IoT: Smart Security System

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Abstract - *Iot (internet of things) is a technology which explores with various possibilities of automation. IOT connects various non-living objects through the internet and enables them to share data and information with their community network to automate processes for humans and makes their lives more comfortable. This research introduces a new smart security system which will enable users to automate his camera with comparatively low cost. This project is focused on smart system which uses Camera controlled by iot device (raspberry pi). In this system the main focus is on introduction of efficient camera which uses less amount of storage to store videos and snaps This project also introduces alert system which automatically alert user through email, of any intruders in monitored premises. The main objective of this system 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. In addition, this system provides addition feature where system automatically alerts user if any intruder is caught on camera. This feature is will greatly save time and resources as camera is not required to be monitored 24/7 by the user.*

Keywords: IOT, Technology, Internet of Things, Security, raspberry pi.

1. INTRODUCTION

In day today life technology is rapidly growing. it has made our life easier. although in modern world the crime rates have been increasing rapidly. Law enforcement officials search for surveillance video from convenience stores and fast-food restaurants. now, when they canvass a neighbourhood after a crime, they're asking homeowners if they have video footage. often, the answer is "yes." This practice for installing cameras for surveillance is common in multinational companies, they can afford this type of technology to monitor their premises of any unwanted intruders, cost for installing cameras and maintain 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 the maintaining them was a huge challenge which would require a considerable amount of expenditure. To solve this problem, we have designed this system which can be easily installed for domestic and small-scale business purpose were huge amount of expenditure and high maintenance is not required. This project is made so that it can fill the problems that are faced by local household and small-scale business for installing a heavy security system at heavy expenditure and maintenance. Once installed it won't need any different server to store data as it only captures videos or images when motion is detected in front of camera like person walking. This immediately will make camera start and take snaps of unknown person or object and will store in local device. Then an email is immediately generated with first snaps of the object. This makes user save time as well it is altogether 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 intruders in surveillance premises. This project has easy application as well as cost effective saving user both money and time.

2. LITERATURE REVIEW

2.1 Installation cost

Video surveillance comes in a vast range of forms, from self-installed systems that homeowners can install themselves and track from their smartphones with costs starting at Rs.4,276.20, to more complex systems that include professional installation and monitoring. The vast majority of people today are opting for wireless set ups that can allow for both professional monitoring in the event of a break-in, as well as the ability to view different rooms in the home from tablets or phones. The average cost for this is around Rs.14,252.00 per camera with Rs.7,126.00 for installation, and a monthly monitoring charges of around Rs.2,137.80 per month. Unmonitored systems are available for similar costs, without the monthly charges. Most people install a minimum of 4 cameras at a time, for a total cost of Rs.85,512.00 at time of setup.

2.2 Surveillance Cameras and Security Cameras

On the surface, surveillance cameras and security cameras have a lot in common. Both can help protect your home and let you review footage of situations like attempted break ins. The biggest difference comes with monitoring. Security cameras are continuously monitored in the event of a break in, fire, accident, or other issue, while surveillance cameras may be used for you to take a look at what your kids are doing in their rooms while you stay in the kitchen. Surveillance systems can be used to monitor your entryways and windows, and can also be monitored either by you on your smartphone or by a company if desired.

2.3 Resolution of Camera

Like any camera, your surveillance will have a range of resolutions, and the one that you choose will ultimately be based on what you intend to use the system for. For example, if you're using the system to monitor the interior of your home and to see what your kids are up to, you may not need as sensitive a system, while a camera mounted on your front door may need a clearer picture to give you the details of a potential burglar's identity.700 tvl or higher is the suggested resolution for cameras mounted at doors and entry points; anything lower should be used strictly for interior home use only. Higher resolution cameras typically cost about Rs.3,560.22 to Rs.21,361.35 more than lower resolution versions.

2.4 Camera Vision

In addition to the camera resolution, you'll also need to pay attention to the field of view, or the range the camera has. Most systems are designed to give you a range of 15 to 40 feet, allowing you to track movement inside the rooms of your home, as well as the area surrounding your front door. To see further than 40 feet, you will need to purchase a camera that has a long-view lens. These lenses often give you the ability to change the view or the scope from the monitoring device, giving you more detail and allowing you to cover a greater area. Prices increase dramatically for this type of system, with many long-lens cameras starting around Rs.71,204.50.

