Faculty of Engineering & Applied Science

SOFE 4610U Design And Analysis of IoT Software Systems

Smart Kitchen Ventilation System

Github: https://github.com/Waleed20210/IOT-Project

Deadline date: 11/02/2022

Group Number*: 4*

Course Instructor: *Ramiro Liscano*

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Purpose and Requirements

– Purpose : The purpose of this project is to create a smart kitchen ventilation system which assists the homeowner to turn on/off the ventilation fan if the temperature or humidity of the room increases.
– Behavior : The system should be able to detect increases in temperature and humidity in the kitchen and should turn on the ventilation fan.
– System Management Requirement : The system should provide local monitoring and remote control functions.
– Data Analysis Requirement : The system should sense room temperature and humidity and if any increases in temperature and humidity are detected then it should notify the user and turn on the ventilation fan.
– Application Deployment Requirement: The application should be deployed locally.
– Application Requirement : The system should turn on the ventilation fan and notify the user if any increases or decreases in the temperature or humidity are detected by the system.

Requirements

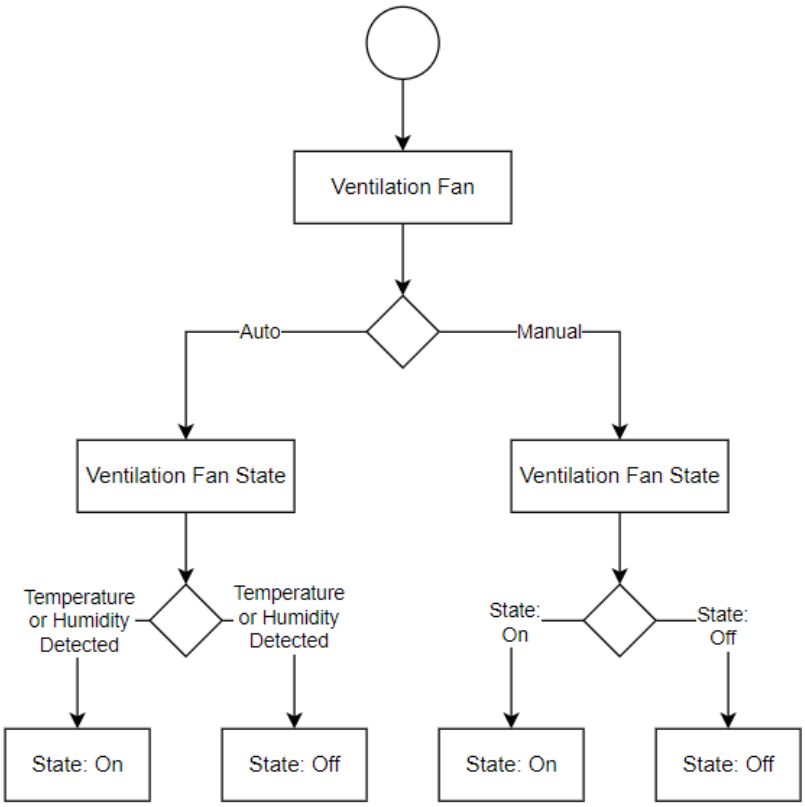
Stakeholders	Requirement ID	Requirement Type	Requirement Description	Priority
Resident/Landlords	REQ 1	Functional	System should detect the temperature and humidity of the room.	H
Resident/Landlords	REQ 2	Functional	System should be able to turn on the fan automatically when the temperature is higher than 30 degrees.	H
Resident/Landlords	REQ 3	Functional	System should notify the user if increases in temperature and humidity are detected.	H
Resident/Landlords	REQ 4	Functional	Users should be able to control the state of the fan remotely.	H
Resident/Landlords	REQ 5	Non-Functional	System should be able to work with both wifi and bluetooth.	M
Resident/Landlords	REQ 7	Non-Functional	The system will utilize MQTT protocol for stable low bandwidth event streams	H

