

IoT Approach for Motion Detection and Controlling the Home Appliances without Cloud Server

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Abstract

This paper is on IoT Approach for Motion Detection and Controlling Home Appliances without Cloud Server. It covers monitoring the premises and controlling of home appliances from outside. Here we are avoiding the use of external cloud server for which we have to pay some amount monthly to get space there. Now-a-days cost is an important factor. So to implement this, we are using Raspberry Pi, a credit card sized computer that has the capability to act as a server in home side and motion is detected using PIR sensor and Webcam is going to capture the pictures and finally these pictures will be send to e-mail as attachment with alert message. A python script, then directs the Pi to send email notifications every time motion is detected. Apart from monitoring we have focused on controlling on appliances at the premises. User will have automatic settings like lights On/Off condition, fan On/Off and other appliances can be controlled. Further, this service is good and one of the reliable ways to encapsulate home from internal and external danger. People in job or outside home can work freely and smartly having control to their home. They can just sit and login browser and see what is going on in their home in just a second and feel that their home is with them all time. Motion Detection and Home Automation is truly one of the needs in today's world. People rely and feel safe and warmth in their home with their family. Home Automation brings closer and safer to them on safety and then other facilities extended along with it. Services like lights On/Off condition, fan On/Off and other services are featured in this Home Automation.

Keywords: IOT Approach, Motion Detection, Cloud Server, Controlling Home Appliances,

MOTIVATION

Previous Systems need an external server to process the data. The external server process the data and live streaming can be done. In previous system everything is transmitted through the cloud server. If any problem occurred in the cloud server, it affects the transmission. The costs of previous methods are high. So the user needs an alternative

method to reduce the cost of implementation and maintain the quality and efficiency.

PROBLEM STATEMENT

To design hardware system, that can detect the motion and control the home appliances using IoT technique. And also avoid the external cloud server which costs high.

