

# Development of Intelligent Surveillance Camera System using Raspberry PI

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**Abstract**— The project deals with the design and implementation of smart surveillance Monitoring system using Raspberry Pi and PIR Sensor for mobile devices. It increases the usage of mobile technology to provide essential security to our homes and other control applications. Raspberry Pi operates and controls the camera for remote surveillance. The PIR Sensor senses the motion and locates the person with the help of Infrared light. When the motion is detected, the Camera automatically initiates capturing and Raspberry Pi device alerts the admin having a smart phone and if he sees the person is valid then the permission to open the door and allow the person to enter the room is given by the user. The proposed system increases the security of our home.

**Key words:** Raspberry PI, PIR Sensor, DC Motor

## I. INTRODUCTION

Home automation refers to a system that is used to control devices around the home. These devices can include doors, lights, surveillance systems, and consumer electronics. A user can control a variety of home devices with the help of a home automation system. To provide mobility, a mobile phone-based home automation has been developed. As another approach toward home automation, an Internet-based home automation system has been proposed, providing a graphic user interface. The project is used in the places where there is a need of high security. The User can permit the person to enter the place under surveillance. The place can be made secured only by allowing the genuine person to enter the room and reject the suspicious person.

The advantage of this system is that it does not require to be touched with any hardware. Automatic entrance/exit door control is widely used in public places such as grocery stores, businesses, transportation stations, airports, and wholesale department stores to eliminate the need of manually opening and closing actions. High Definition Surveillance Camera using raspberry pi is set up in the area which we want to monitor. Live streamed video can be accessed from anywhere by just entering the static IP assigned to the System in a web browser.

## II. LITERATURE SURVEY

### A. Application of Raspberry Pi and PIR Sensor for Monitoring of Smart Surveillance System[1]

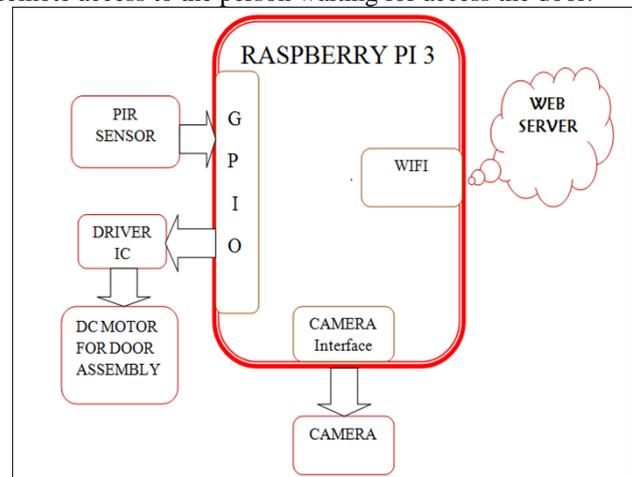
The usage of mobile technology to provide essential security to homes increases. The proposed house security system captures information and transmits it through a 3G modem to a smart phone using web application. Raspberry pi operates and controls motion detectors; video camera for remote sensing, surveillance, streams live video and records it for future playback. Infrared sensor detects the located persons.

### B. Smart Surveillance and monitoring system using Raspberry Pi and PIR sensor[2]

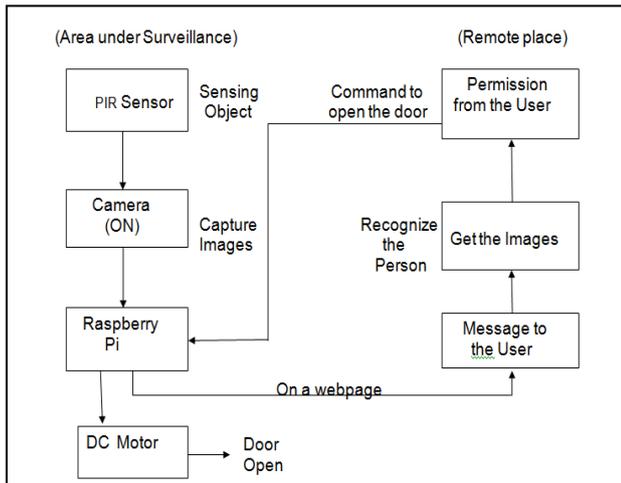
The security is a scenario in which objects, animals or people are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. The web-cam has evolved from the convergence of wireless technologies and the Internet. Internet of things based application can be used remotely to view the activity and get notifications when motion is detected.

