Acropolis Institute of Technology and Research, Indore

Department of Computer Science and Engineering

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Lab Assignment

On

Skill Development Lab [CS 604]

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TABLE OF CONTENTS

PROBLEM STATEMENT: IDENTIFYING THE REQUIREMENTS

1. Problem Statement

CCTV systems are not enough as criminals take advantage of blackouts (zones which are not covered by cameras) and enter the premise. Also in many cases it was found that criminals disrupted the power supply to the CCTV cameras or destroyed the cameras thus leaving no trace of the crime they committed.

2. Solution Proposed

By using modern technologies like motion sensors, image recognition systems and IoT and biometrics, this can make offices and home more secure. We design a system consist of multiple technologies and alerts the residents far away even when there is no one in the house. Sensors, facial recognition, footprint sensors, and more to increase the security of homes, offices, and buildings. Just imagine the applications—doors can be unlocked through facial recognition, lights can be activated with motion or footprint sensors, the camera is activated, and a live feed is triggered on your smartphone, or the police can automatically be notified if an intruder breaks a lock in your home.

3. Users

The different User for 5his system are :-

1. Business purpose.
2. Home security.
3. Office uses.
4. Used on public places.

4. Functionalities

- ✓ Anti-thief
- ✓ Noise Detection
- ✓ Visitors Counting Numbers.
- ✓ Normal Recording with Notification
- ✓ Face Identification of known and unknown persons.

This is a Project built using latest Programming Language and highly evolving Computer Science field which is “Computer Vision”. Which means this project allow computer to watch or in other words it gives vision capability to computers.

Synopsis

1. Abstract

At this time, one of the most crucial aspects of human life is security. Homes are frequently left unattended due to complex activities. Most individuals use CCTV (Closed Circuit Television) cameras to protect their homes when they are away from home. In smart cities, the footage captured by surveillance cameras is critical for crime prevention and investigation. Because the camera only records without analyzing objects, traditional Video surveillance is less effective. The sensor camera's purpose is to reflect progress in the motion of entities that are observable to the camera, in this situation, physical movements. This camera's reliable monitoring mechanism can detect approaching items. The adaptive background removal technology proposed in this paper can accommodate to frame changes. The prior background intensity inference will always be used to update the background frame. It will then analyze the method's effectiveness. Along with motion detection, it will only record moving frames, allowing the system to make the most of its capacity.

2. Introduction of the Project (1 paragraph)

Nowadays, people want one sole thing that is to make them feel safe and secure. The Most commonly used security system is the CCTV (Closed Circuit Television). The cost of implementation of CCTV varies depending upon the size and use of the system. It is usually installed in hospitals, malls, parking lots etc. However, with the help Of CCTV one can monitor the area 24/7, or the footage if stored in a location can Beretrieved when required. Although, it can be used to deter crime and allows the Authorities to identify and solve a crime, it doesn't detect neither recognize the person Who is involved.

We have implemented system which provides multiple feature's like Object Detection, Face Detection and Count Number of objects, We provide the option such as if anyone can enter who is unknown person and taken some things then our system can detect the thinks which is stolen. and many more. Thus, we are dealing with real time-image processing. Open source computer vision(OpenCV) software, a powerful library of image processing tools, is a good choice. With the help of a smart surveillance system, we have achieved a system that can record the event, detect and recognize the person, count.

3. Objective (100 words)

There is a need to develop a robust security system which is not dependent on CCTV or any one technology but consist of multiple technologies and alerts the residents far away even when there is no one in the house.

4. Scope (100 words)

Smart CCTV Surveillance system is designed to help prevent and detect crime. It can reassure the public about community safety. It is located in public places to:

- ✓ Provide evidence to relevant enforcement agencies
- ✓ Maintain public order.
- ✓ Prevent antisocial behaviour and nuisance

- ✓ Provide reassurance
- ✓ Promote economic well being

Cameras record images 24 hours every day. CCTV operators watch lives images at strategic times in a local monitoring suite. If they notice criminal activity on camera, they can direct police response to the incident.

5. Study of Existing System (200 words)

Before starting this project we have researched on some exiting system which are already made and addressing them we have made the following conclusion: **Network CCTV Camera -** By inserting IP to the existing CCTV, CCTV can be managed individually, and as long as internet is available, remote management and remote monitoring are available. Collection of information by CCTV system that uses public IP: as the system is linked to various paths, exposure of IP address as problem that information on the operating system and application used by CCTV system server can be collected with ease. Hackers can use this as a starting point to make different hacking attempts based on information collected from each server. Lack of data safety from nonapplication of encryption on video data: existing analog CCTV and network CDTV with relatively low hardware specifications have a problem in which real-time data cannot be encrypted. This results in easy exposure of data stored in servers. **Video Steganography Application Plan for Network CCTV Monitoring Security –** This proposes a method to protect the system by inserting steganography to the real-time video of CCTV monitoring system provided in open source. Though there are some demerits also like it need to have "free" space in the carrier media. This means usually deleting part of the data that is invisible such as the alpha channel in a picture and replacing it with the hidden data. Sometimes it is only possible to compress this "useless" data, not delete it. Also In a highly compressed video it might be close to impossible to embed additional, hidden information. As steganography on itself is easy to detect, the embedded data has to be encrypted. Also an uncompressed image, the maximum amount of embeddable information is usually at most 30%. In practice however it will be in the single digit range.

