A Restructured model on Live Streaming Motion Detection by Using Camera Security

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Abstract

In current situation, crime percentages are expanding at a drastic rate because of burglary cases. Catching the burglar is being one the major role in prevention of theft. Most of the time, thief escapes due to delay in action. In this paper, a reformed model on the design of a Smart Door lock technique which uses Raspberry Pi and Internet of things. And surveillance is done by integrating webcam and motion sensor. Alerting the user takes place through e-mail. Raspberry Pi controls motion sensor and webcam for sensing and surveillance. The motion sensor continuously sense the surrounding and if there is any motion is detected, the webcam starts streaming and an alert message send to the user's registered mail id. Webcam also captures the person's image, in case of any attempt of wrong pin. And the captured image send to the user through mail and all this process are real-time so the user can immediately avoid the theft.

Keywords: *Smart door locking technique, Raspberry pi, IoT, PIR sensor, Webcam.*

1. Introduction

On considering the theft cases in recent days, it is very necessary to strengthen the security system. Even though the surveillance system are utilized for the safety of our belongings [1], it is necessary to construct a smart door lock system which will give a real-time solution for the theft issue. Hence, this paper proses a robust smart door locking system which uses the advantage of IoT for ensuring the safety. Basic concept of IoT in this work is shown in figure 1,
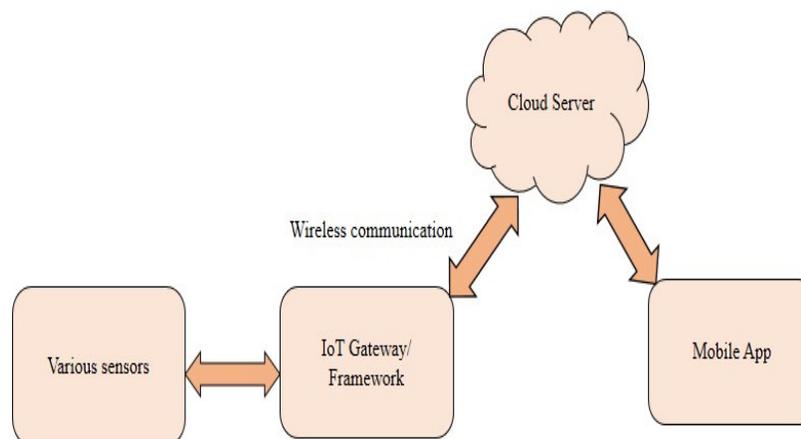

Figure 1. Basic IoT concept

This concept includes IoT because the existing method like RFID based security system [2], GSM implemented security system [3] and OTP based [4] which will not give real-time based security so we are replacing it by IoT based security system. Here Raspberry Pi is the controller of all this process. For monitoring purpose, Passive Infrared Sensor (PIR) sensor or motion sensor and webcam is attached with Raspberry Pi. And a keyboard is connected for input. Liquid Crystal Display (LCD) and Light Emitting Diode (LED) is used for output. This paper also concern about power consumption, so all the device will be in off state except the motion sensor. Once the motion sensor detect the movement of person, it will give signal to the raspberry pi so that it can on all devices. Webcam will start recording after this signal and a link for live streaming is send to the user through their mail id. Message for the input of password will display in the LCD. If the password is wrong picture of the person with message indicating unauthorized access is send the user's registered mail id. All this process happens with high speed and accuracy.

2. Proposed method

This paper concentrate on the improving the security in door locking system. Since the demand of security is increasing everyday, it is always appreciable to bring some technical advancement in door locking system. Here the concept of smart door locking is done with the help of raspberry pi, IoT, webcam and motion sensor. Block diagram of this concept is shown in figure 2.
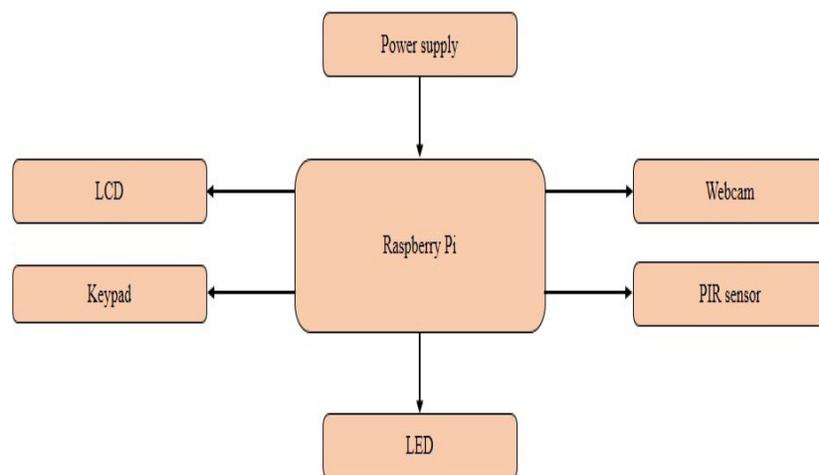

Figure 2. Block diagram of proposed method

Power supply given to all required components. For controller, we are using raspberry pi. All the devices are connected to raspberry pi also. Raspberry pi controls and command the process for remaining devices. The core concept of this concept is providing security for door locking system and alert the user using IoT. Real-time assembly of the devices is shown in figure 3. LCD is the output device which shown text or instruction for the user and LED is also used for indication. This method uses 16*4 LCD display. Keypad (4*4) is the only input device here, through which the user can input their password to unlock the door. PIR sense continuously sense the area near the door and indicate the raspberry pi through a signal if there is any human activity. Webcam act as a surveillance here. The main advantage of this concept is the idea for power consumption. All the devices get turned on only when there is human activity indicated by the PIR sensor. The signal for turn on is given through raspberry pi. So the wastage of power is reduced considerably.

