Queen Mary University of London

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Smart Home Gateway

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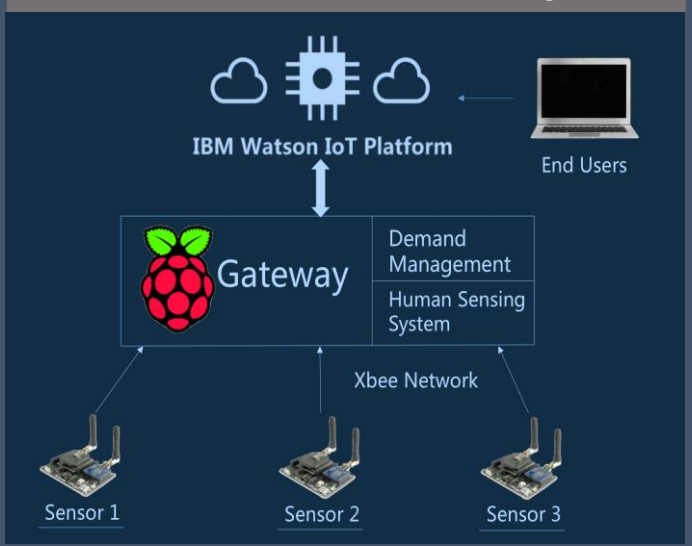
Project Description

The aim of our project is to develop a smart home gateway as part of the energy demand management system.

We will built a software and hardware systems that consists of number of different sensors and actuators. The sensors will collect the relevant sensing information and deliver the information wirelessly to a central server, whist the actuators will control the relevant smart appliances to act accordingly to the energy requirements. All energy usage is being monitored and are displayed online to the users. Energy control algorithm will be developed, and it will be applied to perform the required actions based on the energy supply and demand.

Smart Home Gateway



■ Current Progress

The smart home platform consists of Waspmote boards, Raspberry Pi, IBM Watson IoT cloud. We are currently focusing on building the smart home gateway to collect data from the sensors and record them into IBM cloud system. Currently, the gateway can collect the information from Waspmote board and upload to IBM Watson IoT cloud.

■ Hardware

- Raspberry Pi3
- Waspmote boards
- Temperature Sensors
- XBee Module*5

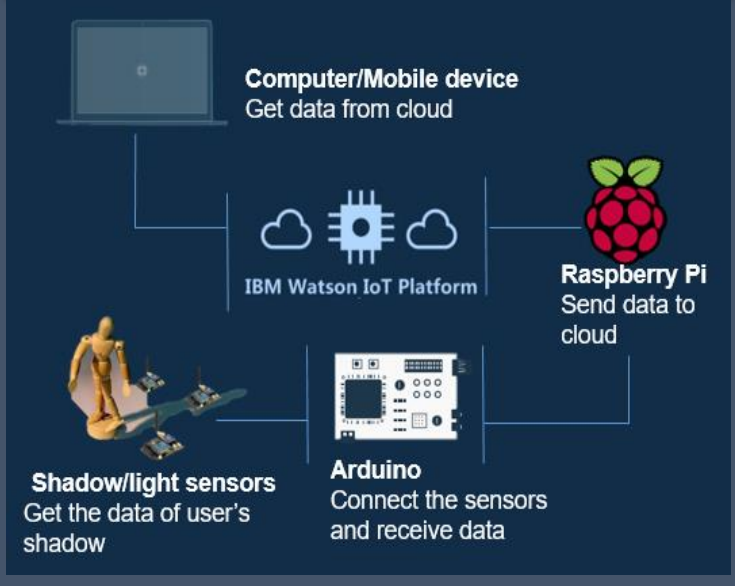
Energy Demand Management

Energy Demand Management system is to enable more efficient integration of renewable energy sources in the smart grid and smart home, especially the presence of increased demand caused by high electric vehicle penetration.

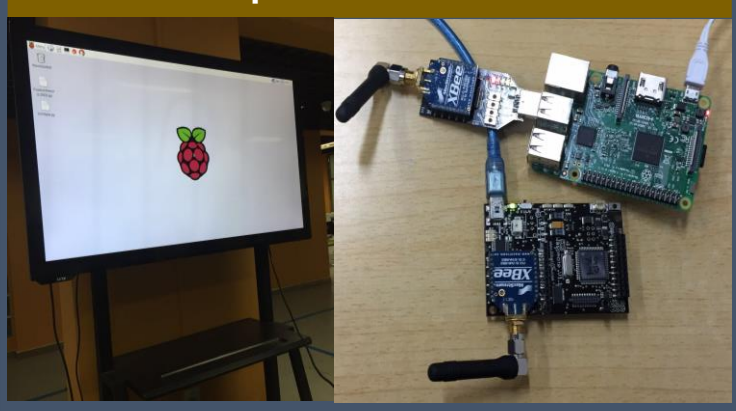
It consists of an intelligent demand response algorithm and hardware including solar panel to collect renewable energy, battery storage to store unused renewable energy, relevant sensors to detect the required demand and load at home. It will be implemented as part of the smart home gateway.

Human Sensing System

Human Sensing system detects human body shadows from blocked light and reconstructs a human skeleton postures. The work involves using lights on the ceiling and detect and sense complex shadow patterns on the floor. Hence, the lights/shadows sensors on the floor will collect relevant sensing information to form the human postures. This will be implemented as part of the smart home Gateway.



Experiment Hardware



Desirable results

Conclusion

In this project, we have developed a prototype of smart home gateway, which could help people monitor various parameters like temperature and energy demand of their home at any time on their computers or mobile phone through the Internet.

The further research of this project can be divided into two directions, the energy demand management and human sensing system, which will be conducted in our next stage.

■ Reference

[1] LI T, AN C, TIAN Z, et al. Human Sensing Using Visible Light Communication[J]. 2015: 331-344.
[2] Ivana Dusparic, Adam Taylor, Andrei Marinescu, et al. Maximizing Renewable Energy Use with Decentralized Residential Demand Response. 2015 IEEE