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Review of Efficient Monitoring and Surveillance of Intruder Tracking System

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Abstract:- The human intrusion detection system is designed to prevent unauthorized person gaining access to authorized area. Environment is made respond to human behaviour automatically by intelligent surveillance system. Our system has been designed to improve the standard of living. IOT based security system enables the user to control and view the activity or scenario from the remote area. This facilitates the user to receive the notifications when intrusion is detected and view the image from remote location. The sensors and the controlling power of Raspberry pi from windows is established i.e. user can update the position of the camera and capture new image. The main focus is providing the low cost and efficient surveillance system that can have wide scope in monitoring , gathering evidences and detecting theft instantly.

Keywords:- *Intelligent surveillance, PIR sensor, cloud video storage, Camera, Raspberry pi.*

I. INTRODUCTION

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems.

Attacks aims to exploit, destroy, and steal the authorized information. The main goal of software security is to protect confidentiality, maintain integrity and to ensure availability [1]. It's very difficult to crack down on cyber criminals because the Internet makes it easier for people to do things anonymously and from any location on the globe. Botnet is one of the significant types of attack technique used by hackers [2].Cloud computing promises the capability of sharing encrypted data with different users through public cloud storage and it may have the security issues over the data confidentiality and authentication access control. The blind storage allows a client to store a set of files on a remote server that the server does not familiar with the files that are stored in it[3].Visual analysis of human behaviour has created a considerable interest in the field of surveillance due to its wide range of applications. The new object detection algorithm is done using Cauchy Distribution system (CDS). CDS permits the object detection to be done without much mathematical complexities, which occurs in the old methods of segmentation[4].

With the advent of Cloud technology, the notion of connecting any and every device to the Internet with an on and off switch became a reality. As IoT develops, the relationship is between people-people, people-thing While this idea seems like it would provide countless opportunities for the security industry, it happens to be posing numerous challenges as well. In Wired Magazine's article "The Biggest Security Threats We'll Face in 2016", the author included surveillance CCTV cameras as IoT devices that are being used by hackers to gain entry into corporate IT networks. This creates new cyber security challenges with precisely the technology being used to protect the organization and provide security's, and things-things creating the opportunity to connect billions of devices. The security industry needs to quickly get a grip on keeping hackers out of devices connected through IoT by establishing more secure firewalls and monitoring, that alert the security leaders of a potential hacker.

In recent years, there has been an increase in video surveillance systems in public and private environments due to a heightened sense of security like, CCTV and RFID. There are several defects in the video surveillance systems such as picture is indistinct, complex structure, Poor stability, lot of storage space is needed to save the surveillance information and prices remain relatively high. This paper proposes the real time security surveillance system using IoT. The system design uses Motion Detection algorithm written in Python as a default programming environment. This significantly decreases the storage usage and save investment cost. The algorithm for Motion Detection is being implemented on low processing power chip Raspberry pi 2 and Pi camera, which enables live video streaming with detection of moving objects and get alarm when motion is detected and sends photos, videos to a cloud server directly using pi camera. When cloud is not available then the data is stored locally on raspberry pi and sent when the connection resumes. The camera is

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mounted on the motor and its movement (Left/Right) is controlled through IoT webpage by the user, thus providing user with enhanced view of the surroundings.

II. INTRUDERS

One of the two most publicized threats to security is the intruder (the other is viruses), generally referred to as a hacker or cracker. At the benign, people just simply want to explore internets and see what is out there At the serious, people attempt to read privileged data, perform unauthorized modifications to data, or disrupt the system. Some examples of intrusion, consists of:

- Performing a remote root compromise of an email server
- Defacing a Web server
- Guessing and cracking passwords
- Copying a database containing credit card numbers
- Viewing sensitive data, including payroll records and medical Information, without authorization
- Running a packet sniffer on a workstation to capture Usernames and passwords.
- Dialling into an unsecured modem and gaining internal Network access
- Using an unattended, logged-in workstation without Permission.

A. Classes of intruder

Masquerade**:** An individual who is not authorized to use the computer and who penetrates a system's access controls to exploit a legitimate user's account.

- *Misfeasor*

A legitimate user who accesses data, programs, or resources for which such access is not authorized, or who is authorized for such access but misuses his or her privileges.

- *Clandestine user*

An individual who seizes supervisory control of the system and uses this control to evade auditing and access controls or to suppress audit collection.

