Rasp Berry Pi based Intruder Identification System with E-mail Notification

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Abstract: *Now-a-days CCTV surveillance system plays an important security role in our day-today's life. Almost in every organizations like malls, shops, railway stations, bus stands, academic institutions, hospitals, roads etc. where surveillance security system is installed which monitors the area under surveillance constantly, such systems require very large setup of hardware like Digital Video Recorder i.e. DVR used along with analog camera's is a wired security system which has high cost of installation setup. CCTV surveillance system requires congested wiring connections which take more time for the installation. The surveillance system has continuous requirement of power supply, a high degree of redundancy is inevitably built in to the power system. The 24X7 supply of power leads to high cost of system. Hence there is a need of an efficient and cost effective system. Our aim is to explore the usefulness of implementing Rasp Berry Pi based intruder identification system using PIR sensor and to develop the system cost effective and easy to use, with less power requirement which gives high performance.*

The problem that currently faced by many surveillance system is fixed by building a Intruder identification system with PIR sensor and Rasp Berry Pi which exactly detects the intruder whenever the intruder comes in the vicinity of the PIR sensor, which activates camera through Rasp Berry Pi to capture the image and sends it to registered e-mail ID. The user while observing the received image through e-mail ID will identify the person, if the person is intruder then he/she sends alarm signal to Rasp Berry Pi though SMS or E-mail for alert.

Keywords: **Rasp Berry Pi, PIR sensor, Camera, Wi-Fi adapter, VNC viewer**

1. INTRODUCTION

In Every 3 minutes a burglary, robbery or a break-in is taking place in India. It's time we reconsidered the safety levels of our premises. The financial loss due to these thefts and burglaries are staggering. Intruder identification and notification system secures premise of offices/homes from intruder by detecting intruder as well as informs the user about intruder to view the intruder's details. In this system, we used a PIR sensor which detects the intruder and activates the camera through Rasp Berry Pi. Rasp Berry Pi sends the captured image to users registered E-mail ID. User receives the e-mail and observes the image through VNC viewer on his/her smart phone or Laptop/Desktop. As far as user identifies the unknown person entering into secured area he/she decides whether to trigger alarm or not by sending alert message to Rasp Berry Pi.

1.1 PURPOSE

The purpose of this project is to improve security level of the premises like, Academic institutions, malls, bus or railway stations, hotels, roads etc. security of personnel and protecting the wealth become the prime concern for everyone in present situation. The present existing systems are not fully protects the premises in fact they don't have provision to alert the owner of the premises. Using the intruder identification and e-mail notification system user can alert about the incident before its happening. The user can avoid such incidents by triggering alarm. If such incident is happened then user gets the pictorial evidence of the incident which may be helpful for further investigation.

2. SYSTEM DESIGN

System consists of Rasp Berry Pi kit, Camera, PIR sensor, Buzzer, Laptop/desktop/smart phone with VNC software

2.1 Rasp Berry Pi: It is a single board computer with wireless LAN and Bluetooth connectivity. The Raps Berry Pi 3B is third-generation latest model of Raps Berry Pi. The board is used for controlling and monitoring PIR Sensor, Camera, Buzzer and VNC

software with the use of proper algorithm. The code is written in Python language. Some important specifications of boards are Quad core 1.2GHz Broadcom 64 bit CPU, 1GB RAM, BCM43438 wireless LAN and Bluetooth Low Energy (BLE) on board, CSI camera port for connecting a Rasp Berry Pi Camera, Micro SD card port for loading operating system and storing data.

Fig 1. Rap Berry Pi 3B model

2.2 PIR sensor: A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiated from objects in its field of view. This sensor is used for detecting the motion of the object which comes into vicinity of it.

2.3 Camera: The camera module is used for taking high definition video or capturing still photographs. The camera module have 5-megapixel Omni Vision OV5647 sensor. It is connected to Rasp Berry Pi kit via a 15cm ribbon cable to the CSI port.

