

Smart Camera using IoT

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Abstract - Security is crucial concern now days and there are lot of technologies present today to keep your place secure and monitored. But these technologies cost more for domestic and small-scale business where security is required but with less expenditure and maintenance. Upon that in traditional CCTV cameras, it is required for a person to continuously monitor the system. Our project is focused on automating the surveillance process with the help of camera using an IOT device. The main aim of this project is creating an automated camera which can detect, monitor and alert the user without any human intervention. Compared to traditional camera system, this project introduces an efficient camera system which requires less amount of storage

Key Words: IOT, Smart Camera, Security, surveillance

1. INTRODUCTION

1.1 Background Study

In day today life technology is rapidly growing which has made our life easier. Although in modern world the crime rates have been increasing rapidly law enforcement officials have sought surveillance video from convenience stores and fast-food restaurants. Now, when they ask a neighbourhood after a crime, they're asking homeowners if they have video footage. Often, their answer is "yes." This practice for installing cameras for security is common in multinational companies; they can afford this type of technology to monitor their properties of any unwanted trespasser, cost for installing cameras and maintaining server can be easily provided by these types of companies, even employees are hired only for the task of maintaining and monitoring this system. For common household and small-scale offices, it was not possible to implement this kind of security system as they were costly to afford and even after installation, maintaining them was a huge challenge which would require an ample amount of expenditure. To solve this problem, we have designed this system which can be easily installed for domestic and small-scale business purpose where huge amount of expenditure and high maintenance is not required.

1.2 Objective

The main objective of this mechanism is to provide user with cost efficient but effective monitoring system. This project is mainly focused on providing surveillance for domestic and small-scale business which does not require huge security mechanism. The main feature of this project is that it introduces an automated smart camera which automatically

detects, monitor and alert the user of any intruder in monitored premises. This feature will greatly save time and resources as system is not required to be monitored 24/7 by the user.

1.3 Purpose

Automated smart camera is built to be applied for all domestic and small-scale businesses. This system is mainly focused on providing security for those who require security with less expense and maintenance. User has no need for employing staff for monitoring camera, as this system is built to monitor, detect and alert user of any intruder in owner's absence. In this way, it provides ease of mind to the user as user will be alerted as soon as an intruder is caught on camera. Additionally, it is user friendly, easy to use and low maintenance which is more convenient to the users.

1.4 Scope and Applicability

CCTV cameras are very useful to keep an eye on your premises. Although prices of these types of cameras have been reduced remarkably since their beginning but still traditional cameras, which has the potential to send and receive the data over the network, are very expensive. And for True Surveillance, a camera must have capability to send its feed over the internet so that it can be watched from anywhere in the world. This project is built so that it can ease the problems that are faced by household and small-scale business for installing a heavy security system at huge expenditure and maintenance. This makes user save time as it is a smart system where user don't have to monitor the camera personally or deploy an employee to keep a watch as user is notified immediately of any trespasser in surveillance premises This project has easy application as it is cost effective, saving both money and time of the user.

2. REVIEW OF LITERATURE

Several of the existing researches conducted on the same field will give inspiring ideas of designing and developing the project. This portion will elaborate the recent research on the new technology. It emphasizes the role of camera surveillance mechanisms in many applications. Research and surveys have been conducted in order to design and develop camera surveillance systems that will suit the aim and objective in this project.

[1] The first Home Office study in August, 2002

Conducted by Brandon Welsh and David Farrington, surveyed 22 studies of surveillance camera in both the US

and UK for a meta-analysis and found that as a whole the cameras showed no significant impact on crime. Welsh and Farrington's data showed a very small impact on crime that was statistically insignificant. In studies included in their meta-analysis which did show a reduction in crime other interventions, such as improved lighting, fencing, notices about surveillance camera and increased security personnel confounded the data such that any reduction could be simply attributable to the cameras themselves.

The authors (along with additional co-authors) asserted this opinion in a subsequent paper: "Overall, it might be concluded that surveillance camera reduces crime to a small degree."