III. SYSTEM ARCHITECTURE OF EFFICIENT INTRUDER SURVEILLANCE

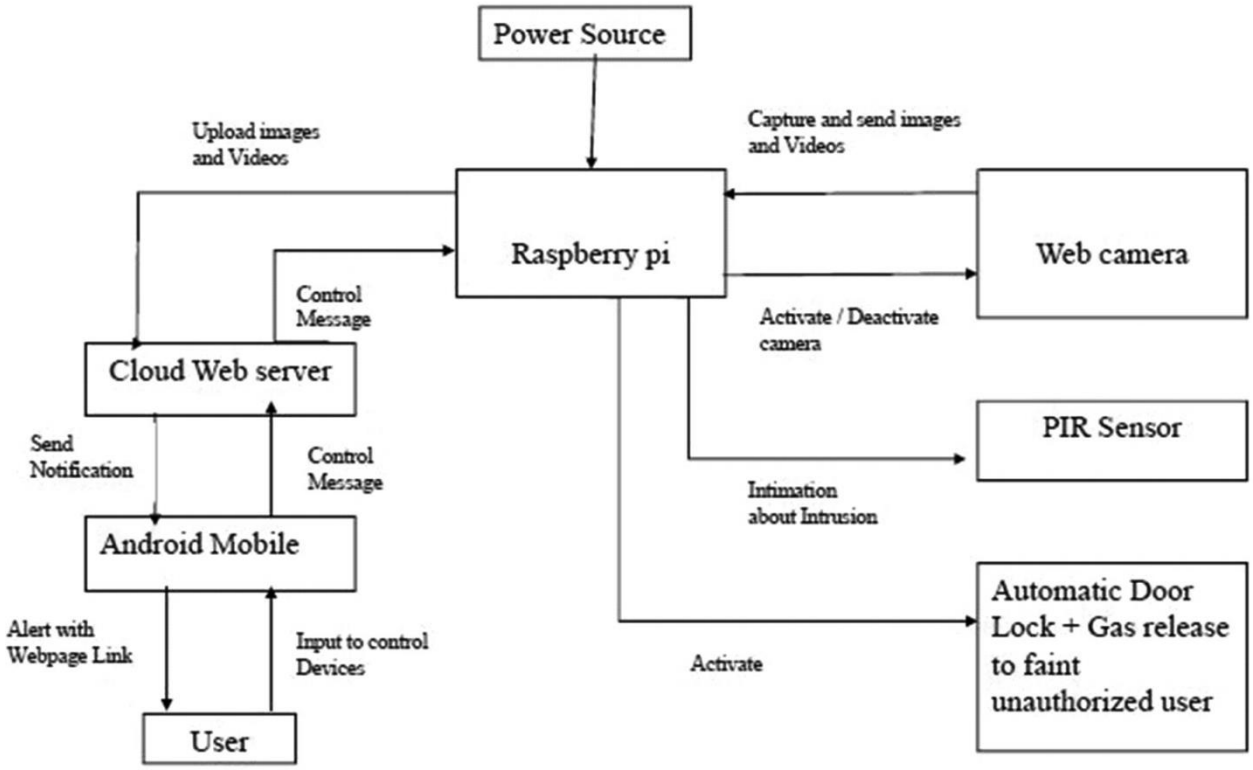

Fig 1:- Architecture of intruder surveillance

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A. The Raspberry Pi

The Raspberry Pi 3 Model B is the second generation Raspberry Pi. It replaced the original Raspberry Pi 1 Model B+ in February 2015. Compared to the Raspberry Pi 1 it has A 900 MHz quad-core ARM Cortex-A7 CPU and 1GB RAM It has an ARMv7 processor, it can run the full range of ARM GNU/Linux distributions, including Snappy Ubuntu Core, as well as Microsoft Windows 10. The Raspberry Pi 3 has an identical form factor to the previous (Pi 1) Model B+ and has complete compatibility with Raspberry Pi 1. It offers more flexibility for learners than the leaner (Pi 1) Model A+, which is more useful for embedded projects and projects which require very low power.