2.5 Connectivity

Surveillance systems were once hardwired only, requiring significant costs for installation, including running wires throughout your home. Today, while wired cameras still exist, the vast majority of the systems being installed are wireless, using either WIFI or Bluetooth technology. Wireless systems can often be installed DIY or for considerably less per camera, while wired systems tend to cost around Rs.5,340.04 per camera installation, with a minimum of 4 cameras usually being put in at the same time for a cost of Rs.21,361.35 for installation only.

Three types of wires are generally used for these types of systems Cat5, Siamese or Coax. The cost of the cabling itself runs around Rs.17,800.12 for 1000 feet. If your home is already wired for ethernet 1, this can help cut down on the costs considerably, while running the wire itself can cost up to Rs.71317.50 in addition to the camera installation and cabling, for a total of Rs.1,45,954.88 for a wired system, versus the more common costs of Rs.21,359.25 for a wireless.

While wireless cameras are considerably cheaper, it's important to keep in mind that they are also more vulnerable. They can be easily disrupted, while wired systems may be more stable. However, as technology improves most companies and homeowners are making the switch to wireless systems.

2.6 Database and Storage

When it comes to home security systems, one of the benefits is the ability to watch the footage again later in the case of a break in. Professional monitoring includes this storage in their monthly fee, but for home monitoring-based systems, you will need some type of storage. There are two general types: local and cloud. Local storage systems usually involve some type of SD card, which is placed inside the camera, and on which you can store or write over again in the future if need be. The cost is minimal, Rs.712.30 to Rs.1,424.60 per card with up to 128 gigs of storage. No other equipment is needed.

Cloud based storage is another option, which means you don't need to deal with equipment; the video is uploaded directly to the cloud. For this service, you typically pay a monthly fee of around Rs.712.30.

2.7 Outdoor and Indoor Camera

Surveillance systems exist for both indoor and outdoor use. Some will also provide you with mixed use cameras that can be used both indoors and out. Generally, cameras aimed to be installed outdoors will have longer range and better resolution. They'll also cost more, about Rs.7131.75 per camera on average, than those designed strictly for interior use.

3. 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 can be a scenario where a hacker can hack into the wireless network which is connected to users pi and modify or see the content of user.

For wired connection there won't be much issue as it directly connected pi Via USB port or pins so hacking it would be almost impossible.

Other security issue with pi can with the standard Raspbian set up on the Pi is the widely 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 is as secure as any ordinary Linux system.

Pretty much 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 bootloader you can do the same thing by editing the kernel command line through grub.

What they probably mean is they don't understand it and it isn't running an OS where they have a service contract/can control what software is installed.

4. SYSTEM DESIGN

Basic Modules - There are 4 major modules. They are as follows: -

4.1 Camera setup

This is where camera is connected to raspberry pi via USB or WIFI depending on the users need, if camera connected via USB drivers have to

be installed depending on the camera model, if connected via WIFI ports have to be configured for camera separately

4.2 Record and Store

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

4.3 Generating Email

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

4.4 Notification

After mail is generated and send to user there will be a notification about the mail has been delivered to user in application controlling the camera.

