

Literature Survey on “Interactive motion detection security system using Raspberry Pi in IOT”

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Abstract: *Internet of Things is the communication technology mainly intended for transferring usable data in real time monitoring system, for example, to monitor and control temperature of room by using a sensor. The aim of this paper is to devise a new security system for detecting motion and get an image or notification when motion is detected. This system will send snapshots to end user through mail or notification via text message. When the internet service is not available, Raspberry Pi will store the data locally and sends that data when internet is available. Raspberry Pi is a low-cost security system as compared to present systems. Raspberry Pi is a small sized computer used to process a captured image as well as video as and when the motion is detected. Passive Infrared (PIR) sensors are used to detect the motion, the image is captured through the camera and provisionally stored in the Raspberry Pi module.*

Keywords: *Internet of Things (IOT), Motion Detection, Raspberry Pi, PIR sensor*

INTRODUCTION

The term IOT was first published by Kevin Ashton in 2002 through his work of Auto-ID center at Massachusetts Institute of Technology (MIT) [1]. Currently, the Internet of things is used in many areas of research like in the fields of automobiles, transportation, agriculture, house management, health care, etc. Now days, recent technological trends emphasize on the security systems and their cost reduction. It is expected that around 50 billion devices would be connected via internet by 2020. In existing system, CCTV camera is used for surveillance but it is costly because it requires more hardware and storage for continuous recording of activities. Also it requires human interaction to detect any unapproved activity. The type of communication that we experience today is either human - human or human – machine but the IOT assures machine – machine communication. Fig1. Shows the concept behind the Internet of Things. The basic notion behind IOT is to permit autonomous exchange of useful information using internet-enabled devices. The advents of new technologies have attracted considerable attention of all the researchers. Earlier many systems were handled manually. However, recent advancements have been

playing a pivot role in automation. By the use of IOT ample amount of data can be retrieved and transferred through network. Now a day people keep on moving across the world and want to monitor and control either their business place or house from the remote location. IOT can be used effectively to achieve an affordable and secure way of monitoring and controlling. The emphasis of IOT is to allow things to become smarter, more reliable and more autonomous. Sensors play a very important role in the field of security. Different types of sensors are used for the various applications like ultrasonic sensor, photo electric sensor, temperature sensor, and passive infrared (PIR) sensor [3].

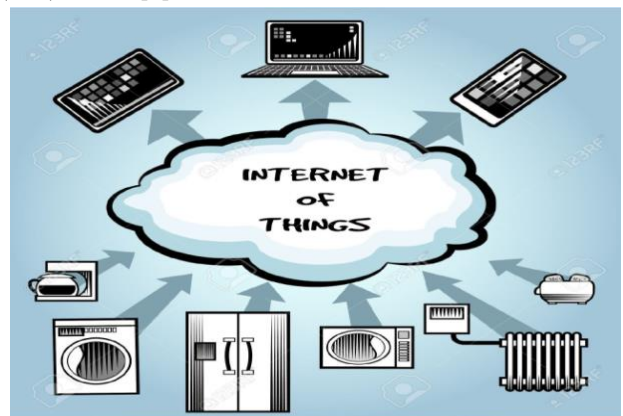


Fig 1. Internet of Things

IOT has tremendous potential in the design and implementation of security systems. To detect motion for various purposes such as anti-theft security system, inspection of objects in factory; IOT helps in many ways. This paper introduces Raspberry Pi using wireless communication such as Wi-Fi. Raspberry Pi is small size and portable computer board and it's a low cost device [4]. User can connect web camera, computer monitor or television, keyboard, mouse, etc. In addition, programmer can develop application or script using Python language. Raspberry Pi uses Raspbian operating system where Python is main core language [5]. A wireless sensor network (WSN) is composed of different distributed nodes contained sensing devices to monitor and to measure

characteristics of physical environment at different location [6]. One of the components used in Raspberry Pi module is PIR sensor. It is used to detect a motion in specific region.

