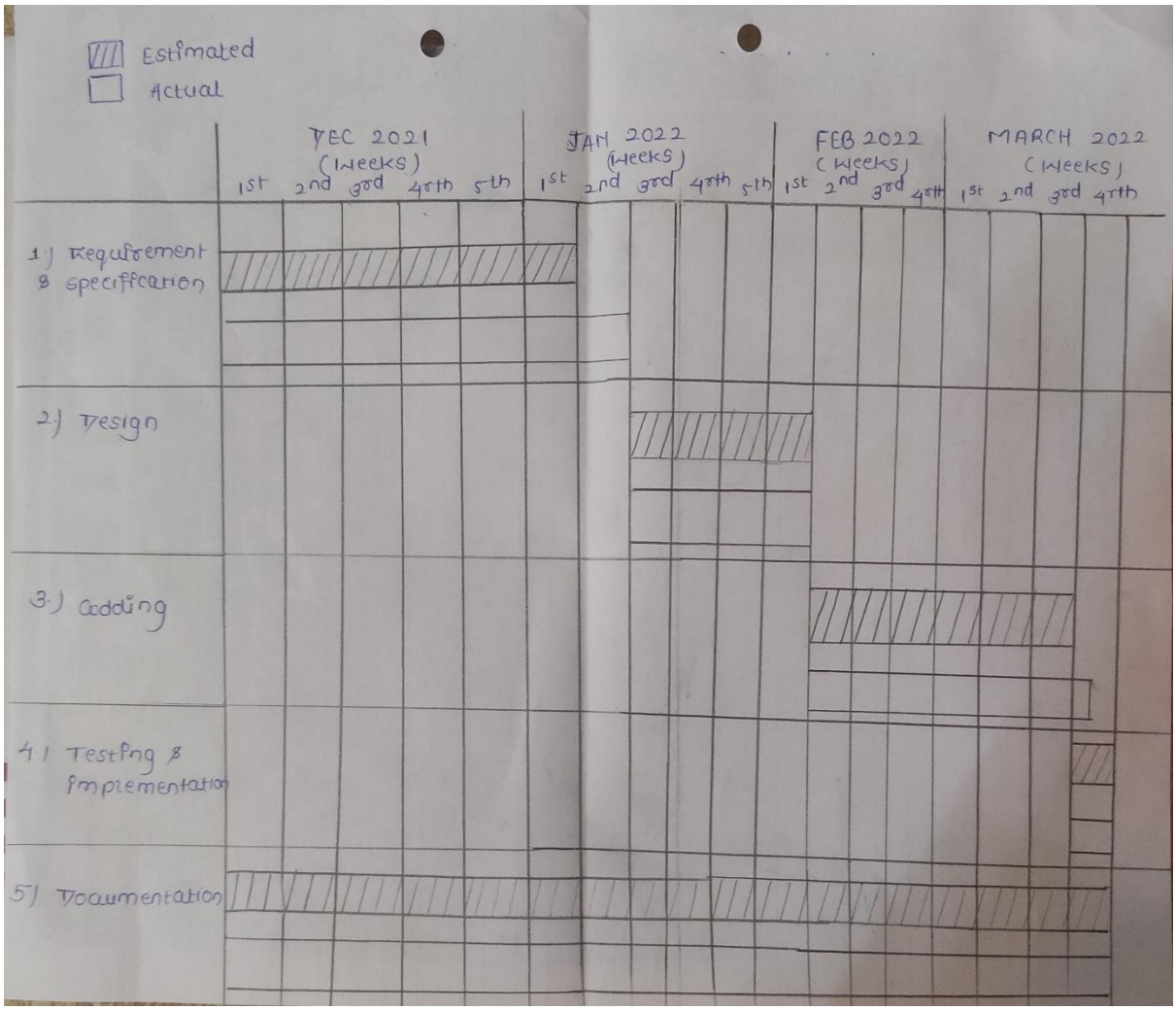
Gantt Chart


Estimated
Actual
DEC 2021
(Weeks)
1st 2nd 3rd 4th 5th
JAN 2022
(Weeks)
1st 2nd 3rd 4th 5th
FEB 2022
(Weeks)
1st 2nd 3rd 4th
MARCH 2022
(Weeks)
1st 2nd 3rd 4th
1.) Requirement & specification
2.) Design
3.) Coding
4.) Testing & Implementation
5.) Documentation

INDEX PAGE

1. INTRODUCTION

The presence of a human safety officer is not an effective process of security and is not reliable. In such scenarios, our framework provides proper interloper detection and protects the owner's property. By using this system, we can reduce robberies. So, we can react rapidly with the end goal that no damage happens to our houses. Having the interloper's face detailing, we can find him by raising a complaint against him at a police station. In the planned framework, the camera is placed in a room that can continuously capture the video. We planned our framework to undergo a client-side process whenever a gate crasher enters the room and an alert message will be sent via Twilio API to the user or owner. Our framework is based on motion detection and sending an alert message using OpenCV and python.

The proposed system uses a webcam and python code for detecting the intruder and sending an alert SMS. On the client side, the video is captured continuously and filtered. The filtered information is sent to the server side. And it displays the status of the interloper with a time and date stamp. It starts recording the current frame. After the movement is detected in the current frame the framework alerts the user or owner by sending an alert message using a Twilio API and saves the recorded footage into the local storage.