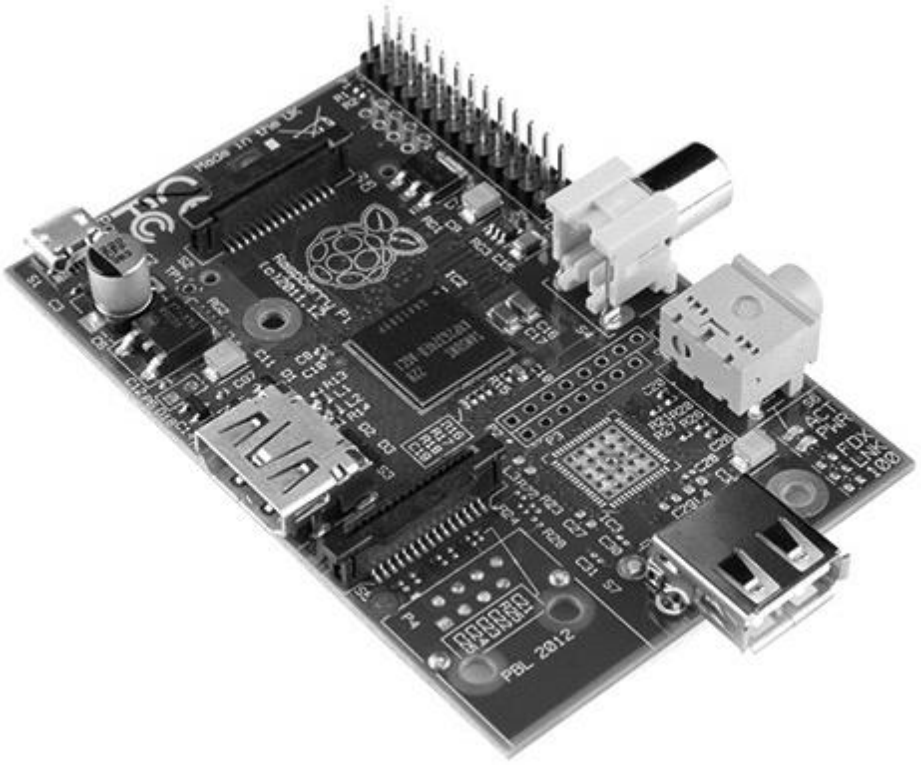

Fig 2:- Raspberry Pi

B. PIR Sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures heat radiation of wave lengths in a band around 10 microns. This results in good sensing when there is small changes in environmental temperature. Connecting PIR Sensor to the Raspberry Pi GPIO pins. One pin is for +5 volts, one pin is for ground and the other is the sensor pin (the middle pin on our Pi). This sensor pin will receive power whenever motion is detected by the PIR module.

Fig 3:- PIR Sensor

C. Input Processing

Images captured by the camera will be given to the Raspberry pi for processing. In processing, images are cropped and classified using edge detection and classifier algorithms to find out whether the intruder is human or not. This increases the accuracy of the intrusion detection. Based on the detection result from Raspberry pi, the alert about the intrusion will be given to the authorized user's android mobile.

D. Solar Panel

A solar cell, or photovoltaic cell, is an electrical device that converts the energy of light directly into electricity by the photovoltaic effect. Solar cells packaged of

photovoltaic modules, which is known as solar panels. A single solar can produce only very limited amount of power.

E. Automatic door-lock

It uses a motion-detecting sensor (PIR sensor) to open or close the door which detects the infrared energy emitted from human's body. When someone comes in front of the door, the infrared energy detected by the sensor changes and it triggers the sensor to open the door whenever someone approaches the door. The signal is further sent that controls the door .A number of technologies are available to make such kinds of systems like PIR sensors, Radar sensors, Laser sensors, Infrared sensors, etc. In this Adriano based project, we have tried to replicate the same system by using a PIR sensor.

F. Raspberry Pi Camera

The Raspberry Pi Camera Module V2 is the new and improved official camera board from the Raspberry Pi Foundation! Custom designed and manufactured by the Raspberry Pi Foundation in the UK, the Raspberry Pi Camera Board V2 features an ultra-high quality 8 megapixel Sony IMX219 image sensor (up from 5MP on the V1 camera board), and a fixed focus camera lens. The V2 camera module is capable of 3280 x 2464 pixel static images, and also

supports 1080p30, 720p60 and 640x480p90 video. The module attaches to Raspberry Pi by way of a 15 Pin Ribbon Cable, to the dedicated 15-pin MIPI Camera Serial Interface (CSI), which was designed especially for interfacing to cameras. The CSI bus is capable of extremely high data rates, and it exclusively carries pixel data to the BCM2835 processor. A 150mm CSI cable is included with every camera. The board itself is tiny, at around 25mm x 23mm x 9mm, and weighs just over 3g, making it perfect for mobile or other applications where size and weight are important.