## III. OVERVIEW OF THE SYSTEM

The Smart surveillance system is designed for remote monitoring of person at your doorstep. The system having Raspberry PI, PIR sensor, DOOR assembly, Camera capturing image after movement detection. The PIR sensor interfaced in the proposed system will continuously monitor if any movement detected at the doorstep, after detecting movement the camera will take a picture of that person. Then that image will be sent to the web server designed for our application via on-chip Wi-Fi connectivity and an SMS notification is sent to the admin person. Because of this the admin person can remotely be able to see the person standing next to his door from the web server and can open the door remotely. The admin person can be able to allow the entry to that particular person if he is known to him. The system gives remote access to the person waiting for access the door.



### A. Block Diagram



The block diagram shows the flow of the overall system. There are two parts in the project: the area under surveillance and the remote place from where the user is controlling the surveillance area.

### IV. SPECIFICATIONS OF SYSTEM

The proposed system consists of following modules:

#### A. Raspberry Pi

Raspberry Pi is a credit-card sized computer manufactured and designed by the Raspberry Pi foundation.

Processor: Broadcom BCM2837 chip set

Camera connector: 15 pin MIPI camera serial interface

GPIO connector: 40 pins

Memory card slot: push or pull micro SDIO

1.2GHz Quad-Core ARM Cortex-A53 802.11 Wireless LAN and Bluetooth 4.1 1GB RAM

#### B. Raspberry Pi Camera

5MP Camera exclusively made for Raspberry Pi

Wide range

Size: 25 x 20 x 9 mm

Supports 1080p30, 720p60 and VGA90 high definition video modes

Small in size and can be connected directly to Raspberry Pi board

#### C. Passive Infrared Sensor

PIR Sensor: SB0081

6 Meters range

110 degrees wide

A PIR Sensor is a Passive Infrared Sensor which controls the switching on/off the lighting load when it detects a moving target.

#### D. DC Motor

Speed: 10 rpm

DC (Direct Current) Motors are two wire (power & ground), continuous rotation motors. When you supply power, a DC motor will start spinning until that power is removed.

#### E. Motor Driver

IC: L293D

Motor Driver consist of two H-bridge

It is the simplest circuit for controlling a low current rated motor. It is a 16 pin IC.

### F. Softwares

Different softwares are needed to be installed like:

Eclipse (for programming in Java and for designing of Web Page in HTML), PUTTY (remotely controlling Pi for other PC), IP Scanner (for scanning the IP of active Pi), WinSCP, NOOBS (Raspbian OS)

### V. WORKING

The system is designed for highly secured area. Whenever the user is not at home or is at some remote place then the user is able to operate the door remotely through his smart phone.

Whenever there is motion in front of the door or when a person comes in front of the door, The PIR Sensor immediately detects the motion and then Raspberry Pi commands the Camera to capture the image. At the same time, a message notification is sent to the user on his smart phone. The message contains link to the webpage where the image captured by the Camera is stored. When the user opens the link there he needs to enter the login details for authentication. The password is given to ensure that admin is using the webpage. After entering the login details the user can view the person standing at the doorstep of his home. If the person is valid he can command the Raspberry Pi to open the door using the DC Motor. Else if the person is unknown or invalid he would not permit the Raspberry Pi to open the door.

### VI. RESULTS

The different modules are tested separately and are compiled together. The final result obtained from the project is that the user is able to get the notification remotely on his/her smart phone about the person standing in front of the door. The link to view the remote area is given in the message. By clicking the link and logging into the web page the user is able to open or close the door by identifying the person. The system has evolved into a secured system as the details are authenticated.

### VII. CONCLUSION

The Intelligent Surveillance Camera System is capable of capturing images on detection of motion and transmits the images to the admin on the mobile phone. The system is an advantageous system as it offers high level of security and privacy to the user. As the door opening is automated, it reduces human efforts. The main objective of the project is controlling the place from the remote area. This is very helpful not only in homes but also in highly secured areas like banks, offices, lockers etc. The system is safe as the admin has to login using password. The user can be able to monitor the area without continuous surveillance. Unlike the conventional CCTV Cameras, the intelligent surveillance camera can be switched on only when the motion is detected which proves that the system is also cost effective.

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