This project is made for making easy to install security cameras which takes almost very less storage compared to traditional cameras which require huge database server to store its data while giving user on the go notification about any security breach
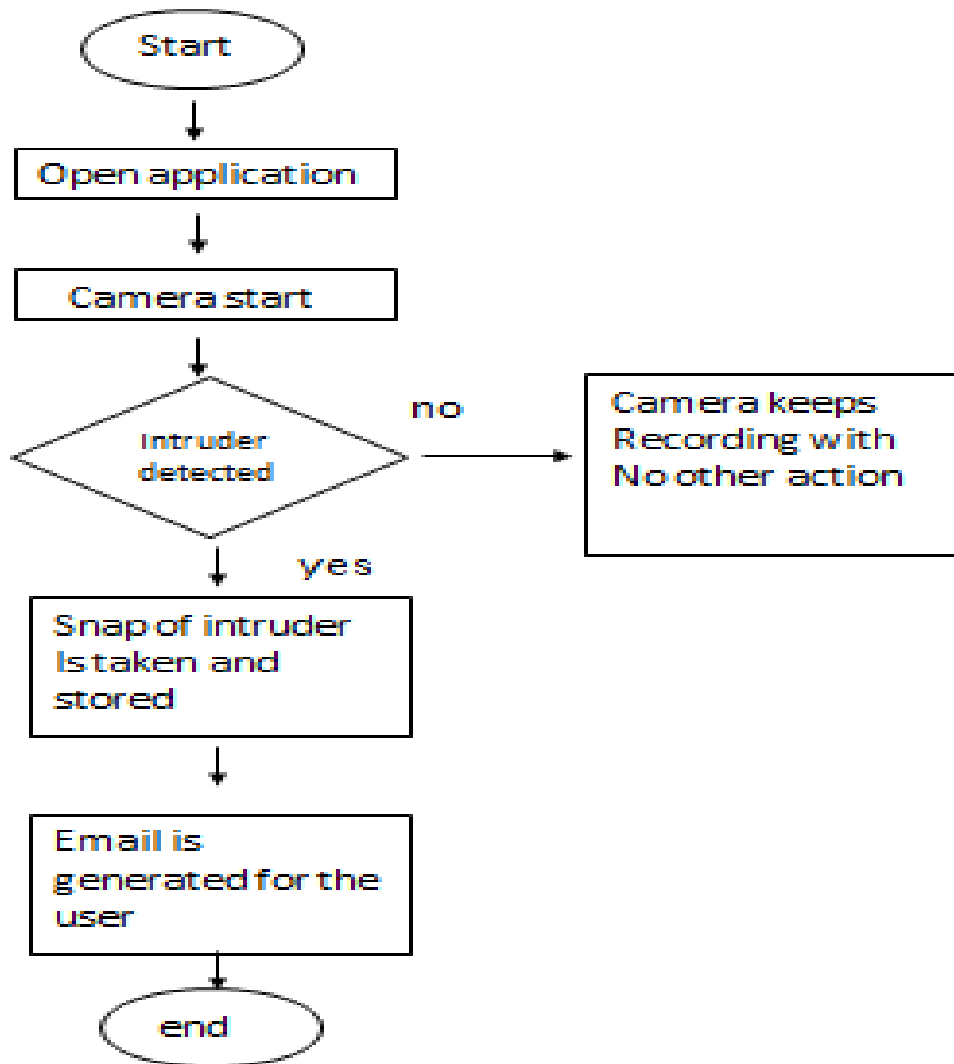
5. CONCLUSIONS

This research is done to show the current cutting edge technology cameras and Surveillance systems which costs a huge sum of fortune which can be equipped by multinational companies which makes a good turnover and has a need to protect their assets which are highly confidential and can have millions of dollars invested of consumers as well as their employees with their premises being large but for small scale business or household purposes this kind of security and surveillance is a overkill, first of all such small scale organization or household won't need such security in most cases and cost for such security cannot be earned back or will be wasted.

This security system is not developed so that it can go head to head with leading cameras their features and their components but instead it is way to install a security system which can have 1/10th, price of camera and give user almost same features without a need to monitor or hire a staff to maintain any database as this system will only record or take picture if the motion is detected and record video for specific time and send email with first picture of intruder which will work as an alert system and user can login and watch the live feed immediately anywhere around the globe.

Installation cost can such for cameras and various components available now on market.

Camera	Features	Cost
Dummy	Fake camera	$10-$15
Box	Stand-alone camera with a box shape	$20-$100
Outdoor	Weather resistant camera	$50-$200
Dome	Meant for mounting on the ceiling	$80-$100
Bullet	Small footprint camera	$100
Hidden	Meant to look like something else, such as a smoke detector or pinhole in the wall	$100-$150
C-Mount	Most standard type of camera	$150-$200
License Plate Capture	Can snap a picture of a car's license plate from near a doorway or driveway	$300-$600

Fig 5.1 – Installation cost

Camera and features according to brands which are currently leading.

Brand	Pros	Cons
ZModo	Versatile and easy to set up yourself	Can use a lot of data over your network
Q-See	Lots of options for style and model of camera	Difficult setup and installation
CW	Includes a zoom lens that allows for better images	Vulnerable to hacking issues
Ray Sharp	Used by many video surveillance companies	Has had issues with hacking in the past
Dahua	Clear image quality	Not a lot of installation options
HikVision	Bullet camera with lots of options	Documentation and motion sensors are not as good with this brand
Swann	Works well indoors and out	Doesn't always work well with existing cable networks
Lorex	Can purchase bundles of several cameras to set up a wider net of images	Vulnerable to hacking issues
Optica	High definition	Set up can be difficult
Sony	Dome cameras, very rugged	Expensive

Fig 5.2 – Leading Brands

All this equipment can be used for large scale industry which are costly but this security system needs wired or a wireless camera, a raspberry pi and SD card rest all the configuration are easy to perform and a smart security camera can be built under the cost of Rs 5000 over all depending on camera and once set up this won't require almost no maintenance and alert system will work on motion detection so no staff or employees are needed for monitoring of the camera.

6. ACKNOWLEDGMENT

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7. REFERENCE

https://www.fixr.com/costs/install-video-surveillance-cameras