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IV. EXISTING SURVEY OF EFFICIENT INTRUDER SURVEILLANCE

TITLE	AUTHOR	YEAR	LIMITATIONS
A resource oriented architecture for the Web of Things.	Guinard, D. Wilde, E.	2010/IEEE	Environmental sensor nodes and an energy monitoring system to the World Wide Web.
The Reinforcement of Communication Security of the Internet of Things in the Field of Intelligent Home through the Use of Middleware	Li You-guo Jiang Ming-fu	2011/IEEE	Network protocol stack of the overall structure and dissects the accomplishing technologies of Windows CE-based IPsec VPN core modules.
Evolution of wireless sensor networks towards the Internet of Things.	Mainetti, L. Vile, A	2011/IEEE	Different sensors and actuators technology using wired medium.
Three-Dimensional Location-Based IPv6 Addressing for Wireless Sensor Networks in Smart Grid.	Chih-Yung Cheng Ray-I Chang	2012/IEEE	Wired area network (WAN) infrastructures seamlessly without a requirement for deploying proxies.
Research on the Visualization of Equipment Support Based on the Technology of Internet of Things.	Wang Tie-ning Zhu Yu	2012/IEEE	Interfaced RFID with server.
Operating Systems for Low-End Devices in the Internet of Things: a Survey.	Hahm, O. Petersen, H.	2014/IEEE	Low-end devices which cannot, due to stringent resource constraints, e.g. very limited memory, computational power, and power supply.

V . ADVANTAGES OF PROPOSED SYSTEM

In this paper we have proposed an intruder detection system which is robust and may also be combined with closed circuit television surveillance systems to automatically record the activities of intruders , and may interface to access control systems for electrically locked doors. Systems range from small, self-contained noise makers , to complicated, multi-zoned systems with color- coded computer monitored outputs.

VI. IMPLEMENTATION OF EFFICIENT INTRUDER TRACKING SYSTEM

As the part of implementation, each step will be presented in detail along with its techniques and process.

A. Capturing the image/video

In this step the web cam connected to the system which is working actively and continuously will capture the motion at the door, The ROI (region of interest) will be processed to cut the face from the image and discard the remaining content of the image .

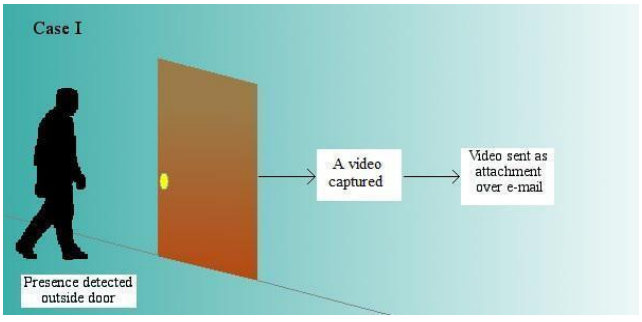

Fig 4:- Image capturing

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B. Converting the colour image to gray scale image

In this phase the image will be converted from color to gray for the purpose of easy comparison of stored image features and current image features.

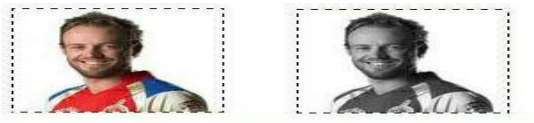

Fig 5:- Conversion of grey scale

C. Comparing current image with stored image

In this phase currently taken image will be compared with stored image, the purpose of this phase to check whether the image is of any family person or a relative. If the image matches the stored image then it is not necessary to send it, by this the additional computational task will be saved. The mat-lab algorithm for feature comparison has been used in this system.

D. Action taking phase

In this phase if the user confirms the face, action not necessary to be taken. But if the user declines to recognize the face, He can initiate the alarm process from his end.

Fig 6:- Response phase

E. Storing Phase

In this phase the image captured during the first phase will be stored in the database for future iterations if needed. Even all the family members' images will be stored by the user so that the new image can be compared with each of the existing image.

VII. CONCLUSION AND FUTURE WORK

The "Review of efficient monitoring and surveillance of intruder tracking system" is a Home/Office based security system which can be of great where security is a matter of concern. The Motion Detector patches up for the need of a cheap and small security system in day-to-day life. In future we can use release of gas to unauthorized person to delay the access of authorized area. A heavy laser beam of light can be used to capture the intruder.

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