[2] San Francisco – UC Berkeley, CITRIS Report, 2008

In the United States, the first major scientific surveillance camera study was conducted based on San Francisco's Community Safety Camera (CSC) program. Jennifer King of University of California (UC) Berkeley Law and her colleagues conducted a six-month study for San Francisco through the University's Centre for Informational Research in the Interest of Society (CITRIS) releasing a final report December 17, 2008. The study found very little impact on violent crime and that homicides did decline near the cameras but increased further away (a displacement effect but not reduction). The study did find a statistically significant decrease in property crime near the cameras. Finally, there was little of evidence of an impact on other types of crimes in the vicinity of the cameras.

The report concluded that at least for property crimes, "the system is clearly having an effect" but noted that the CSC program's "lack of deterrent effects on violent crime and its limited usefulness with respect to investigations" limited the program's benefit. The camera program was incredibly expensive, especially given its failure to reduce violent crime. Finally, because the study was short and featured only one city, its results could be a fluke.

[3] Chicago – ACLU of Illinois, 2011

In February 2011, the ACLU of Illinois published a large-scale report on Chicago's network of video surveillance cameras. The ACLU's Schwartz estimated the city has access to somewhere between 10,000 and 20,000 publicly and privately-owned cameras though the exact number is unknown. Like the NYCLU's report and ACLU's California report, this report did not scientifically examine the effectiveness of the surveillance camera system as a tool to fight crime but rather analysed the system with respect to civil liberties. The study noted the following risks inherent in such a surveillance scheme as demonstrated by various surveillance camera systems: the absence of regulation of many of the cameras' features, privacy and First Amendment problems, improper release of video by employees, and racial disparities in targeting. The study looked at the exorbitant costs of the cameras while noting such systems are not particularly effective for solving crimes and questioning their effectiveness in deterring crime.

3. SURVEY OF TECHNOLOGY

As the technology for security and monitoring advances and prices of such technology has reduced considerably installing a CCTV camera can be very expensive. Installing the cameras itself is a very expensive thing to consider. On top of that, maintenance can make a huge crater on any home or business owner. As a result, it is necessary to consider if spending so much money on the initial down payment and then the supplemental maintenance fees. The cost of security cameras can be off-putting to small scale business and households. You can spend nearly up to thousands getting your security system installed. Maintenance for the cameras can also be costly. If you don't have enough knowledge about wiring systems, you may end up damaging the cameras if you try to install them yourself. So, such camera system generally needs to get firstly camera installed then additionally they required a computer to process the software which streams and captures their feed upon that a dedicated server to store all the footage altogether traditional camera system can be quite expensive.

There are many technologies such as Network IP, Analog and HDCVI CCTV which give higher resolution picture with better detail and functionality. But these technologies are expensive as they use Coax cables with BNC connectors or CAT5e/CAT6 cable with RJ-45 connections. However, for larger installation, it will need dedicated cables to be run to allow for sufficient bandwidth.

Our system uses IOT device called as raspberry pi, this is very cheap compared to a computer and portable camera can connected to this chip and all the functions are booted up in raspberry pi and a USB camera can mounted to this raspberry pi, it will automatically record, monitor and alert the user. This system is low budget and energy efficient and installation is very simple compared to traditional camera system also the live feed can be viewed from all over the world if user is connected to internet thus adding an edge over traditional CCTV and IP camera system.

4. SOFTWARE AND HARDWARE SPECIFICATION

• Software Requirement

○ Python -

Python is a wonderful and powerful programming language that's easy to use (easy to read and write) and with Raspberry Pi lets you connect your project to the real world.

Python logo -

Python syntax is very clean, with an emphasis on readability and uses standard English keywords. Start by opening IDLE from the desktop.

IDLE -

The easiest introduction to Python is through IDLE, a Python development environment. Open IDLE from the Desktop or applications menu:

Python in the applications menu -

IDLE gives you a REPL (Read-Evaluate-Print-Loop), which is a prompt you can enter Python commands into. Because it's a REPL, you even get the output of commands printed to the screen without using print.

Note: two versions of Python are available — Python 2 and Python 3. Python 3 has been first released in 2008 and Python 2 development ended with 2.7, which was released in 2010. Python 3 is recommended, but Python 2 is available for legacy applications which do not support Python 3 yet.

○ **Raspbian operating system -**

Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. However, Raspbian provides more than a pure OS: it comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on your Raspberry Pi.

The initial build of over 35,000 Raspbian packages, optimized for best performance on the Raspberry Pi, was completed in June of 2012. However, Raspbian is still under active development with an emphasis on improving the stability and performance of as many Debian packages as possible.

