Home Security System

Niranjan Shrestha | Embedded System development | 05/06/2020

Overview:

- Background

- Problem Statement

- Requirements
- Design / Architecture

- Link to prototype code on GitHub

- Testing approach you have used for evaluating your system

- User Manual (this should be complete enough so that we can run your project on our own devices)

- Conclusion (should include 1-2 paragraph reflection on your experience, issues you faced, and how you would have done the project if given a second chance)

Background

- In this project, I am using particle argon to detect motion, when motion is detected, I will receive the notification in from of email, using IFTTT web service. In the email there will be a web link, when I click on that link, It will send be to a webpage where I can see the live streaming video. This live streaming came from raspberry pi. I am using raspberry pi to create web server by installing Nginx web server and using pi camera to stream the video live on the internet.
- I am also using Particle argon API, when the motion is detected, using Get request through python code, raspberry pi will check if the motion variable changes and if it detects the motion then it will start recording the video for 10second
- So, the streaming live and recording video will occur simultaneously when motion is detected.

Problem Statement
- I live in a share house, any room in the house has no lock on it. And most of the time back door of the house is left open. I do have few valuable item in my room such as my computer, Ipad, and laptop, getting the security system that is as effective as my prototype will cost from 600-900 dollar.
- For my project, I spent only $125 dollar and there is no installation and maintenance cost.

Requirements
- Hardware -particle argon, motion sesor, jumper wire, raspberry pi and raspberry pi camera.
- Software – C++ programming knowledge, python programming for Raspberry pi, IFTTT account, particle cloud web IDE.

Design/Architecture of the project
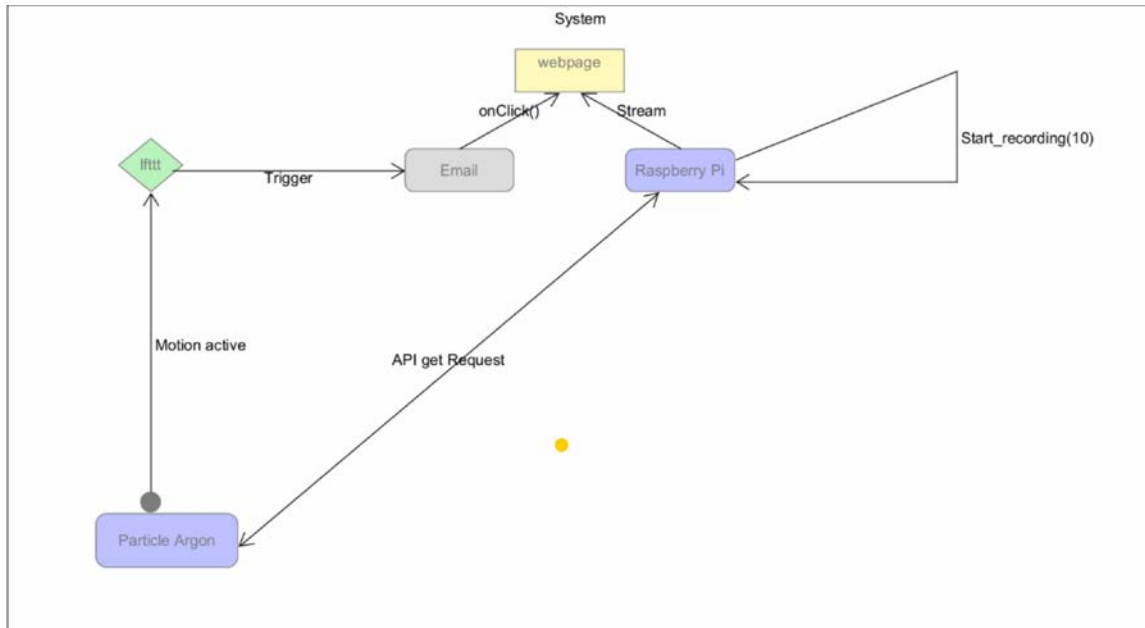
This is the Design of the project. I have particle argon with motion sensor. Using particle cloud IDE, I will flash the code in the device. When the motion is detected, IFTTT web service will trigger the notification in form of email with the web link attached to it. When I click the link, it will send be to the webpage where I can see the live streaming video which is coming from the Raspberry Pi and its camera.