Use Case

1. **UC-1:** Temperature and humidity detection
    1.1. **Description:** The temperature and humidity sensor detects increases in temperature or humidity in the kitchen.
    1.2. **Actors:** Property Owner/Resident
    1.3. **Basic Flow:**
        1. Temperature and humidity sensor on the system detects an increase in temperature and humidity of the kitchen.
        2. System notifies the user of the increase in temperature and humidity and prompts the user to turn on the fan.
        3. System automatically turns on the fan if temperature or humidity rise above a threshold level or the user turns on the ventilation fan in the system remotely using the application.
    1.4. **Post Condition:**
        1.4.1. **Successful Condition:** Sensor detects temperature and humidity, user receives notification of the event from the system, the fan is turned on manually (remote) by the user or automatically by the system
        1.4.2. **Failure Condition:** System is unable to detect temperature or system, system is unable to send event notification to the user, and system is unable to turn on the ventilation fan manually or automatically

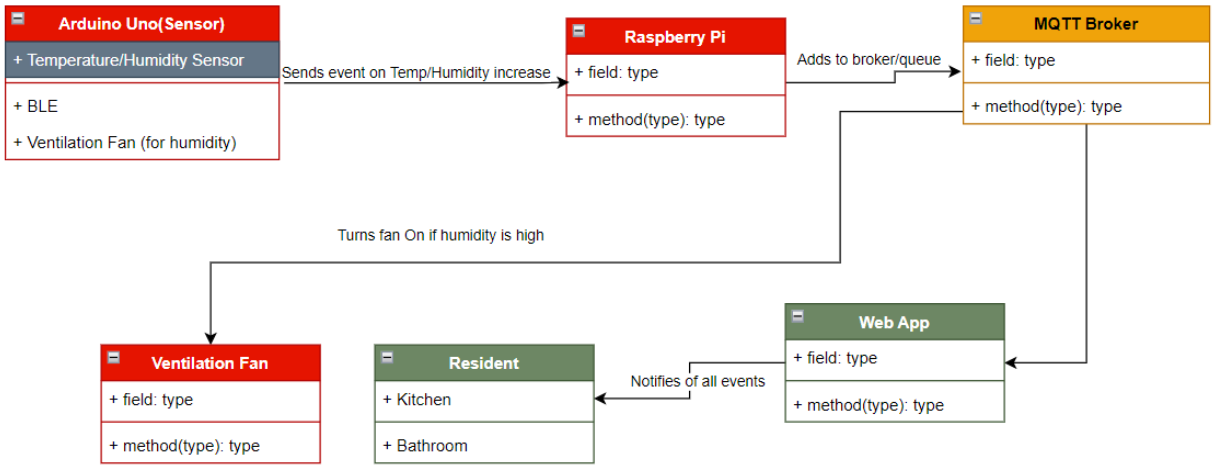
Process Specification Model

The process specification model is used to capture the use case. This model captures the temperature and humidity which will be used to turn on the ventilation automatically if the temperature is higher than 30 degrees or manually by the user.