6. Project Description (200 words)

Security Management System and its requirement in today's time is widely understood from the fact that people throughout the country have started opting for CCTV cameras in their home, offices and business. Although only the CCTV systems are not enough as criminals take advantage of blackouts (zones which are not covered by cameras) and enter the premise. Also in many cases it was found that criminals disrupted the power supply to the CCTV cameras or destroyed the cameras thus leaving no trace of the crime they committed. Security Management System and its requirement in today's time is widely understood from the fact that people throughout the country have started opting for CCTV cameras in their home. Although only the CCTV systems are not enough as criminals take advantage of blackouts(zones which are not covered by cameras) and enter house. Addressing this problem statement by using modern technologies like motion sensors, image recognition systems and IoT and biometrics, we can make our offices and home more secure. Thus, there is a need to develop a robust security system which is not dependent on CCTV or any one technology but consist of multiple technologies and alerts the residents far away even when there is no one in the house. When it comes to the security of your business, home, offices facial recognition, footprint sensors, and more to increase the security of homes, offices, and buildings. Just imagine the applications—doors can be unlocked through facial recognition, lights can be activated with motion or footprint sensors, the camera is activated, and a live feed is triggered on your smartphone, or the police can automatically be notified if an intruder breaks a lock in your home. Use of AI, motion sensors and many cutting edge technology will result in a more robust system.

7.Methodology/Planning of the Project work (200 words)

For this project we have used various latest technologies which will be evaluated in this section with every details of why it is used. We have used Python language as it is very new and also comes with so many features like we can do Machine Learning, Computer Vision and Also make GUI application with ease.

Reasons for Selecting this language :

- ✓ Short and Concise Language.
- ✓ Easy to Learn and use.
- ✓ Good Technical support over Internet
- ✓ Many Package for different tasks.
- ✓ Run on Any Platform.
- ✓ Modern and OOP language

The method proposed not only records the live footage but also supports multiple features like:

1. Monitor
2. Identify Person/Object
3. Motion Detection
4. Visitors in the room
5. Count Number of objects/people
6. Record
7. Live Location of the house

➢ Monitor Feature:

This feature is used to find what is the thing which is stolen from the frame which is visible to webcam. Meaning It constantly monitors the frames and checks which object or thing from the frame has been taken away by the thief.

➢ Identify Person/Object:

This feature is very useful feature, It is used to find if the person the frame is known or not. It will identify the person in the frame and if it is known then we can see the person name with his id number.

➢ Motion Detection:

This feature helps to detect the motion that means there is a frame where no motion is detected as soon as motion is detected the alarm is raised and we can identify that there is some motion.

- **Visitors in the room:**

This is the feature which can detect if someone has entered in the room or gone out. It also capture and save the images the person who entered and went out of the frame.

- **Count Number of objects/people:**

This is the feature which will count the number of people that are present in the frame.

- **Record:**

This is the feature which will record the live footage with current date and time.

- **Live Location of the house:**

This feature will notify the police that in which house theft has happened and will tell the live location of that particular house.

7. Expected Outcome (100-150 words)

Our project will be helpful in advanced security management system as it keeps monitoring the things inside and frame, can easily identify the known and unknown person also count number of people, detect motion, notify the police and many more.

Benefits:

✓ Our system allows user to view videos even if he is at some remote place. Due to http protocol usage, the application provides online video streaming functionality so that user can view the videos from through android device as well as user's computer.

✓ Our system uses image matching technique, so it gives more precise and accurate results.

✓ Entire Smart surveillance can be made remote using this architecture. User can even control the system through a remote place.

✓ The user gets notified as soon as the intrusion is detected.

8. Resources and Limitations (150 words)

Software Requirements:

Since this is a software hence it will have to run on some hardware and operating system, so below are the requirements to run this software :

- ✓ Windows/Linux/Mac OS any version, hence it can run on any platform.
- ✓ Python3, it need python to be installed in your system to run this successfully.
- ➢ Packages in python -
- ✓ OpenCV
- ✓ Skimage
- ✓ Numpy
- ✓ TKinter

Hardware Requirements

In terms of hardware requirements there is not much required at all but still below requirements are must :

- ✓ Working PC or Laptop
- ✓ Webcam with drivers installed
- ✓ Flashlight/ LED if using this at night.

Technology used to make this project :

- ✓ Python language is used.
- ✓ PyCharm Text Editor is used to write the code.
- ✓ Window 11 OS is used to run and create this minor project.
- ✓ HP-ay503tx laptop is used.
- ✓ Core i5 dual core
- ✓ 240GB SSD
- ✓ 8GB RAM
- ✓ In-built webcam hp-truevision

Limitations:

- ✓ Some CCTV with advanced features and improved technology is very expensive and cannot be purchased as it puts a lot of burden on our pockets.
- ✓ These CCTV cameras are connected to computers, laptops, or smartphones therefore they are vulnerable.
- ✓ A large size storage medium is required to store videos, images, etc. These storage are quite expensive.
- ✓ We also need to take regular backups to avoid any complications.
- ✓ Restriction of use as they cannot be installed in the places like restrooms and changing rooms without prior permission.

9. Conclusion (100-150 words)

Smart video surveillance system significantly contributes to situation awareness. Such systems transform video surveillance from data acquisition tool to information and intelligence acquisition systems. Real-time video analysis provides smart surveillance systems with the ability to react in realtime. Our system senses the intrusion and sends notifications to authorized persons so that action can be taken in response to the intrusion.

10. References

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