2.4 Buzzer: Buzzer is used for generating alert alarm.

2.5 VNC software: VNC software is used to send picture captured by camera on PC/ laptop / smart phone.

3. WORKING

When we power on our project the initialization takes place in which camera, sensor, buzzer are initialized. The block diagram of project is shown in below fig 2.
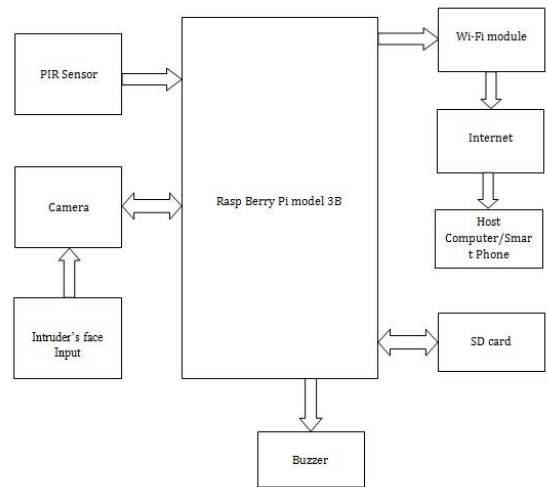

Fig 2. Block diagram of intruder identification and notification system

Intruder means a person who enters into to private premises without permission. When the intruder comes near to the range of PIR sensor then PIR sensor senses the intruder's presence and informs to the Rasp Berry Pi. Rasp Berry Pi now activates the camera to capture the image of the intruder who is in the proximity of PIR sensor. The captured image is compared with the existing database images that user has stored which is of known persons that user wants. If the captured image matches with the any one of the data base image then system remains ideal. If the image doesn't matches with the data base images then system informs the user about the intruder detection and user will trigger the buzzer by sending message to the Rasp Berry Pi. The code for recognition of face by comparing the captured image with data base images is written in python language and the flow chart of code is given blow in fig 3.
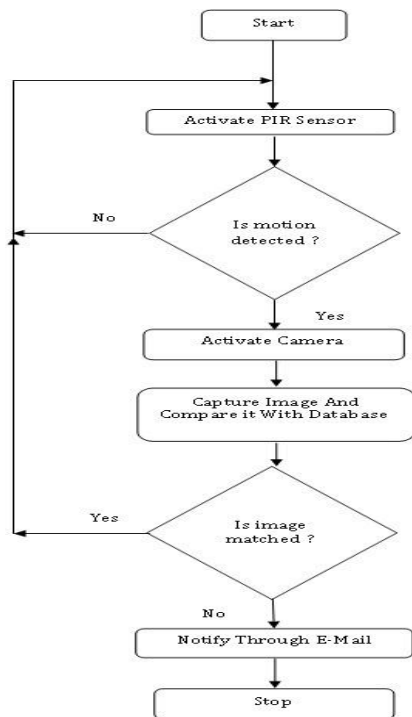
Fig. 3 Flow chart of Python

