Temperature Visualization

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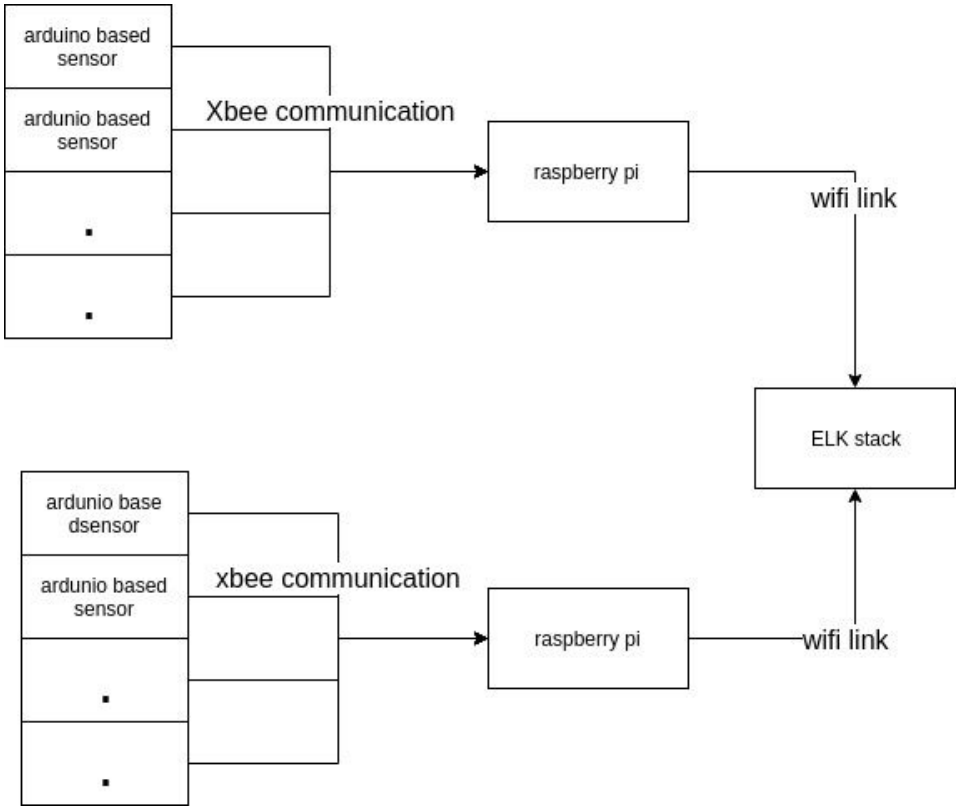
Overview

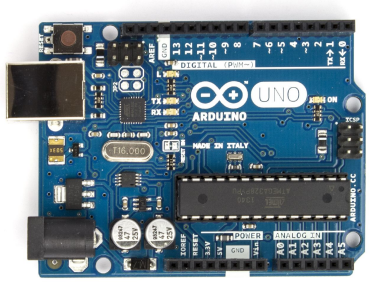
Our goal is to visualize temperature of certain areas using heatmaps. We are using **arduino based endpoints** to measure temperature and **raspberry pi based coordinator** to send data received from arduino to server with **ELK stack**. From server we can get temperature data of different zones and plot heat maps for visualization.