Devices in internet communicate with each other using IP addresses. Currently, few devices are available in the world, so IPv₄ addresses are adequate because it covers 4.3 billion unique addresses, but when idea of IOT is implemented everywhere object or device will require a unique IP address and IPv₄ addresses exhausted soon. Hence we need to adopt IPv₆. Another challenge faced by IOT would be data storage. As billions of devices are connecting for such devices useful data need to be stored and for this ample storage space is required.

This system is viewed by only one person, so it offers privacy on both sides. It is simple to implement and less expensive.

LITERATURE SURVEY

The limitation of CCTV cameras is discussed in [3]. In literature [4] an IOT based system and its advantages are explained which uses email notification and cloud to store data. Through PuTTY raspberry pi can be programmed and then works in standalone mode [5]. There's no hard drive on the Raspberry Pi; everything is stored on a Secure Digital (SD) Card [6]. Data is stored and retrieved without using external cloud server is discussed in [7]. The two approaches of powering Raspberry Pi with batteries are discussed in [8]. The both approaches use the small capacity batteries which power Raspberry Pi model B and ensure Raspberry Pi working time of approximately 2 hours.

NEED FOR PROJECT

It is beneficial to integrate and implement IOT into security system to detect motion, for example, when you are at remote location and you want to monitor and get notification if any activity happens at your home or office. The project aims to provide technology oriented and low cost system to monitor motion detection. Main emphasis is to provide user friendly interface, which would send quick notification to user through email or text message.

PROPOSED SYSTEM

Existing system has disadvantages. It is difficult to implement and very complex. It requires more human effort and hardware. So entire system is expensive. These can be overcome by use of interactive motion detection security system using Raspberry Pi in IOT.

This system consists of three layers- first layer is for motion detection. In the second layer actions are processed according to Python script and in third layer recorded snapshot or video is sent to user [7].

METHODOLOGY

Raspberry Pi is credit card sized computer and also known as Model B+ have the following features:

- 700 MHz ARM CPU
- 512MB SDRAM
- Ethernet RJ45
- 2 x USB 2.0
- HDMI and Composite RCA

The Raspberry Pi runs Linux based operating systems Raspbian OS. It has a low price relatively as compared to machines in the market and can serve as a server for light traffic [8].

Raspberry Pi model is shown in Fig.2

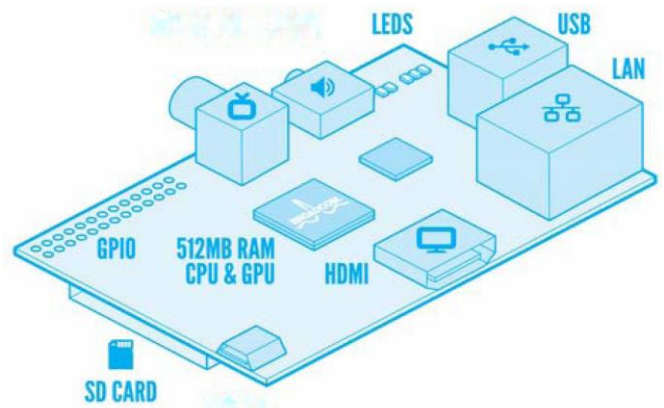


Fig. 2 Raspberry Pi

A Passive Infrared (PIR) sensor is connected to general I/O pins of the raspberry pi. When the motion is detected, the camera records the snapshot or video for the assigned time or until motion is detected. For storing the snapshot temporarily an external SD card is used in the raspberry pi. For sending email and text message notifications, internet connection is required. If the server is not available then the snapshot are stored in the raspberry pi and send that data when the internet resumes.

FUTURE ENHANCEMENT

Interactive motion detection security system can be enhanced in future by adding additional infrared emitting system at home so even though person has covered his/her face, it can easily identify the person. System should go on sleep mode when it is no longer in active mode.

CONCLUSION

Raspberry Pi proves to be a smart, economic and efficient platform for implementing the home automation. This project mainly focuses on the motion detection and it enables the user to monitor their homes and building even from remote locations. This system could be an alternative for expensive security systems are being used in the present days. This system does not need any special

modifications in the infrastructure at the place where it is installed. It can be implemented without much difficulty.

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