

SWAT: MOTION BASED INTRUSION DETECTION SYSTEM

**A Project Report
on
SWAT: Motion based Intrusion Detection System**

Submitted By

Akshay Galgali

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CHAPTER 1 INTRODUCTION

1.1 Introduction:

This project presents a wise indoor security system using general electronic components and networking technology which are easy to use and cost effective. It is a security system using which one can keep total watch on room even without their own presence. This security system is used for highly secured areas, where entries of people are restricted. As per the current security system using Surveillance Cameras such as Spy Cameras, Dome Cameras, Bullet Camera etc are not that convenient, because of the cost, specifications and their working provided. For maintaining proper convenient security, we require a proper system which will work smartly and in a proper required way. So we decided to make a project that should not only be something that will grow us as an engineer, it should be something that will benefit the mankind.

This project was undertaken after understanding this universal truth. We have tried to enable the security of the room of home/office/shop/bank with a high rate of accuracy. There will be an automatic monitoring on anyone entering the room and whatever activities he performs inside. So using this security arrangement the owner does not have to worry about the security of the room. He will be getting information of every motion taking place in that particular room. This system uses a Raspberry Pi, Sensor, Camera, Mutt (email client) and Python & Shell Script. The camera records a video, when sensor detects any motion and by using mutt email client, the recorded video is emailed to the user on the spot by using date and time as a filename, even for quick response a notification is send on Telegram Messenger as "Intrusion Detected" followed by Five photos of the intruder and even a video is recorded and is uploaded on Telegram. Raspberry Pi is employed as main a part of the sensible home system. The Raspberry Pi supports various languages i.e. C, C++, python etc. Python is the default language of Raspberry Pi.

Python language programming is integrated with the shell script. Shell Script is used to send instant notification, photos and video on owners smartphone when intrusion is detected (notifications are received on messenger, named Telegram).

This is a standalone project which contains a Raspberry Pi. This project ensures security by preventing thefts, by monitoring its surrounding using some specialized sensors and camera footage. It works in a different way as compared to existing IDS.

As when some motion is detected in a restricted area, camera captures photos and even records a video. This recorded photos and video will be instantly sent to owners messenger such as Telegram so that there will be a quick action taken for the intrusion detected and even video will be mailed to the user on the spot. So, there is no need for user to maintain a database of whole day recordings etc. User will receive notification along with photos and video attachment whenever intrusion is detected on telegram. Additionally, Owner will also receive notification and video as a mail. Programming is completed with the help of Python and shell script.

1.2 AIM & OBJECTIVE

The main objective of this project is to ensure the security of a room or a premise, by monitoring the activities happening when a trusted person is not present in the room and alerting the trusted person when required. The principle of this project can be used in environments where important data is to be secured.

CHAPTER 2 *Review of Literature*

2.1 REQUIREMENTS FOR THE REAL-WORLD PROBLEM

Many methodologies have been proposed to provide security to a surrounding. A large percentage of such works utilizes CCTV recordings which take videos constantly, however additionally, motion sensors are added to record the video only when motion is detected.

2.2 EXISTING SOLUTIONS

Jayati Ghosh Dastidar - Dept. of Comput. Sci., St. Xavier's Coll., Kolkata, India

With the emergence of so-called 'smart CCTV' being able to recognise the precursors for disorder and civil disobedience, we present a preliminary study into using available CCTV networks augmented with big social media datasets. We examine the existing CCTV infrastructure in the UK, and use an agent-based simulation to model interactions between people based on friendship networks and features derived from their social media usage, proposing a novel algorithm for detection of psychopathy. Finally, we explore the frequency of crimes occurring within CCTV viewsheds using available UK police crime datasets to illustrate the current limitations of the CCTV infrastructure, as well as the potential ramifications of the stealthy emergence of CCTV networks as the fifth utility in smart cities the authors have introduced a texture-based classification scheme for conjunctival vasculature biometrics.

Using the established Wavelet-derived features and neural network classifiers for a new application domain, they have shown the potential of conjunctival biometrics as a standalone authentication system using ordinary photographic setup. This new biometric modality also has the potential of adding precision and security to existing iris biometric systems. The experimental results, based on the evidence of 50 subjects, indicate the potential of the proposed scheme to characterize the individuality of the ocular surface vascular patterns and further confirm the assertion that these patterns are indeed unique across individuals.

Giles Oatley, Dept. of Comput., Cardiff Metropolitan Univ., Cardiff, UK:

The field of CCTV surveillance is topical and widely used in many different applications. The fundamental part of the CCTV system is a reliable image evaluation by a human observer, whose effectiveness is influenced by many variables. Optimization of the effectiveness is a multidimensional problem related to both technical and human characteristics. In many applied systems, the overall performance is affected by a real performance of technical system (image compression, channel transmission, etc.). On the other hand these technical systems have different optimization criteria than a typical video system. TNO Defence, Security and Safety (formerly the TNO Physics and Electronics Laboratory) initiated a project in which the influence of several technical variables on the operator's effectiveness was studied. The whole project was carried out in close co-operation with the Czech Technical University in Prague (CTU). The paper demonstrates and summarizes selected experimental results and evaluated dependencies.