2. LIMITATION OF THE CURRENT SYSTEM

In today's world, there are many existing systems for surveillance and security systems. They either need a human safety officer or need work to install, which may produce false alarms. In some surveillance systems, an interloper will be detected by using video recording cameras and storing the recorded video in an external storage disk which needs a huge investment for controlling, storing, and monitoring the activities. But the footage should be examined manually by an owner to detect the gate crasher which may lead to a waste of time as he needs to watch the entire recording to find the interloper and may miss small details while analyzing. And the second system is a radar-based system that detects an interloper by using a radar system by transmitting microwaves or radiofrequency waves that will bounce off any object in its path. The other one is the intruder alarm system, which includes electric alarms delegated to alert the owner when the interloper enters. And

many other systems are passive infrared motion detection systems, ultrasonic motion detection systems, vibrate sensor systems, etc.

3. ADVANTAGES OF THE PROPOSED SYSTEM

Algorithms used for the proposed system are background subtraction, grayscale conversion, noise removal, applying a threshold on an image, and detection of contours and blobs.

Phases of the motion detection process are as follows:

a. Grayscale conversion and noise removal
   Before performing any operation on images, it is a good idea to convert to grayscale, it is less complex and more optimal to work with these types of images. The noise caused by the camera itself and by the lighting must be minimized. This is done by averaging each pixel with its neighbors.
b. Subtraction operation between the background and the foreground
   Background subtraction consists of taking an image of the scene without movement and subtracting the successive frames that we obtain from a video.
c. Apply a Threshold to the image resulting from the subtraction
   The goal is to binarize the image, that is to have two possible values. All those that exceed the threshold will be white pixels and those that do not exceed it will be black pixels. It will help to select a moving object.
d. Detection of contours and blobs
   When we join all the points on the boundary of an object, we get a contour. Typically, a specific contour refers to boundary pixels that have the same color and intensity. OpenCV makes it easy to find and draw contours in images.

This project aims to achieve a web camera application system with automation detection capability. The main idea is to develop a low-cost surveillance system using a web camera, which runs the software that is incorporated with a motion detection algorithm. It uses the concept of “motion detection by vision” to achieve detection capability where no hardware sensors are required.

Automatic motion detection capability helps to reduce archive space and monitoring manpower. The system would be a simple “do-it-yourself” system, which means anyone can set it up by himself/herself.

4. FEASIBILITY STUDY

A feasibility study can be considered a preliminary investigation that helps the management to decide whether the study of the system should be feasible for development or not.

- It identifies the possibility of improving an existing system, developing a new system, and producing refined estimates for further development of the system.
- It is used to obtain the outline of the problem and decide whether a feasible or appropriate solution exists or not.
- The main objective of a feasibility study is to acquire the problem scope instead of solving the problem.
- The output of a feasibility study is a formal system proposal that acts as a decision document that includes the complete nature and scope of the proposed system.

i. Technical Feasibility

- It investigates the technical feasibility of each implementation alternative.
- It analyses and determines whether the solution can be supported by existing technology or not.
- The analyst determines whether current technical resources be upgraded or added that fulfill the new requirements.
- It ensures that the candidate system provides appropriate responses to what extent it can support the technical enhancement.

ii. Economical Feasibility

- In the Economic Feasibility study cost and benefit of the project are analyzed.
- Means under this feasibility study a detailed analysis is carried out what will be the cost of the project for development which includes all required costs for final development like hardware and software resources required, design and development cost and operational cost, and so on.
- After that it is analyzed whether the project will be beneficial in terms of finance for the organization or not.

iii. Organisational Feasibility

- Organizational feasibility focuses on how well a proposed information system supposes the objective of the organization and its strategic plan for the information system.
- This may include information about the founders, their professional background, and the skills they possess necessary to get the company off the ground and keep it operational.
- It also determines whether the new system will have enough support from participants to be successfully implemented and whether participants can operate the system.

iv. Cultural Feasibility

- A cultural feasibility study is known as one that investigates all the environmental factors involved to successfully carry out a project.
- It is done to evaluate the impact of the project on the local culture.

5. REQUIREMENT SPECIFICATION

5.1 Software Requirements

- Operating System: Windows 10, Mac OS 11.2.2
- Tool: Pycharm
- Coding Language: Python
- Library: OpenCV, NumPy, Time, DateTime, collections, Twilio

5.2 Hardware Requirements

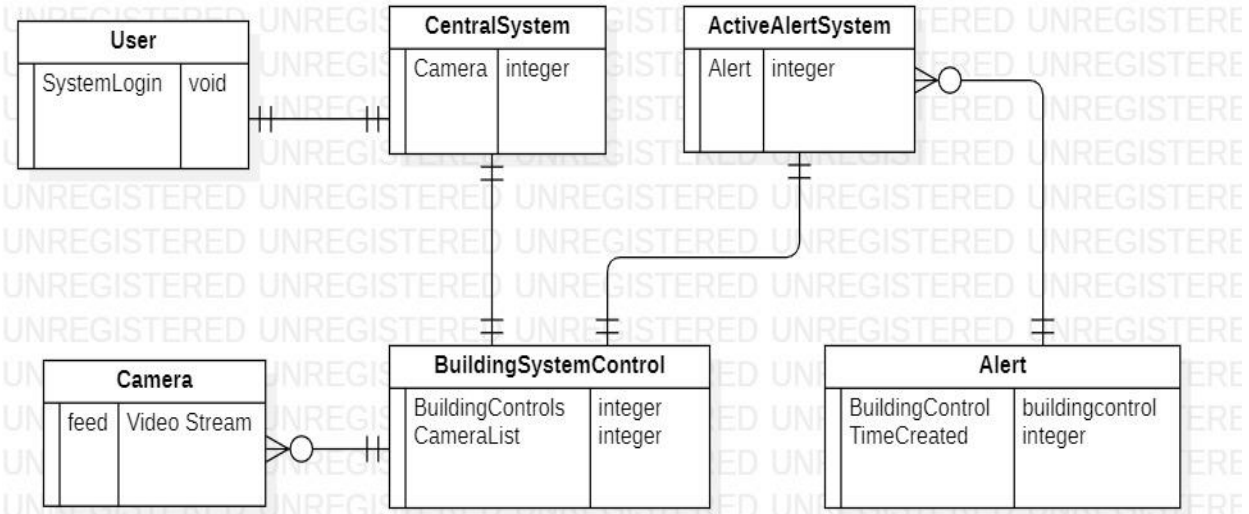
- System: Intel 1.90 GHz
- Hard Disk: 1TB
- RAM: 8 GB
- A Mobile Phone: RAM: 2GB
- WIFI support
- 5 MP Camera
- Storage Space: 4GB

