

# Motion Activated Surveillance System

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**ABSTRACT:** Surveillance is watching over the activities from distance. This distance can be few metres, kilo-metres to geographical boundaries. It forms the integral aspect in present scenario, where security and remote access is crucial. This paper presents the surveillance system that integrates sensor network with conventional surveillance approach. Hence, it ensures high-end security and remote access. The paper emphasises on use of Raspberry pi “System on Chip” as development base for this “Internet of Things “Application, The selection of this SOC has tremendous advantage as depicted in this paper. The application aims at detecting motion by PIR sensor that in turns activates Camera of Raspberry pi, Captures image and send video recording to Drop-box. This video footage can be accessed by android application installed on user’s smart phone. At the same time-mail notification is send to user’s mail-box.[2]

**KEYWORDS:** IOT, PIR sensor, Raspberry Pi, Drop box, Python.

## I. INTRODUCTION

With tremendous increase in mobile and pervasive devices, the new term has new coined up known as “INTERNET OF THINGS”[6][7]. All the devices in realistic world are in some network other devices and hence are capable enough to communicate.”IOT” is trying to make lay man life easy by innovation of smart devices. These devices are capable of monitoring environment from sensitive ecology, rural environment to handling complexities of urban ecosystem. One of the dire needs of today’s scenario is “SURVEILLANCE AND SECURITY”.

Both surveillance and security is key requirement at Offices, Homes, Colleges, Banks and other areas. In this research paper, surveillance system that is motion activated basis has been presented. This can also serve as security system. The system is basically an IP based camera that works in real time scenario. Hence, it is able to make good utilisation of resources like power, sensors, small credit card size micro-processor, and this is advantageous over existing systems. [4]

The paper starts with related work in this field and various products existing in the market, it then moves with comparison among the systems. In the next section we discuss about various hardware modules used in the project, operating system so used is also discussed, the appropriate selection of every module is briefly described. In third section focus is given upon block diagram and the flow diagram of the system. Finally, implementation with screen shots is included with conclusion is presented. We also extend this surveillance system that how it can act as security system, how data mining can help in identifying malicious activities. Its future scope is discussed. At the end references has been included.

## II. RELATED WORK

The commencement of surveillance systems began with the “WIRED SYSTEM”, it slowly evolved to “WIRELESS SYSYSTEMS”, both systems had pros and cons. But proliferation of “INTERNET OF THINGS” requires surveillance systems to be controlled by users even from the remote areas. Hence, need of IP-based cameras inculcated.

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**WIRED-SYSTEMS**-These systems make use of wired connection of cameras, sensors with micro-processor. Hence, it is complex to install them at uneven geographical areas. So, feasibility of these systems is difficult. However, Systems require continuous monitoring, and a dedicated PC is required all the time to serve this purpose. This PC can be hacked also. Hence, not very secure.

**WIRELESS SYSTEMS**-These systems are easy to install, can be install in tough terrains. Hence, Good approach it is, but they also require continuous monitoring. Therefore, inefficient utilisation of resources like PowerPC’s takes place.

**IP-BASED SYSTEMS**-These systems can be monitored remotely. They are new in market and hence still expensive to afford. They still require more security issues. So, in this paper we have tried to overcome these issues with raspberry pi board and real time sensing capability. Android application is also developed; hence it provides high end security.

In market many products having IP based cameras are available, but they don’t frequently employed sensors and other behavioural based algorithms, so this paper will focus on these issues.

Before going in detail, short comparison among these three systems is presented-

PARAMETER	WIRED	WIRELESS	IP BASED( SMART )
SECURITY	LOW	MEDIUM	HIGH
FEASIBILITY	LOW	MEDIUM	HIGH
POWER EFFICIENCY	LOW	LOW	HIGH
COST	HIGH	MEDIUM	LOW
ONLINE ACCESS	NO	NO	YES

### III. PROPOSED SOLUTION

Since project is an “IOT application”, it is the integration of both hardware and software co-design. Firstly various hardware modules are being discussed and their selection criteria is also emphasised and then software used is discussed.

#### Hardware Modules-

**Raspberry pi SOC**-It is the most apt for this project as it has low cost, low form factor, no noise component, huge online community support, scalable LED support and supports various sensors interfacing. Hence, this application needs all these features, therefore this “System-On-Chip” is used keeping all the things in mind.[5]

**PIR Sensor**-This sensor is the base of “motion activation “in this application. It stands for Passive Infrared Radiation sensor, it detects the infrared radiations from human bodies whenever there is change in temperature, hence it will help in motion detection that activates camera and will help in utilising the resources to great extent.

**Pi-Camera**-It is small camera that can be interfaced with Pi module; it is not bulky as cameras used in existing products. Hence, it is a good choice. If we want to have multiple cameras surveillance with Pi Soc then it is possible with combination of plug and play USB cameras and Wireless Cameras. Interfacing of all these modules is also feasible with Pi Soc.

**Network Adapter**-To support “IOT”, we need to connect to internet all time, that is quite often in present Scenario, as a result we want Raspberry Pi also be connected to network via Ethernet or WI-FI all the time. In this application we

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are connecting it with Network adapter TP-link as it provides good support for connectivity with fair speed and supports network encryption protocols like WPA, WEP.

