Diploma in CEN

School of Engineering
TEMASEK POLYTECHNIC

Internet of Things Project (EMC2006)

Project: Smart Home System

Intended Learning Outcomes

1. Build applications on edge devices to enable sensing and control.
2. Configure equipment for network connectivity.
3. Build applications on edge devices to enable IoT connectivity.
4. Construct web and cloud applications for data visualisation.
5. Build an end-to-end IoT application.

Weightage

This project contributes to 50% of the coursework.

Deadline

Week 14 (Midpoint Assessment)
Week 16/17 (Final Assessment)

Contents

1 Introduction

A real estate developer has engaged your company to provide solution for a smart home system to be installed in one of their condominium projects.

The developer is looking at the following features in the system:

- Homeowners can monitor the temperature and humidity in the house remotely via smart devices at all times.

- Homeowners can be alerted when the temperature exceeds a set threshold value.

- Homeowners can control the air-conditioner remotely via smart devices.

  Example:
  Homeowners can use a smart device to remotely turn on the air-conditioner (simulated by the fan) if the temperature is relatively high during the day in order to cool up the house before reaching home.

2 Task

To develop a smart home solution for the real estate developer.

The project lead has identified the following hardware and software components for the system:

- BME280 Temperature Humidity Pressure Sensor
- Raspberry Pi as edge device and gateway
- InfluxDB Time Series Database
- Grafana Data Visualization Package
- MQTT for data and message transport
- Code in Python

3 Deliverables

The project deliverables include the following:

- To demonstrate a working prototype.
- To write a report on the project.

The report should contain the following sections:

- **Introduction**
  - Describe the problem based on the given problem statement.
  - Describe the proposed solution.

- **Project Plan**
  - Formulate a plan for completion of the project, e.g. identify the sub tasks and set a timeline for each sub task.

- **IoT System Design**
  - Design the system architectural diagram for the Smart Home System.
  - Design the I/O pin assignment diagram for the Raspberry Pi I/O interface.
  - Provide details of the MQTT protocol (publisher, subscriber, topic, data transported)
  - Design a schema for the InfluxDB database.
  - Provide details of the dashboard for monitoring of the data.

- **Source codes with comments and explanation**

- **Reflection**
  - Write your reflection on the learning experience for the project in 300 words. You may include the problems encountered and how you resolve those issues in the write-up.