6. SYSTEM DESIGN DETAILS

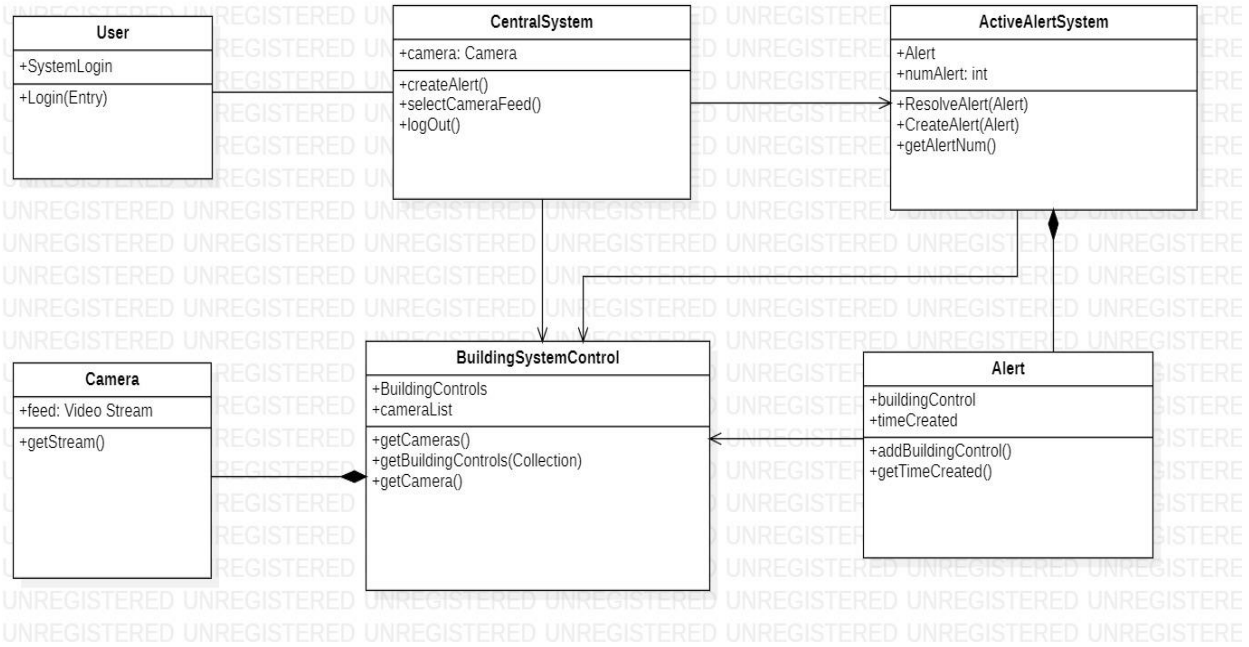
i. Event Table

Sr No.	*Event*	*Trigger*	*Source*	*Activity*	*Response*	*Destination*
1	Camera on	The user must turn on the camera	User	Camera is on	Camera is working	System
2	Speaker on	The user must turn on the speaker	User	Speaker is on	Speaker is working	System
3	Motion Detection	Movement Captured	User	The user makes a movement	Motion Detected	System
4	Alert Sms	Sms sent	System	Alert Sms is sent to the server no	Alert Sms is successfully sent to the server no	User
5	Saving and Recording	Motion is detected	System	The recording is saved in the local storage	The recording is successfully saved	System

