Review Paper on Smart Security System

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Abstract

The use of image processing and computer vision techniques can now be realized using computer processing. And with readily available libraries like OpenCV, it has become easier than ever to use such technologies to improve upon the traditional security systems for our benefit. By creation of this project, we aim to make it a very easy process to secure the homes and workplaces at a relatively cheaper cost. Traditional CCTVs, in addition to being expensive, don't offer much in terms of control over devices. Our proposed system consists of developing a smart tool by which a computer or raspberry Pi attached with a camera can be converted into a smart surveillance system. Further modules can be connected like a temperature module, PIR sensor, etc. The aim of this project is to develop a smart and cost efficient smart system and as a result provide a cheap and manageable option to small business owners and households.

1. INTRODUCTION

Security nowadays has become a very sensitive issue. It is very important for an individual, especially living in a densely populated city, to protect his property. Nowadays, it has almost become a requirement to install security systems in homes, offices and other places of business to avoid and prevent an untoward incident. The current technology that provides this security is passive and delegates the owner to be alert and take action in case of any incidents.

Our system tries to solve this exact problem by removing the load of periodically checking the camera feed and taking action, using Motion Detection Algorithm and an Android app that instantly alerts the user with a timestamp and motion captured image of the scene that triggered the motion detecting algorithm.

2. PROPOSED SYSTEM

2.1. Algorithm[1]

The Motion Detection Algorithm makes use of OpenCV library[2][3]. It works by comparing two consecutive frames from the feed where every frame is mapped from the RGB channel to its corresponding Grayscale values.

This helps in filtering out unnecessary values and also reduces the processing required per frame. Every pixel of the two consecutive frames are compared to their corresponding pixel in the other frame. A count variable keeps track of the number of pixels that differ in both the frames for every difference the count is incremented by 1. After every pixel is processed then the count variable is checked against a threshold value if the count exceeds the threshold then a motion detection event is triggered and the user gets the alert in his application.

2.2. System

The proposed system finds its way into a variety of domains. The most basic setup will include a webcam connected to a computer or a Raspberry Pi device. After the code is executed on this device, the camera will start observing the environment and as soon as it detects a motion, it will notify the user on his/her phone.

Firebase will be used as a database and a communication link between the device present on location and the phone that will be with the users. Additionally, this system can be modified to include counter-measures upon confirming a break in or an attack, such as calling the police, etc.

Further sources of input, like a temperature sensor, LDR sensor, etc can also be connected to the device with very small modifications to the code.

This project will enable its users to set up a security system using the devices they already own and hence will prove to be very cheap and effective.

3. RELATED WORKS

The most commonly used technology for security and surveillance are CCTV cameras. They are used to deter crimes, monitor activities, for evidence and maintain records. But they are also expensive, may compromise your privacy and can be vulnerable to attacks. Furthermore, there

is little the CCTV systems can do to prevent the theft from happening in real time.[4]

Many systems were developed to solve similar problems. Let's take a look at a few of them.

3.1. Low cost multi-level home security system for developing countries[5]

It is built around an Arduino Uno board (Board1), 5V single-changeover relay, PIR motion sensor and a few other components. This uses Cayenne as the backend to trigger an alert to the registered user in the Arduino. The alert event is triggered by PIR(Passive Infrared) Sensor, which detects motion in its range. If a motion is triggered when the sensors are activated the Arduino sends an alert event to the Cayenne backend which sends the event to the user which is registered. The alert can be sent as an SMS or E-mail. This requires adding a cell phone number prefixed with country code.

3.2. Automated Security System using Surveillance[6]

In this paper, an alert is sent to the user as soon as someone enters the room. In the system mentioned in this paper, the people entering the room are detected using IR sensors and the output signal is sent to the Raspberry Pi for processing. Relay circuits are controlled by Raspberry Pi. These circuits control the fan and the light and capture the image using a camera. The system also has a GSM modem to send SMS to the user. This SMS contains the link to the image.

4. CONCLUSION

Hence, we looked at the current technology used, looked at similar works and proposed a solution that can be implemented in a cost effective manner.

With plenty of work being done in the field of automating the home surveillance systems to make the future homes, offices and places of business more robust, secure and capable of dynamically taking action.

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