *Miguel Grinberg, Flask Web Development", (2018), pp. 23-172,*
- [8] *Sebastian Raschka, Python Machine Learning Equation Reference, (2015).*
- [9] *E.R. Polyantseva, "Study of Urban Environment Safety in a Residential Area in Yekaterinburg", (2022), pp. 10-19.*
- [10] *Suwarno, Kevin, "Analysis of Face Recognition Algorithm: Dlib and OpenCV", (2020).*
- [11] *Sharma, Karthikeyan Shanmugasundaram, Sathees Kumar Ramasamy, "FAREC - CNN Based Efficient Face Recognition Technique using Dlib", (2016).*