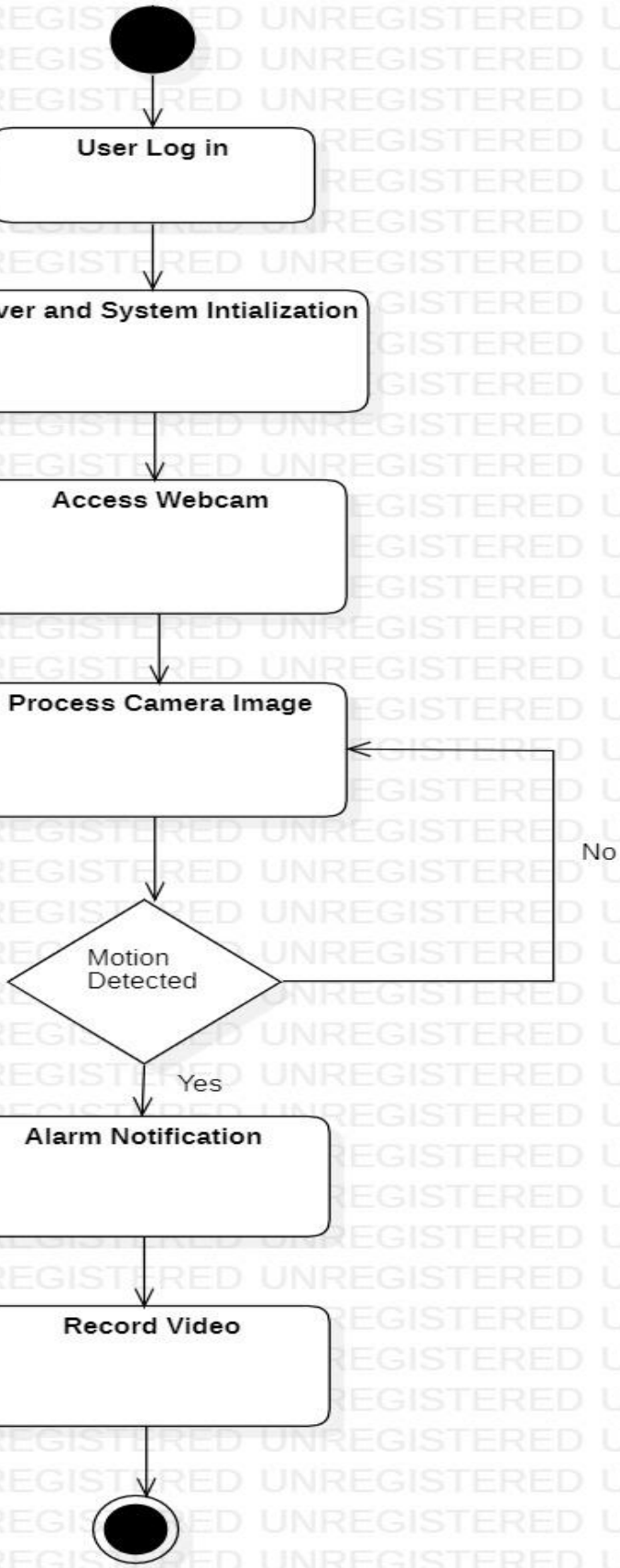
ii. Entity Relationship Diagram



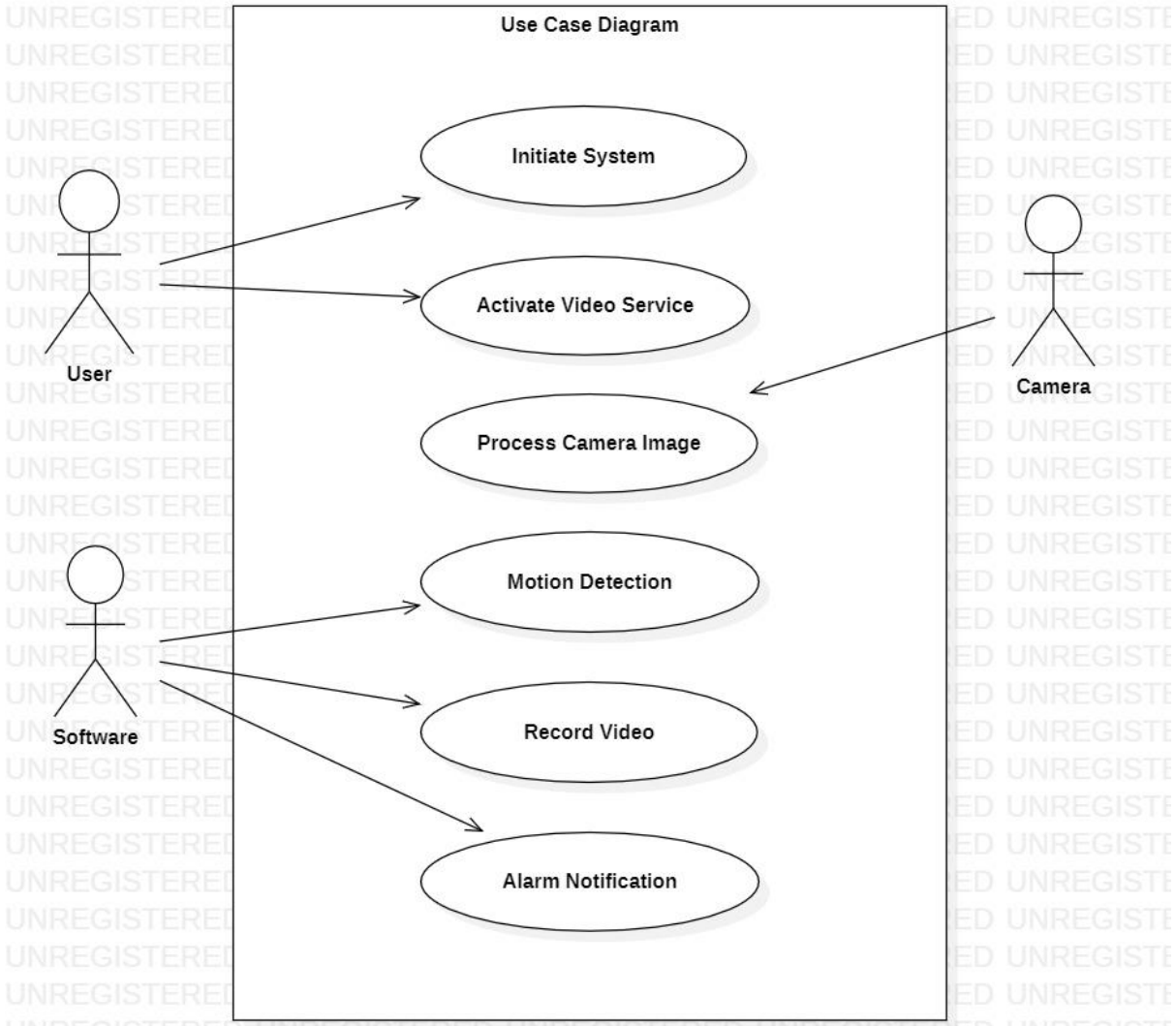
iii. Class Diagram



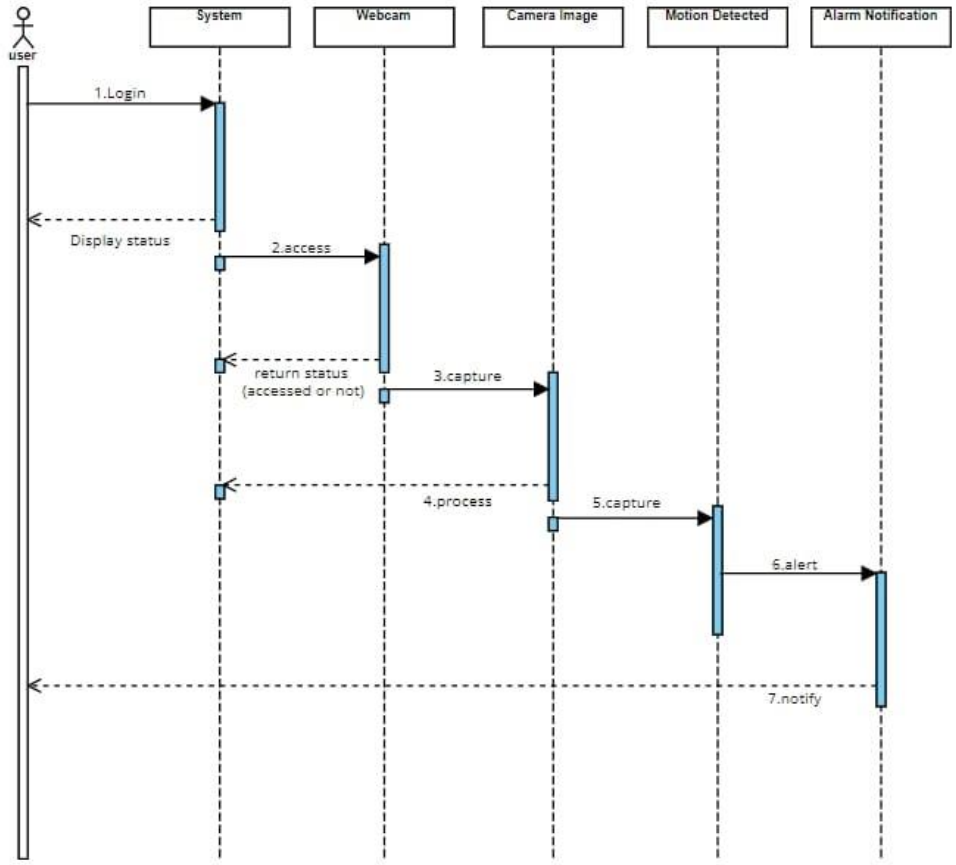
iv. Activity Diagram



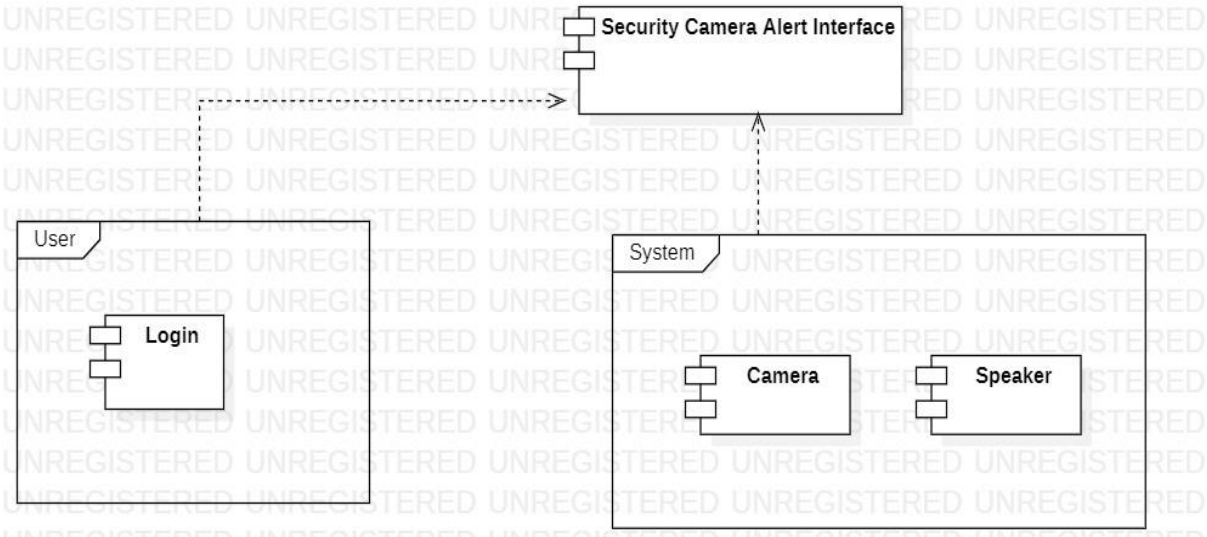
v. Use Case Diagram



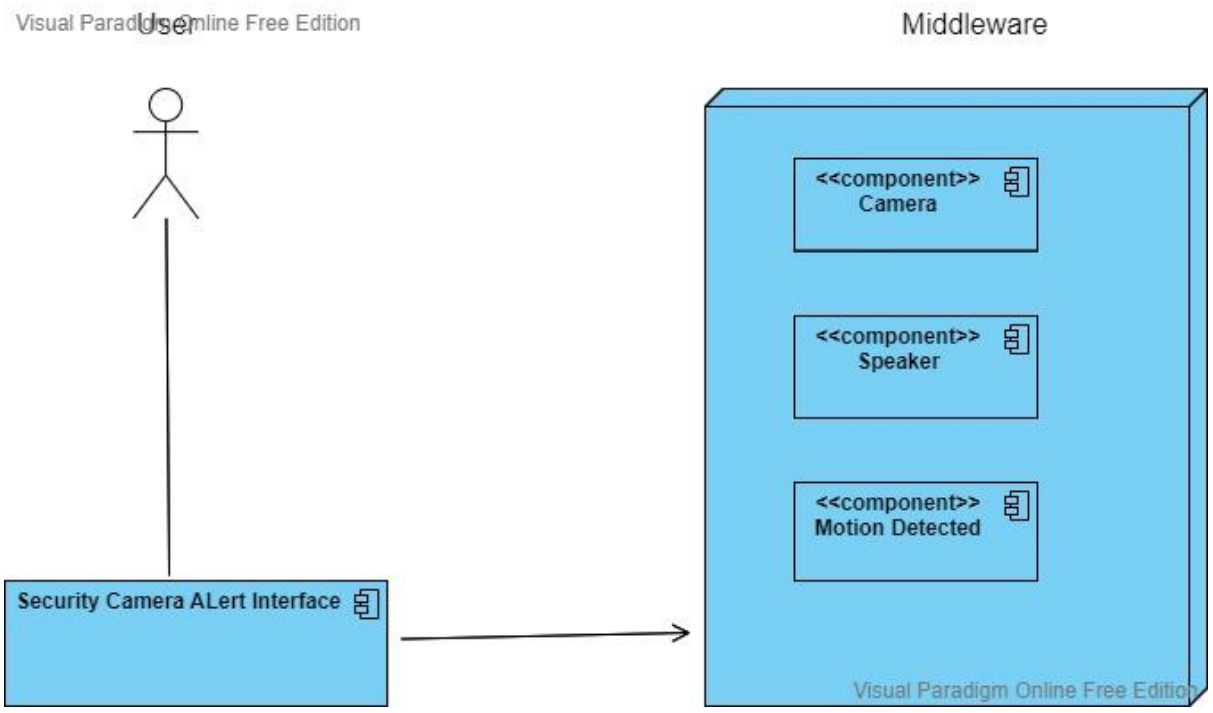
vi. Sequence Diagram



vii. Component Diagram



viii. Deployment Diagram



7. SYSTEM IMPLEMENTATION (CODE)

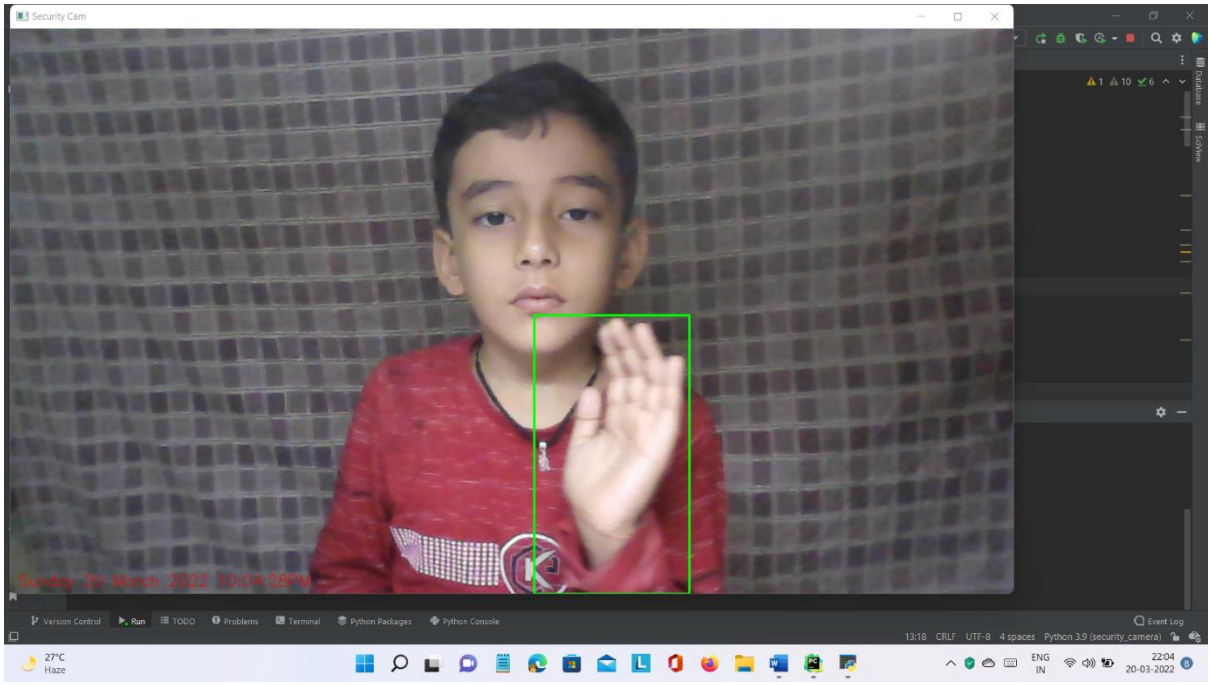
```
import datetime
import winsound

import cv2
from twilio.rest import Client

cam = cv2.VideoCapture(0)

def change_res(width, height):
    cam.set(3, width)
    cam.set(4, height)

change_res(5000,3000)

face_cascade = cv2.CascadeClassifier(cv2.data.haarcascades +
"haarcascade_frontalface_alt_tree.xml")