**SD-card**-Since “IOT devices” don’t have huge memories like general purpose computer we require storage card for these devices. In this application we have used Class-10 SD card. This is used because being class 10, it has higher data transfer rate as compared to other classes, and moreover it take images with high quality.

**Power supply** –Adapter is required to connect raspberry pi with power.

**Software**-Selection of proper operating system is required in “IOT devices” as they are real time devices. The operating system be robust, secure, supports multiple languages. Hence, we have used two softwares here-

**Raspbian** -This is Linux based operating system for Pi board. It is open source and being Linux based more secure than other OS. This OS is base for this application and has been customised depending upon the tailor needs of these applications.

**Android**-For making mobile application for the end user android development tool kit is used. This is widely used popular operating system having huge community support and easy to build applications. It offers security, robust in nature and hence suits to this application.

## Programming language

**Python**-For raspberry Pi, we have used python programming used as it offers high code Density, easy to learn, similar to C/C++ platforms.

**Java**-Android bundle supports Java that is portable, relies on magic code called “byte-code”, secure. This offers an edge to the application environment.

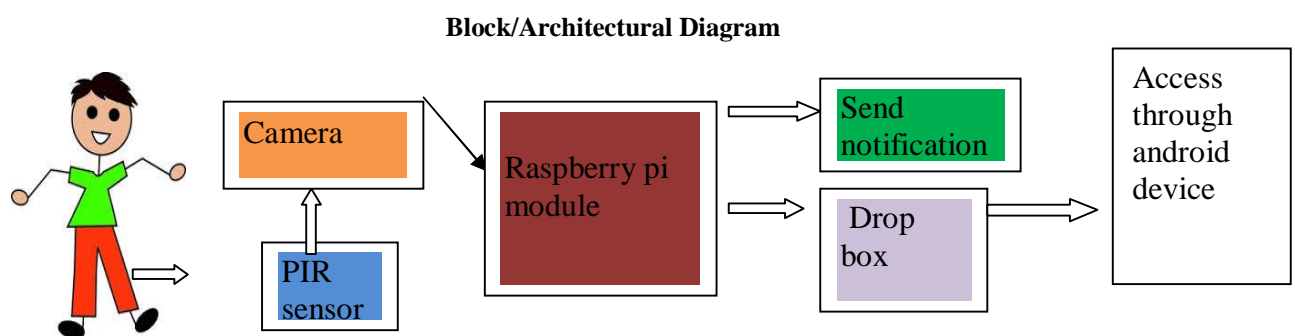


Fig 1-Block Diagram of motion activated surveillance system that detects motions and send push message and recordings to android application whenever motion is detected  
And drop-box can be accessed.

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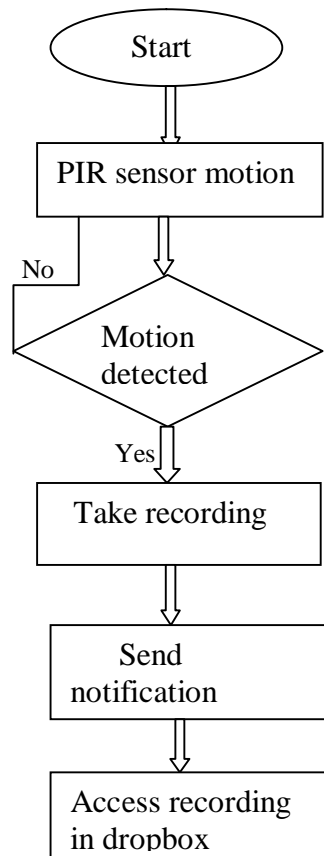


Fig2-Flow chart of the purposed system that Illustrates flow of proposed system and shows loop Back if motion is not detected.

## SCREEN SHOTS



Fig3-Hardware setup of proposed system showing PIR sensor and Pi-camera with network adapter with Adapter and connecting wires.

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Fig 4-Screen showing motion detection by PIR sensor  
Whenever there is motion or movement  
Here, hand is used for detecting motion



Fig 5-Android application for accessing videos & snapshots  
User can login on receiving push notification  
And view recording send by Pi module.

## IV. CONCLUSION

1. This motion activated surveillance system is able to capture recording whenever PIR sensor detects motion and transmits it via Internet that can be accessed with android application. However, it may happen in some of the case it may capture image of Birds also, in that case sensitivity of PIR sensor can be enhanced and the setup can be used in combination with ultrasonics sensor to bring out better results.

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2. It can also be given end-product look and can be mounted in wall as its form factor is low and disabling of LED on board won't give a clue that they are under surveillance.

## V. FUTURE SCOPE

Till now, I have worked on surveillance now but various sensors like Smoke, Glass-break, LPG leakage sensors can be interfaced with it so that it can act as both security as well as surveillance system.[3][8]

I will also employ so data mining technique in it so that any malicious activity can be determined and immediately alarm can be ring. This will work great in our day to day life as crime is burgeoning. [1]

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