● **Hardware requirement**

- Raspberry pi (3.0)
- Micro SD card with Raspbian OS
- Micro USB power supply (2.1 A)
- TV or monitor and HDMI cable
- Keyboard and mouse
- Camera
- USB/wireless camera connection

5. BASIC MODULES

There are 4 major modules. They are as follows

Camera setup

This is where camera is connected to raspberry pi via USB or WIFI which differs from user to user. If camera connected via USB drivers have to be installed depending on the camera model while connected via WIFI ports have to be configured for camera separately

Record and Store

This module records and collects locally captured videos and photos and stores it in assigned storage space. The database is not used here for storage hence local file system is used which is plugged in as SD card

Generating Email

This smart feature introduced in this system where once an intruder is detected by camera in surveillance premises the camera will automatically store the picture of the intruder as well as generate an email with captured photo attached to it and email it to user

Notification

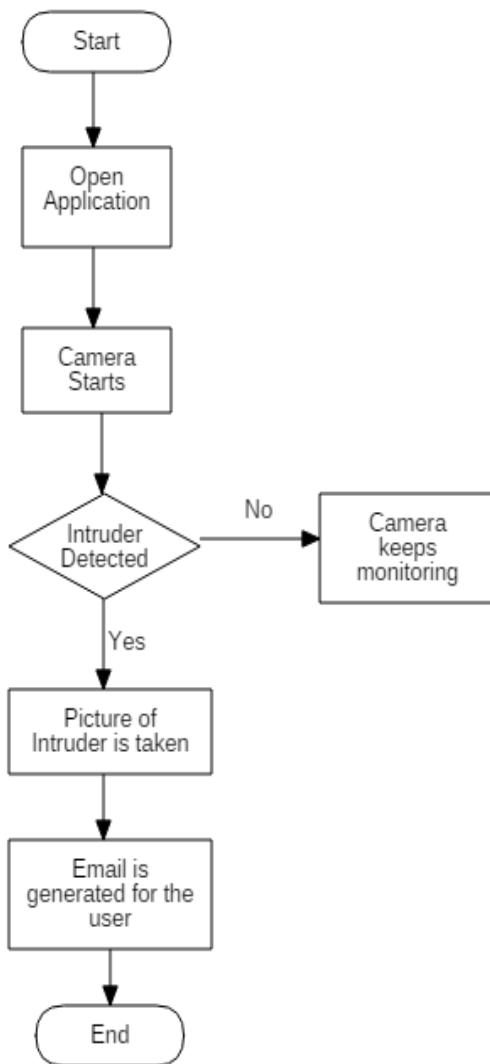
After the email is generated and sent to the user, there will be a notification about the email has been delivered to user in application controlling the camera

This project is made for making it easy to install security cameras which take almost very less storage compared to traditional surveillance cameras which require huge database server to store its data while giving user on the notification about any security violation.

6. ALGORITHM

1. Start
2. Open the app
3. After this camera will be automatically booted
4. The camera screen will start recording video
5. If camera spots any intruder in premises it will automatically take its first picture
6. Picture is stored in the local storage
7. Email is generated and sent with first snap of intruder
8. Notification is generated for user

7. FLOWCHART



8. SECURITY ISSUES

Security issues with this project will vary depending on which hardware user opts to use and how it is configured or connected. If the camera is wireless and is set up through gateways for connecting to pi there may be chances where a hacker can hack into the wireless network which is connected to users pi and alter/change or see the content of user. For wired connection there won't be much issue as it directly connects pi Via USB port or pins so hacking it would be nearly impossible. Other security issue with pi can with the standard Raspbian set up on the Pi is the mainly known username/password (pi/raspberry) combination, which half the 'bots' in the world are trying on everything with an internet connection. Change the username and password and it will be secure as any ordinary Linux system.

Almost every other vulnerability the Pi has is based on physical access - you can pop the card out, edit a file and log

on as root a lot easier than you can do the same thing on a PC - although on a PC with something like the grub boot loader you can do the same thing by editing the kernel command line through grub. What they probably mean is, they don't know it and it isn't running an OS where they have a service contract can control what software is installed.

ACKNOWLEDGEMENT

The Research has placed an important part to explore the practical work, to learn in detail part from the theoretical studies. I would sincerely like to thank all the Teachers who helped me throughout the research.

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