body_cascade = cv2.CascadeClassifier(cv2.data.haarcascades +
"haarcascade_fullbody.xml")

recording = True
if recording is True:
    print("Recording Started")
```

```
frame_size = (int(cam.get(3)), int(cam.get(4)))
fourcc = cv2.VideoWriter_fourcc(*"mp4v")
current_time = datetime.datetime.now().strftime("%d-%m-%Y-%H-%M-%S")
out = cv2.VideoWriter(f"{current_time}.mp4", fourcc, 20, frame_size)

fps = 0

with open('credentials.txt', 'r') as myfile:
    data = myfile.read()

info_dict = eval(data)

def send_message(body, info_dict):
    # Your Account SID from twilio.com/console
    account_sid = info_dict['account_sid']

    # Your Auth Token from twilio.com/console
    auth_token = info_dict['auth_token']

    client = Client(account_sid, auth_token)

    message = client.messages.create(
        messaging_service_sid='service_id',
        body= body,
        to='+1234567895'
    )
    print(message.sid)

while cam.isOpened():
    ret, frame1 = cam.read()
    ret, frame2 = cam.read()


    diff = cv2.absdiff(frame1, frame2)
    gray = cv2.cvtColor(diff, cv2.COLOR_RGB2GRAY)
    faces = face_cascade.detectMultiScale(gray, 1.3, 5)
    bodies = body_cascade.detectMultiScale(gray, 1.3, 5)
    blur = cv2.GaussianBlur(gray, (5, 5), 0)
    _, thresh = cv2.threshold(blur, 20, 255, cv2.THRESH_BINARY)
    dilated = cv2.dilate(thresh, None, iterations=3)
    contours, _ = cv2.findContours(dilated, cv2.RETR_TREE,
cv2.CHAIN_APPROX_SIMPLE)
    # cv2.drawContours(frame1, contours, -1, (0, 255, 0), 2)
    for c in contours:
        if cv2.contourArea(c) < 30000:
            continue