L.K. Lee - DKS Assocs., Los Angeles, CA, USA

Closed circuit television (CCTV) is an essential element of visual surveillance for intelligent transportation systems. The primary objective of a CCTV camera is to provide surveillance of freeway/highway segments or intersections and visual confirmation of incidents. CCTV is becoming more popular in major metropolitan areas around the USA. Since full coverage of all freeways or all intersections in an urban area would be cost-prohibitive, siting of CCTV cameras needs to be determined strategically based on a number of factors. This paper addresses these factors based on design experience in locating over 100 cameras on freeways and surface streets in California, with suggested guidelines for camera site selection. The preliminary and final camera site selection process is discussed. The innovative design and operation of the CCTV video van which is used in the video survey is also discussed as an alternative to bucket truck surveys.

Nick Hewitson - Smart CCTV Ltd Ray Stead, Portsmouth City Council

A PowerPoint presentation on city CCTV monitoring is provided. The monitoring system is available in either centralised or distributed architecture. The system manages large numbers of cameras in real time, enables proactive CCTV management, tracking within the perimeter, and consistency, among others. Its deployment is described and a Portsmouth CCTV example is provided. Three samples of CCTV monitoring are given, featuring usage and advantages

2.3 Hardware and Software Requirements with cost

Hardware Requirements

- Raspberry Pi ----- 2937/-
- SD Card -----790/-
- Jumper Wires -----50/-
- PIR Sensor -----160/-
- PiCamera -----1977/-

TOTAL h/W cost = 5914/-

Software Requirements

- Telegram apk

Non-Functional Requirements

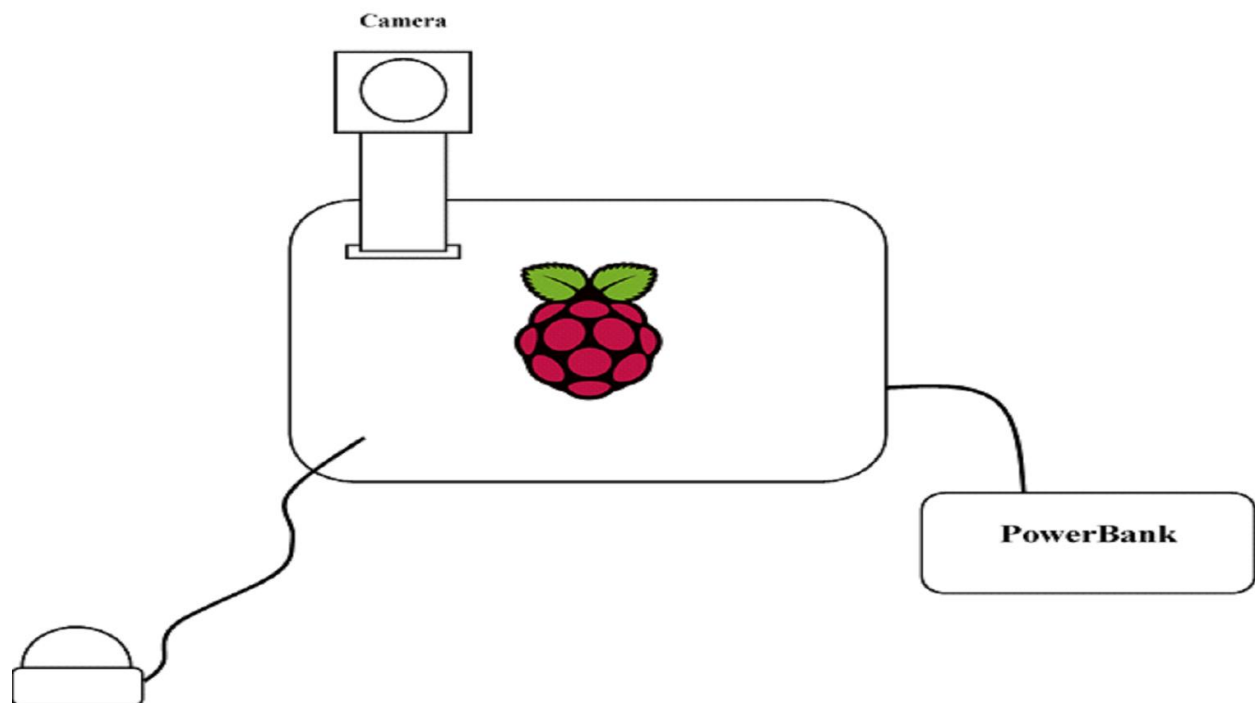
- Reliability: The module will have a minimum rate of failure.
- Maintainability: The module works with any power supply of 5V
- Serviceability: The module will be easy to install and if it fails, bugs can be identified easily.
- Robustness: The module will notify the user when there is an intrusion in the premises with a message.