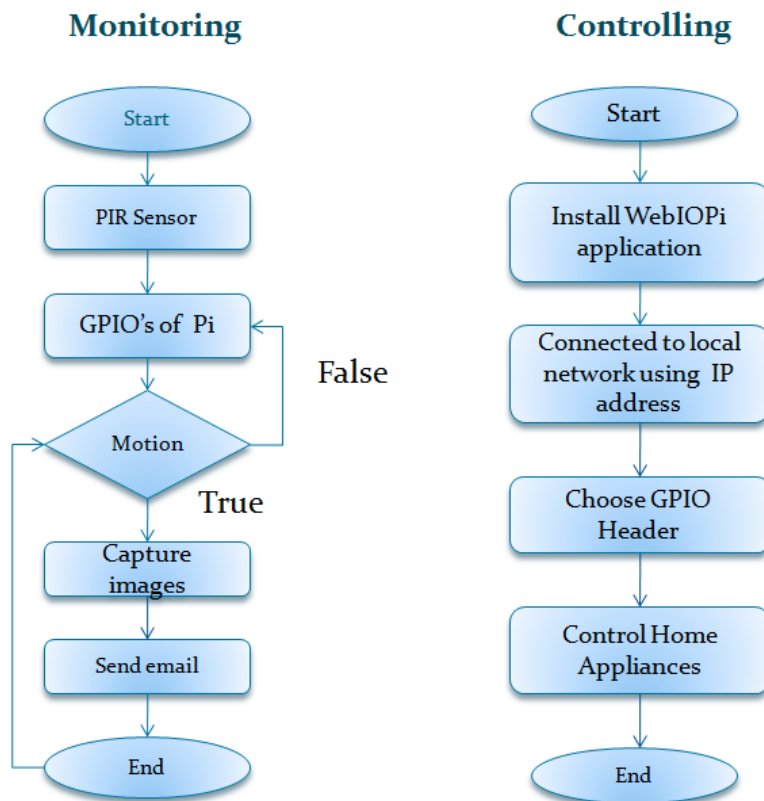


Fig 1. Flow chart

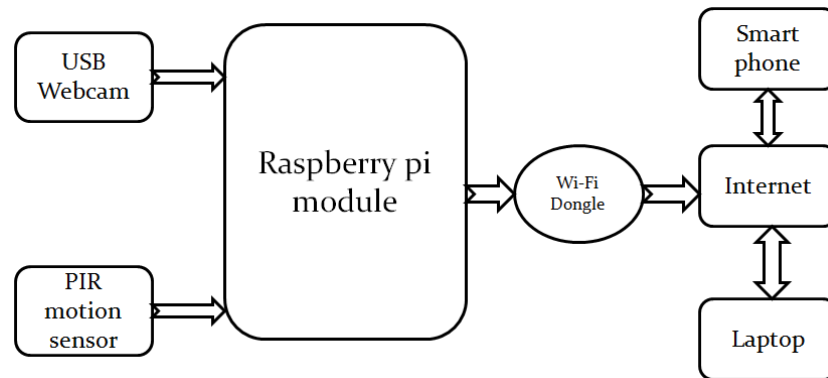


Fig. 2 Block Diagram of Motion Detection

TECHNICAL APPROACH

Raspberry Pi is used as the brain of the hardware design. It takes the input of the PIR sensor, maintains the motion detection of the people. And Pi sends the images to email as attachment through internet. The entire home appliances (such as fan, light or bulb etc) are connected to Pi and they are controlled over internet by using a unique IP address.

The flow chart of the monitoring process and controlling process is shown in Fig. 1. The block diagram of Motion detection is shown Fig. 2. In this block diagram, PIR sensor and USB webcam are connected to raspberry pi module. We connect Wi-Fi dongle to create hotspot for Raspberry Pi to access over internet. When the motion is detected, the USB Webcam captures the images and sends to email as attachment

which we can access using smart phone or laptop.

CONTROLLING THE HOME APPLIANCES

In this project, we are using a web application called WebIOPi for controlling the home appliances from any place from the world. WebIOPi is a web application which allows you to control your Raspberry Pi's GPIO. We can use any browser from network.

- Control, debug, and use our Pi's GPIO, sensors and converters from a web browser or any app.
- WebIOPi is the perfect tool to make connected things.

- Developed and provided by Eric PTAK.
- Click/Tap the OUT/IN button to change GPIO direction.
- Runs on Raspberry Pi.
- Click/Tap pins to change the GPIO output state.

By choosing the GPIO Header link on the main page, we will be able to control GPIO using a webiopi which looks like GPIO header.

GPIO Header

Control and Debug the Raspberry Pi GPIO with a display which looks like the physical header.

GPIO List

Control and Debug the Raspberry Pi GPIO ordered in a single column.

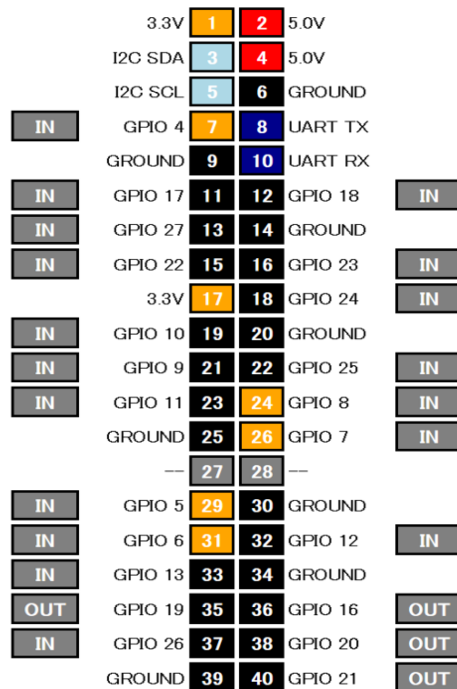
Serial Monitor

Use the browser to play with Serial interfaces configured in WebIOPi.

Devices Monitor

Control and Debug devices and circuits wired to your Pi and configured in WebIOPi.

Fig. 3 WebIOPi main menu



RESULTS

Captured image when motion is detected is shown in Fig. 4.