        x, y, w, h, = cv2.boundingRect(c)
        cv2.rectangle(frame1, (x, y), (x + w, y + h), (0, 255, 0), 2)
        winsound.Beep(500, 200)
        entry_time = datetime.datetime.now().strftime("%A, %I-%M-%S %p %d
%B %Y")
        body2 = "Alert: Some movement detected in the Room at
{}".format(entry_time)
        send_message(body2, info_dict)

    cv2.putText(frame1, datetime.datetime.now().strftime("%A %d %B %Y
%I:%M:%S%p"),
                (10, frame1.shape[0] - 10), cv2.FONT_HERSHEY_SIMPLEX, 0.65,
(0, 0, 255), 1)

    out.write(frame1)
```

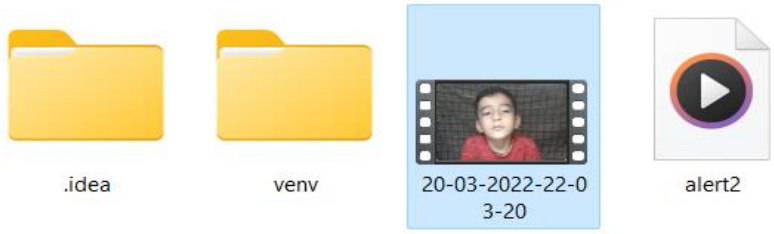
```
    if cv2.waitKey(1) & 0xFF == ord('q'):
        print("Recording Stopped")
        break
    cv2.imshow('Security Cam', frame1)

out.release()
cam.release()
cv2.destroyAllWindows()
```