CHAPTER 3 DESIGN & IMPLEMENTATION

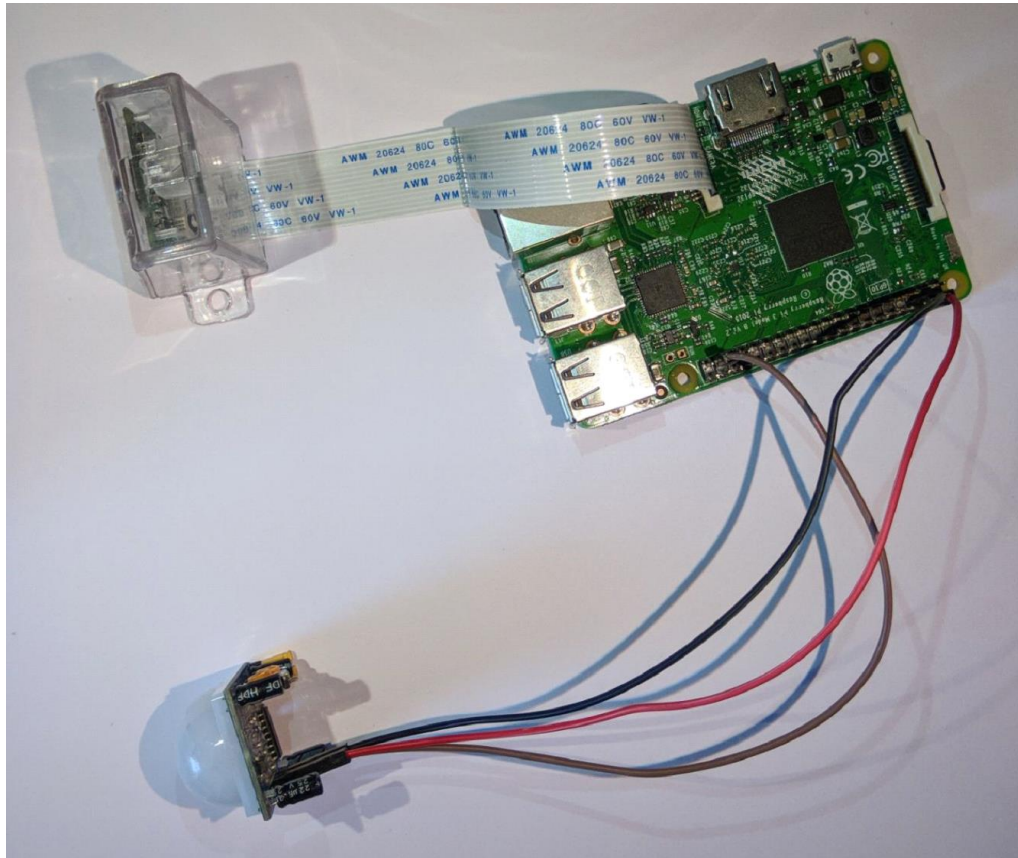
3.1 DESIGN CONSIDERATION

As we have seen above, those were few of existing methods which are currently used in markets, but each method has some or the other limitations or it can be easily hacked or retraced. Thus we propose a new motion based intrusion detection method which can be used for efficient and convenient all above methods.

The method which we use here is very simple:-



3.2 Design Details



3.3 GUI Design

Telegram apk interface



CHAPTER 4 RESULTS AND ANALYSIS

4.1 IMPLEMENTATION DETAILS

We set up the whole project and tried moving in front of the PIR motion sensor. The Raspberry Pi was capable to send Telegram messages to the owner. As well as click a few images and send it via Telegram. This thus made our project work just the way we intended it to work.

4.2 RESULTS AND EVALUATION

The photo that was clicked and sent on Telegram

This photo shows that there was a person walking in front of the door.

Photo of a person intruding



CHAPTER 5 CONCLUSION AND FUTURE SCOPE

CONCLUSION

In this paper, we have proposed a new security system: SWAT: Motion based Intrusion Detection System. Our research results show that SWAT is very promising for monitoring system. This system can be running 24/7 without compromising the security of the environment. And can notify the user whenever there is any motion happening in front of the sensor. The user will be notified with the images and videos of the intruder. So that the user can take required actions regarding the situation.

FUTURE SCOPE

In future work, it's planned the event of latest modules to reduce the energy necessary for police work cameras. By adding an alternative energy panel, the camera is going to be capable of gathering solar energy and be wireless. With an awfully low power Wi-Fi module, it'll be ready to transfer the recorded videos to a server. In addition, to regulate all the modules, so as to stay the performance and management the energy usage through periods of very little or no solar energy provided, there'll be an impression module. We can also add a feature, such as if intrusion is detected then automatically all doors will be locked, so the intruder won't escape. We can send an emergency signal to crime department. We can add alarm systems which will alert the security guards.

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