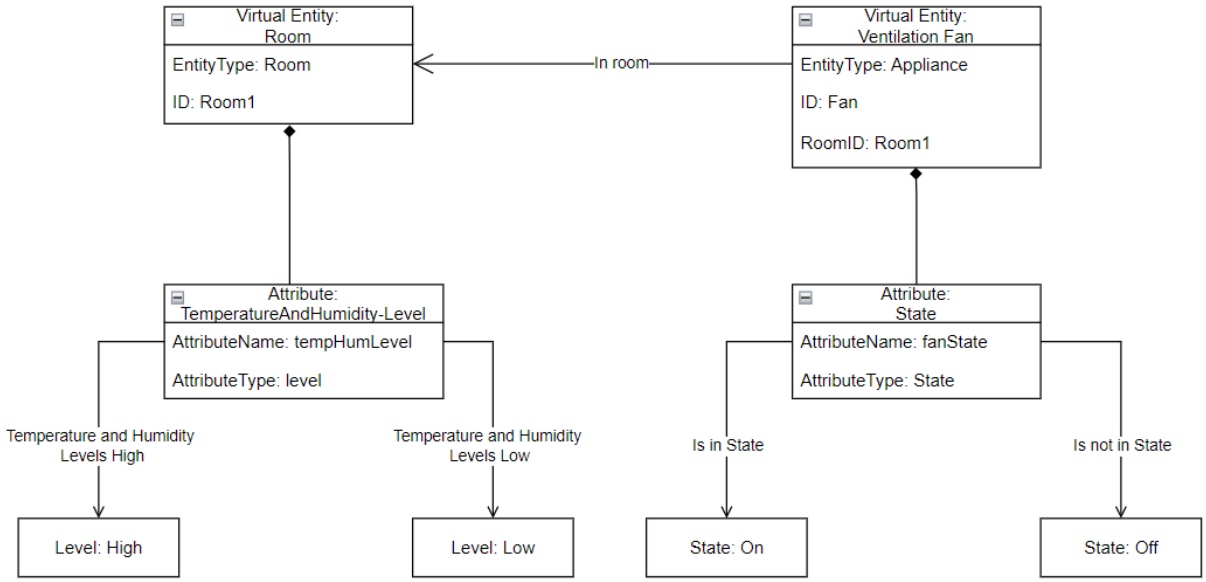
Domain Model Specification

The main concepts here are to design and implement a smart kitchen ventilation system that detects temperature and humidity which will assist the homeowner to be notified in case the temperature changes. The main objects for this project are sensors that would be used to detect the temperature and the humidity.



Information Model Specification

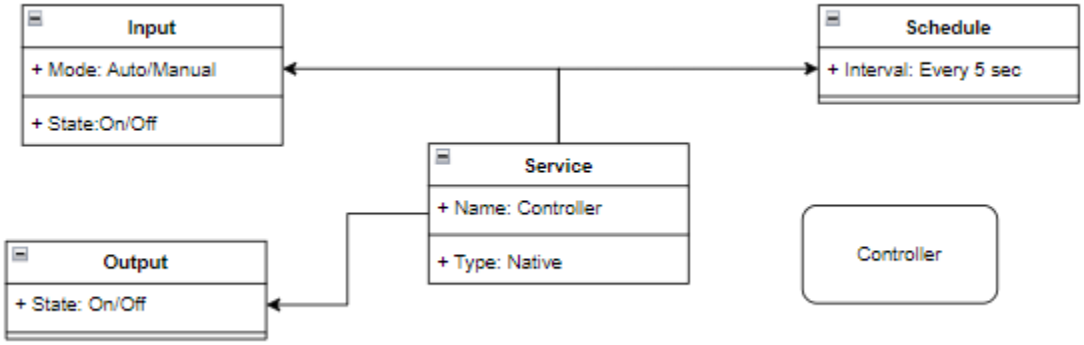
This model describes the structure of all the information in the systems. It looks at the temperature and humidity attributes inside of the room entity and the state attributes of a ventilation fan.



Service Specifications

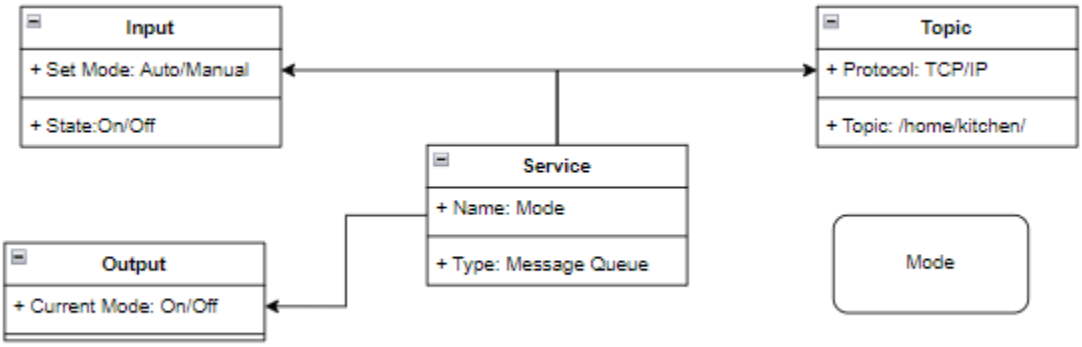
Controller Service:

In auto mode, the controller service will monitor the temperature and humidity of the room and automatically turn on the ventilation fan if the temperature or humidity increases above the threshold level. In manual mode, the service retrieves the fan state from the user application to switch the fan on/off.