8. RESULT

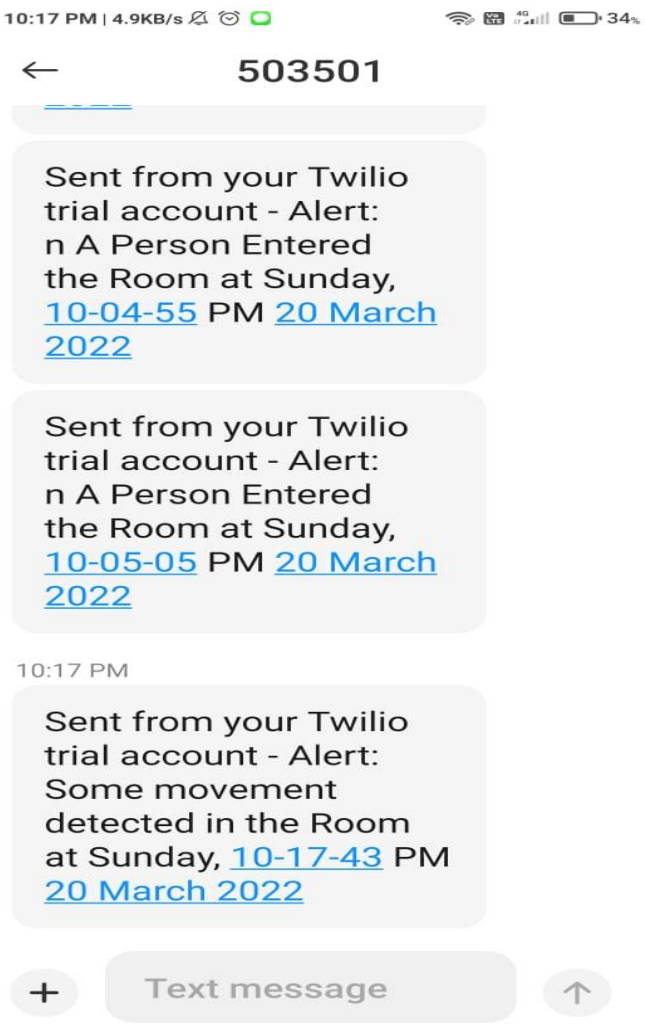
i. Final Output



ii. Saved video with timestamp



iii. Alert Message sent by Twilio API



9. CONCLUSION AND FUTURE SCOPE

i. Conclusion

The application presented in this project is a proof of concept on how to create an application that can detect human motion in a room, which also saves video clips to the local machine. The application also needs an internet connection. The created application yields a good detection result with greater accuracy on labeling the acquired video clips with a proper file name (Date and Time Stamp) i.e., labeling the image if it contains people or not. The gathering of SMS security cautions which has been sent from security gadget through SMS sending API when an interloper has been recognized. The application is suitable in an environment that is static and the movement that occurs is caused by

human movement, for example, in a conference room. The application's motion detection has its limits, for example, the application cannot tell the difference between moving objects and human movement.

The system is made up of both hardware and software components that work together to provide an effective motion detecting method. The background deduction strategy was applied in OpenCV execution and the outcome got from the directed analyses recommended the better precision of an interloper-based movement identification system, taking out bogus alarms. The suggested system is partially self-contained and wireless, resulting in a security system that is dependable, resilient, simple to use, and inexpensive. WIFI has been used to connect to the internet for communication. Various procedures have been successfully tried, and the findings have been reported.

ii. Future Scope

This system has a wide range of applications in a variety of sectors, including banking, forensics, and so on. The reason this system is so beneficial is that it is extremely small and enables facial detection as well as immediate email notification. In addition, face recognition may be used in the future. Any security system's most important component is recognition. Typically, for the greatest recognition system, we need a well-trained database that can serve as the foundation for our recognition. To get the database, first, gather the subject's photographs. The person for the acknowledgment We will be able to give facial recognition once we have acquired and trained our system.

For face identification, we can employ the local binary pattern histogram (LBPH). This strategy aids in the creation of a recognition model. The picture is then transformed to grayscale. The picture pixels are then compared in a clockwise or anti-clockwise way to their neighbor's. For each image, a histogram is created, normalization is performed, and a feature vector is constructed. These feature vectors may now be used to categorize photos and identify the texture using specific techniques. After the face has been recognized, it is reviewed to determine whether it is a recognizable face. As a result, we combine face detection and recognition to create a smart monitoring system for domestic use in our daily lives.

It could be a good idea to make the binary/movement thresholds dynamic and dependent on the average distance in the room to make

the program operate better in rooms of varying sizes. Because if a person goes far away from the camera, the visual difference will be smaller than if the person moved closer to the camera.

10. REFERENCES

[1] M. Piccardi (October 2004). "Background subtraction techniques: a review". IEEE International Conference on Systems, Man and Cybernetics 4. pp. 3099– 3104.doi:10.1109/icsmc.2004.1400815

[2] Yoshida, T., 2004. Background differencing technique for image segmentation based on the status of reference pixels." International Conference on Image Processing ICIP'04, pages 3487–3490, Singapore, October 24-27, 2004

[3] Arabian, S., K. El-Sayed, and S. Ahmed, 2008 Moving object detection in spatial domain using background removal techniques - State-of-Art. Recent Pat on Computer Sci., 1(1): 32-54

[4] Papert, The summer vision project, Massachusetts Institute of Technology, 1996

[5] Efstration Graves, A brief history of computer vision [Internet]. 2016 [updated 05/05- 2016, cited 05/05-2016]. Available at: http://www.egavves.com/a-brief-historyofcomputer-vision/#sthash.b1miJmj3.dpbs

[6] Roqueiro, Petrushin, Counting people using video cameras, Department of Computer Science, the University of Illinois at Chicago, Chicago, IL 60607, USA, 2006

[7] Havaei1, Jodoin1, Efficient interactive brain tumor segmentation as within-brain kNN classification. University Sherbrooke, Canada. 2014

[8] Mobileye, Mobileye - Our Vision. 2016 [updated 04/25- 2016, cited 25/04-2016]. Available at: http://www.mobileye.com/

[9] Vargas, M., F. Barrero and J.M. Milla, 2008. An Enhanced Background Estimation Algorithm for Vehicle Detection in Urban Traffic Video Proceedings of the 11 International IEEE Conference on Intelligent Transportation Systems, Beijing, China, October 12-15, 2008.

[10] Shanker, Lai, Android porting concepts, Electronics Computer Technology (ICECT), 2011 3rd International Conference on, Kanyakumari, 2011, pp. 129-133.