Raspberry Pi is attached with the Pi camera. Pi will be using to create web server which can be accessed globally by installing Nginx Web server. Pi camera will be using the stream the video to that web server.
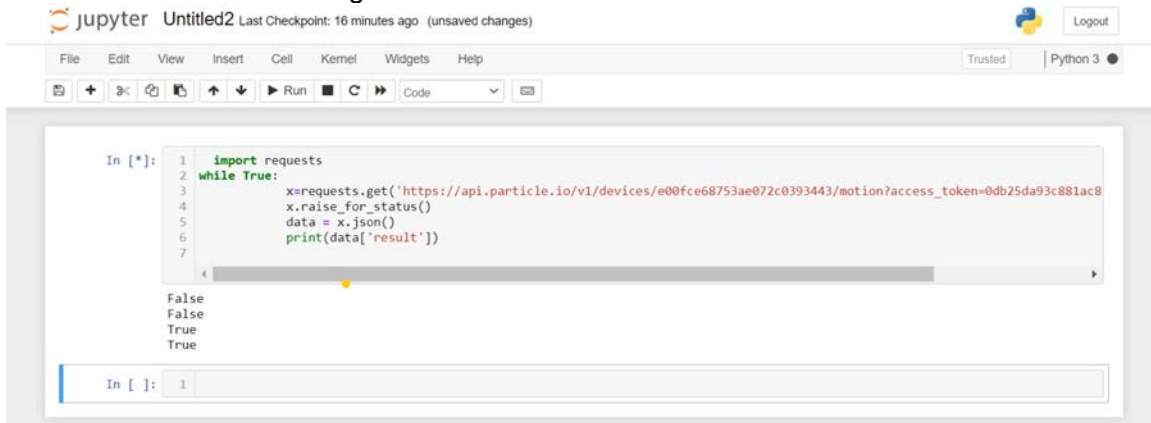
At the same time, I am using particle argon API, to get the motion data, and when it detects the motion, Pi will start recording the video for 10 second.