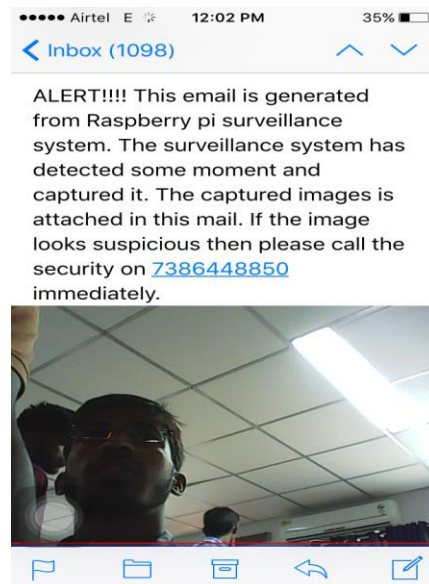


Fig 4. Motion Detected

Controlling of Bulb is shown in Fig. 5 and Fig. 6

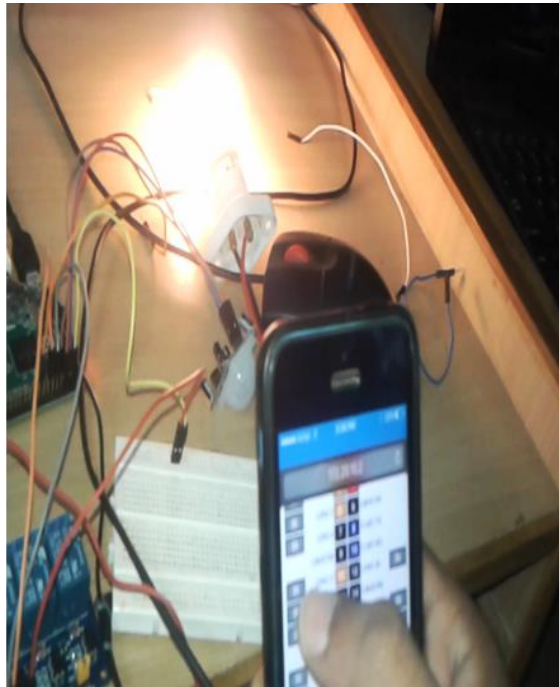


Fig. 5. When Bulb is ON

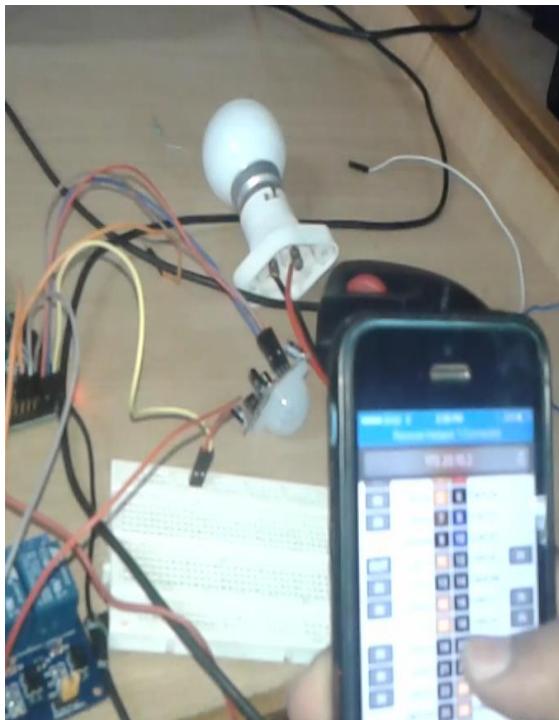


Fig. 6 When Bulb is OFF

CONCLUSION

This project aims for motion detection and controlling home appliances with low cost.

While doing the project, major time was used in coding, logging, troubleshooting device problems and controlling of devices or home appliances.

The outcome of the project was completely for a low purchasing price. The capability of the Raspberry Pi was astonishing. It has potential for many practical tasks. However, the implementation requires a lot of knowledge and research before it can be exploited. Raspberry Pi is a capable product for a hobbyists and people who are interested in new technologies.

So by using this concept the user can get full satisfaction on controlling the home appliances and detecting the motion occurring in remote place by spending small amount at the initial stage only for the Raspberry Pi system setup for capturing and storing the pictures. And later captured images send to email as attachment. It will be a good method to control devices connected to Raspberry Pi.

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