After the PIR sense presence of human near the door and raspberry turned on the device, the webcam start recording the surrounding and a live streaming link is sent to user's registered mail id. If the user enter correct password then the LED blinks showing valid access and all raspberry pi will turn off all device except PIR sensor. And the process continuous as cycle. But if the password is wrong the webcam will take the picture of the person and send it to the user's mail with alert message "unauthorized access". So that the prevention of theft can be real-time without any delay.

Figure 3. Real-time assembly of proposed method

3. Working of proposed method

Working of this smart door locking system process starts with the signal from PIR sensor to raspberry pi [5]. In this method, we are using raspberry pi 3 model B as controller. Power supply is given. All the devices will be in off state except PIR sensor, until the raspberry pi gives signal to turn them on. PIR sensor is always in on state to detect the presence on human being near the door. PIR sensor detect the Infrared (IR) rays coming out of human being. Because living things have temperature greater than zero kelvin and it will emit heat in the form of IR rays. So the PIR sensor will sense the IR deviation and detect the presence of human near the door. The overall flow of this method is shown in figure 4.
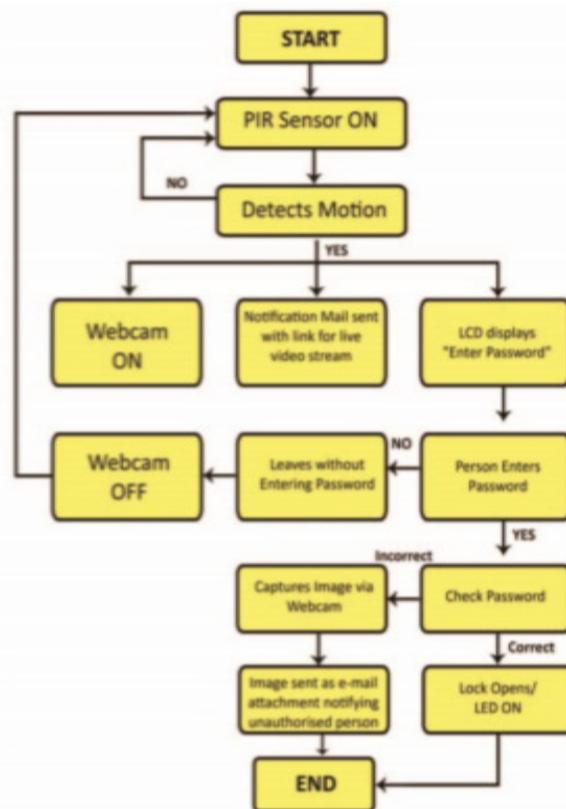
Figure 4. Flow of proposed method process

After sensing the human activity near door, a signal is sent to raspberry pi from PIR sensor. By that moment itself, raspberry pi turns on all the devices and the webcam starts recording. Simultaneously a live streaming of the webcam video is shared with the user as a link through IoT to the user's mail id which is registered in the raspberry pi [6]. IoT plays huge role in attaining real-time smart door locking security [7]. A message will get displayed in the LCD display to let the person entering the password. Password can be entered through the keypad connected to the raspberry pi. If the password is correct the door will unlocked and a LED blinks indicating that the password is correct and it is an authorized access, as shown in figure 5. Then the raspberry pi will send signal to all devices excluding PIR sensor to back to off state.
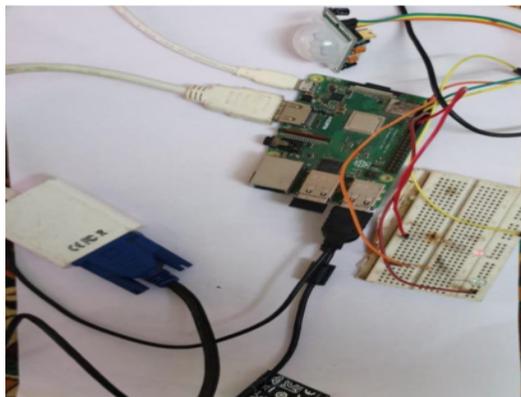

Figure 5. Access granted for correct password

Incase, if the password is wrong, raspberry pi will command the webcam to take picture of the person and it will send the image to the user's mail with caption as "There is some activity in your. See the picture" to alert the user, represented in figure 6. Mail sent to the user by using Python SMTP library for sending e-mail. Internet access on Raspberry Pi is provided through Ethernet Port or Wi-fi connectivity as available in Raspberry Pi 3.

Figure 6. Alert mail sent to the user's mail

4. Discussion

Timely action is the only way against the theft issue. Hence this paper proposes a resructured model for a real-time theft prevention technique using IoT concept. User can be anywhere, theft alert will reach them in time for further action. Since the alert message also have the image of the user, it can used as evidence. In addition, this method also focus on power consumption. There will be huge saving in power due to the on and off concept of the devices. Major advantage here is the timely indication and power savings.

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