Link to prototype code on GitHub

https://github.com/nshrestha1989/HomeSecurity_RaspberryPi-particleDevice

Testing approach you have used for evaluating your system

Used jupyter note book to check the particle argon API. Using while Loop and checking if the motion variable changes from false to true when motion is detected.
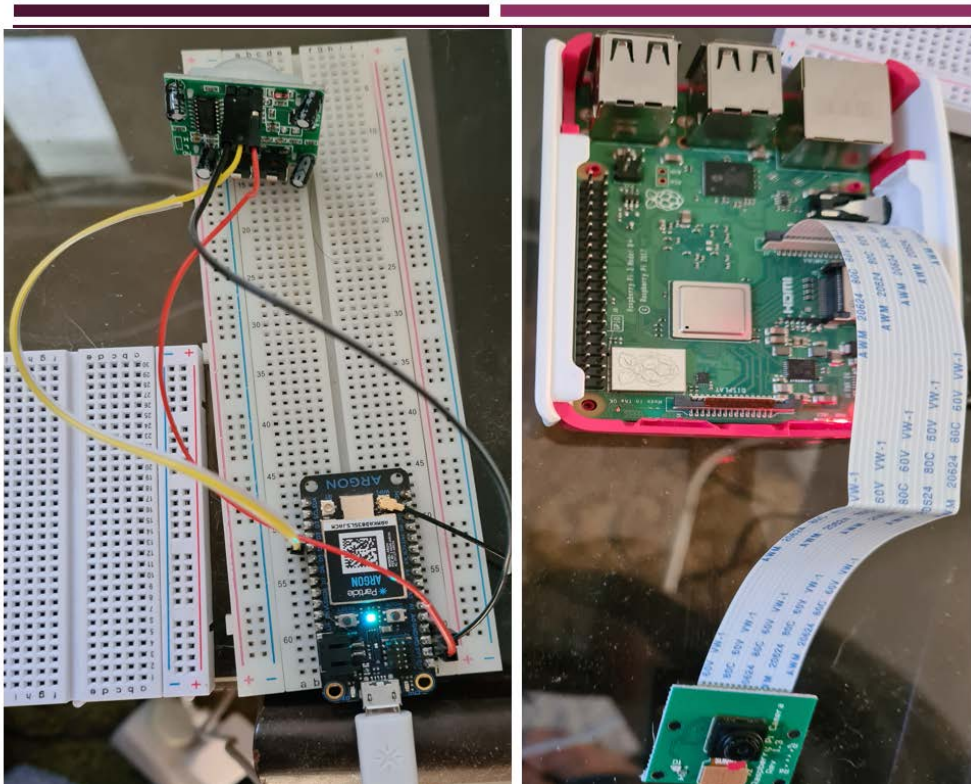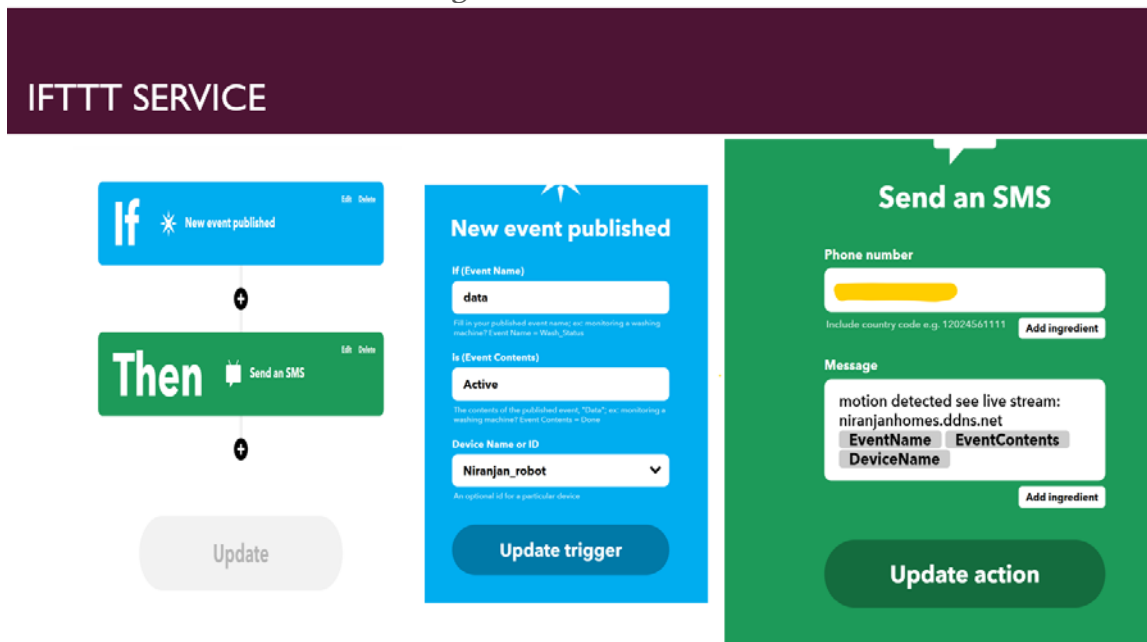

User Manual (this should be complete enough so that we can run your project on our own devices)

- **Wiring**

- **Get the code from GitHub for particle argon**
- **Use IFTTT service like in the diagram below:**

-
- **Get Particle API**
- Use CLI on windows
- Type "particle token create --expires-in 3600" to get 1 hour token
- Get device ID from particle cloud
- https://api.particle.io/v1/devices/DEVICEID/variable?access_token=tokenID
- Use python Juypter notebook to test the API

- **Get python code for Raspberry Pi from GitHub Link above**
- ❖ In Raspberry pi terminal type "sudo raspi-cofig" and enable camera interface.
- ❖ Run the python code for raspberry pi

- **At this point we have working web app to stream live video on local network but to stream online globally we are going to use Nginx.**
- ❖ it is not installed on raspberry pi by default
- ❖ in terminal-->type-->"sudo apt install nginx"
  - o type "cd /etc/nginx/sites-available"
  - o type "sudo nano default"
  - o proxy pass http://localhost:5000/index.html
  - o save the file
  - o type "sudo /etc/init.d/nginx start" on terminal to start Nginx

- ❖ for our website to be available to outside world we need our IP address
- ❖ -->google what is my IP address and it will come up
  - o noip.com -> create hostname-> use my external IP address
- ❖ -->go to router-->port forward to local raspberry pi IP address

- **Now everything being setup, the web application should be available online to see live streaming and recording the video when motion is detected.**

- **Conclusion (should include 1-2 paragraph reflection on your experience, issues you faced, and how you would have done the project if given a second chance)**

This project was helpful as it included using both particle device and raspberry Pi, how to make it communicate with each other. I had good revision on how to use Particle device, using its API through particle. Using variable function to use it on API to GET request from raspberry PI and understanding the WebSocket and multi-threading while coding python.

Hardest part of the project for me was figure out how to stream live and record video simultaneously but after many days and hours of research on internet I was able to figure out and complete my project on time.