Architecture

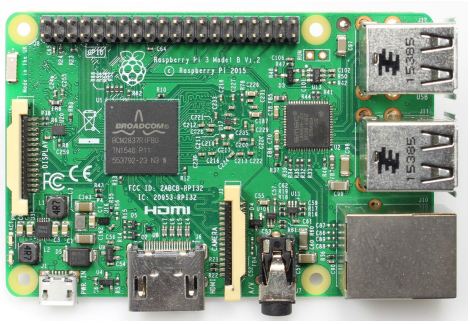


Items used

Arduino



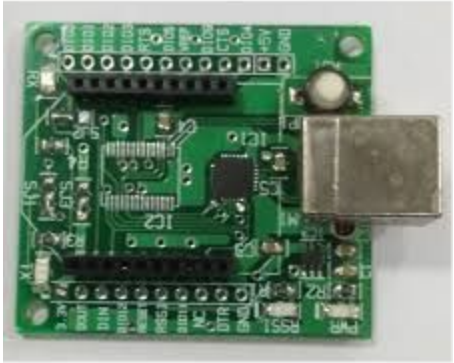
Raspberry pi



Xbee

xbee explorer for arduino

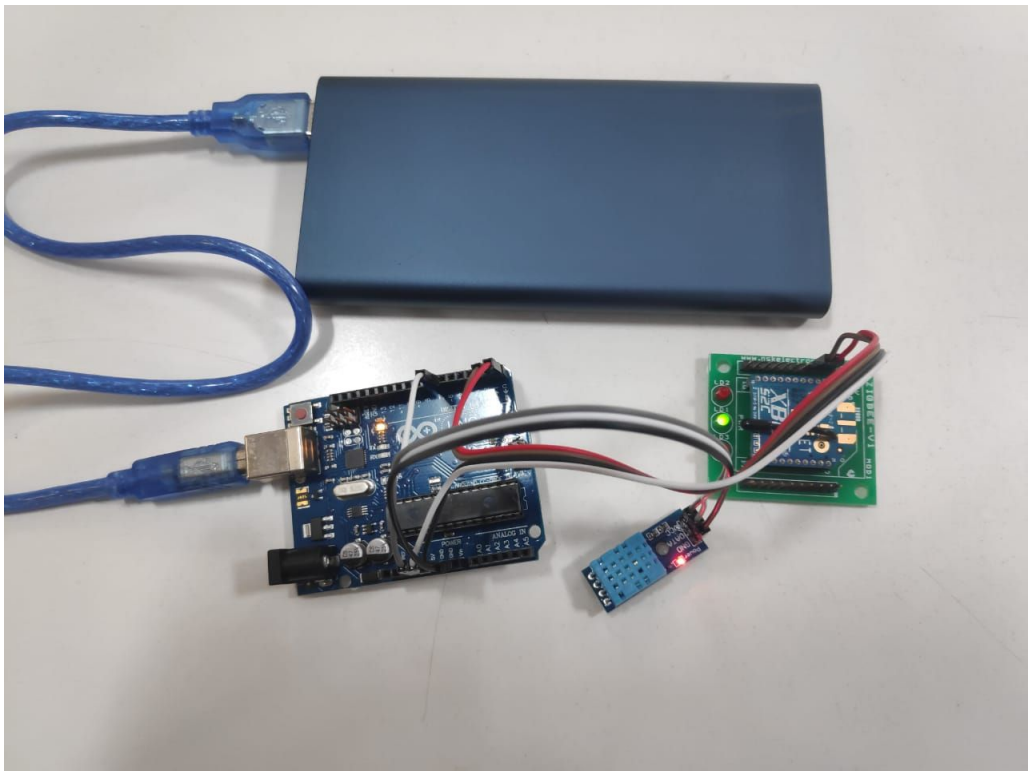
USB based xbee explorer for raspberry pi



Powerbank for arduino

Temperature sensor

Sensor setup(End point)



For raspberry pi connect usb based xbee explorer to it.

Code working

Pi code

It has 2 parts. One is elk_post.py and the other one is coordinator.py.

elk_post.py:

This code takes care of sending temperature data received from arduino to the server running ELK stack using wifi.

coordinator.py:

This code takes care of communication between arduino and raspberry pi (Xbee gateway) . basically it uses round robin technique to communicate with arduino (to avoid possible collisions).

Arduino code

This code in arduino basically gives data whenever it is asked by the raspberry pi.

Visualization code

elk_get .py:

This program gets temperature data from the server and then it plots heatmaps. Line 107 corresponds the array of arduinos (id written on arduino) and it is based on arduino positions in the room. For example if room has 4 sensors at each corner then the corresponding array will be like [[id1,id2],[id3,id4]].

Dependencies

(In Raspberry pi)

- Python 3
- pyserial (python3 library)

- elasticsearch (python3 library)
- requests (python3 library)
- httplib2 (python3 library)
- RPi.GPIO (python3 library)
- numpy
- seaborn
- matplotlib.pylab
- scipy
- json

Python libraries can be installed using **pip3 install name** command in linux terminal.

How to run

Arduino:

We have to give specify the id in this code(id should be unique). We have to connect arduino setup to power source.

Pi:

First we have to go to the folder containing pi codes then do a right click. Then click on open in terminal. When terminal opens enter the following command.

Before running make sure that id in the code is correct and unique. Id must be of 2 digits.

sudo python3 coordinator

Then enter your password. If it shows temperature data for the the arduino then it is working.

Output

elk_get.py code will print the average temperature in the given zones. Then it plots the heatmap. Similar to the following image.