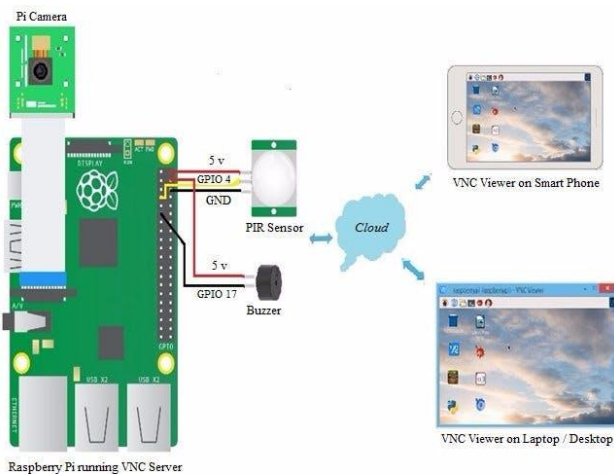## 4. Results

4.1 Overall Project Setup
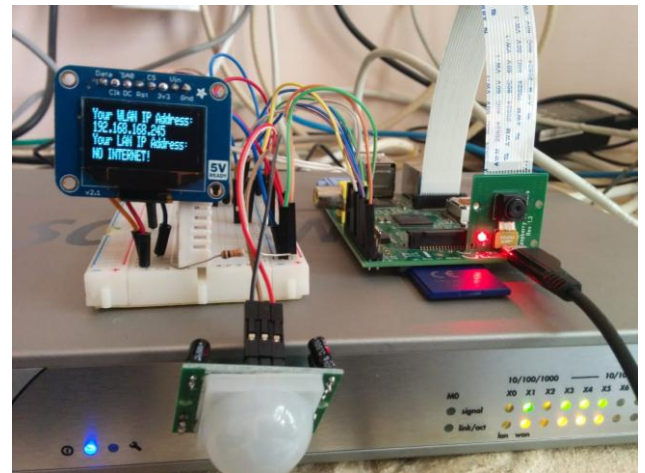
Fig 4. Project Setup 1

Fig 5. Project Setup 2

The overall project setup of Intruder identification with E-mail notification consists of hardware components like Rasp Berry Pi, PIR sensor, Camera, Buzzer.
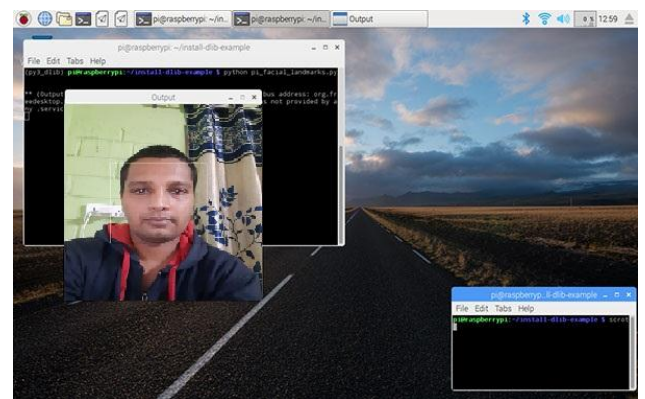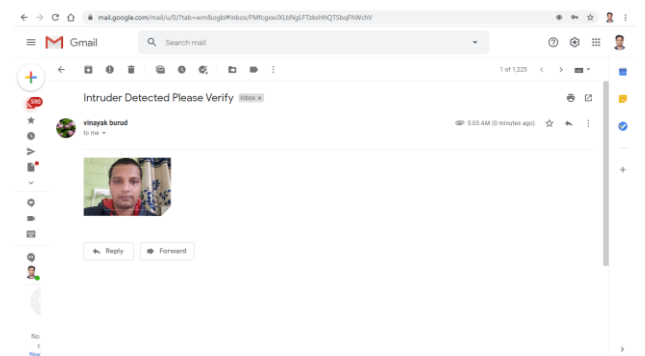
Fig 5. Captured image through camera

Fig 6. Notification on E-mail

5. CONCLUSION

Finally, the proposed system for intruder identification with E-mail notification using algorithm in Python language is better than the existing methods. Generally the existing security systems has a few disadvantages

like, it's required to supply continuous power supply to such system, which increases power cost of system. Also it requires large hardware setup to record and store the captured images & videos. With our intrusion detection system the system powers on only when the intruder is present it doesn't require large hardware setup to record videos since the camera is turned ON after detection of intruder and memory size required to store capture image is very less which will be stored in SD card. This system is inexpensive and it is used where security of premises is necessary

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AUTHOR CONTRIBUTIONS

Mr. Vinayak S. Burud, prepared hardware and software for Intruder Identification with E-mail notification, writing research paper draft,

Ms. Vipula T. Patil, fruitful discussion during writing paper,

Prof. Pravin B. Desai, discussed the algorithm and hardware work

Prof. Pravin B. Ghewari, supervised and review the software work and discussed the results.

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