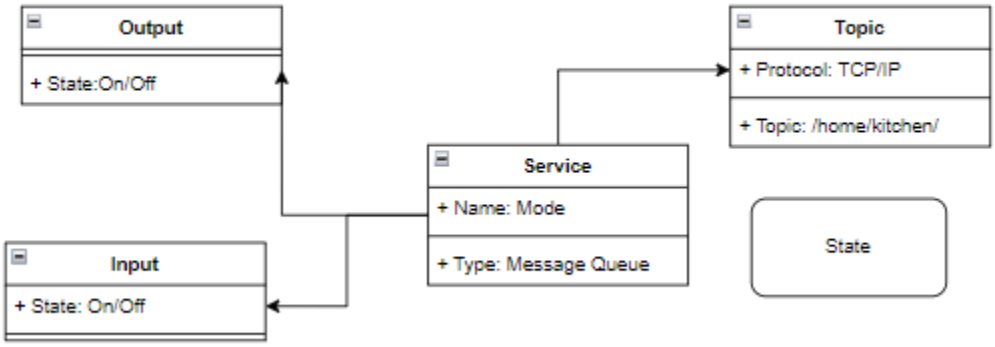
Mode Service:

The mode service will retrieve and set the current mode of the system to auto or manual.

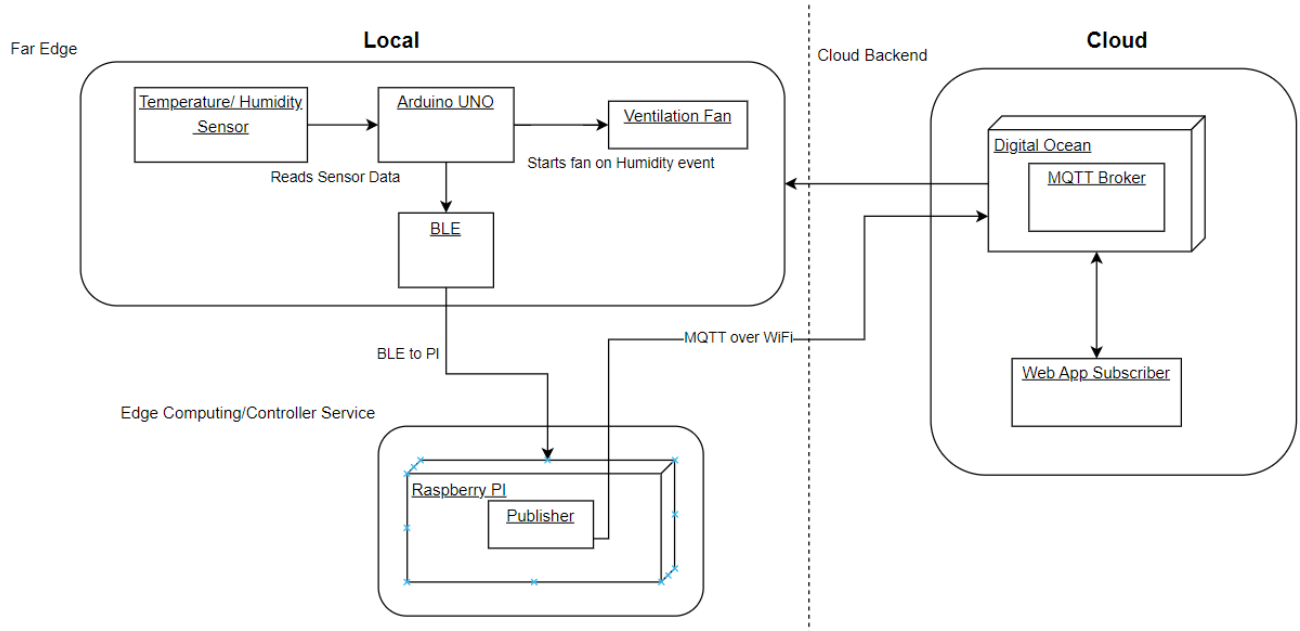


State Service:

The state service retrieves the current state of the fan and sets the state of the fan to off or on.



Deployment Diagram



The deployment diagram explains the different components in the system and now they will interact with each other.