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SAMSUNG

IoT Project Report

TOPIC: Scene Implementation

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1. Introduction

1.1 Target Audience

The target audience includes of this document include member of department of computer science and engineering Indian Institute of Technology Hyderabad, Members of Samsung India team conducting IoT course.

1.2 Scope

The scope of the document is to provide a detail of IoT project "Scene Implementation" overview of which tools and technology was used, implementation specific details and code walkthrough providing overview of code procedures.

1.3 Document overview

This document is divided into multiple section each section having specific purpose as follows

Chapter 1 consist of Introduction covering scope and document overview, Chapter 2 consist of Design principal and Architecture and glimpse of UI.

2. Design Principal and Architecture overview

2.1 Design principal

Idea here is to capture interworking of various technology used in IoT, how closely they are interconnected and how can we build a IoT ecosystem around them. This project show case various IoT technologies and how they work to build a system that is used to develop a system to control various device and implement a specific set of functionalities based on an event trigger aka scene.

Virtual device emulated for this project are

- Light
- Fan
- AC

Property of this device is as follows:

Light: Can be turned on and off, can also change intensity of light emitted also known as brightness

Fan: Can be turned on and off, blades of fan can rotate at 5 different RPM speed which are fixed and hardwired.

AC: Also known as air conditioner, it can be turned on and off also it can increase of decrease temperature between a pre-defined range of temperatures (16° C – 30° C).

All this device can be controlled by user present locally or remotely using following technology/module

- Website
- Central controller

Detail description of technology mentioned above is as follows:

Website: It provide end user with a smoothing and experience rich user interface (GUI), via UE they can control different device present at different locations.

Controller: It is a hub or an intelligent gateway where device get connected and can send and receive command and feedback, also all the requests made by end users is processed by controller and then it is passed to a device or set of devices.

Scenes are a particular arrangement of device in a specific environment for our project we have considered a home with following areas.

- Living room
- Bedroom
- Kitchen

Each of this area have at least one device mentioned above, each of this area can be preconfigured with some condition or can be individually controlled.

2.2 Architecture

Following image represents a high-level overview of IoT design architecture.

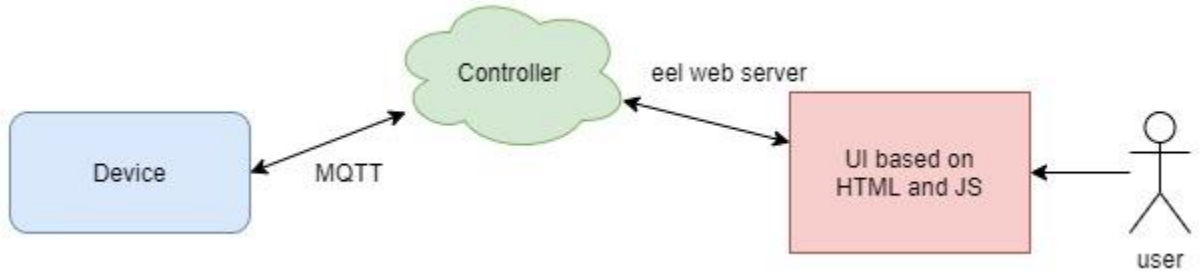

Figure 1 High level architecture overview

2.3 UI

Below is image of UI for Living room, it has three devices AC, Fan & Light.

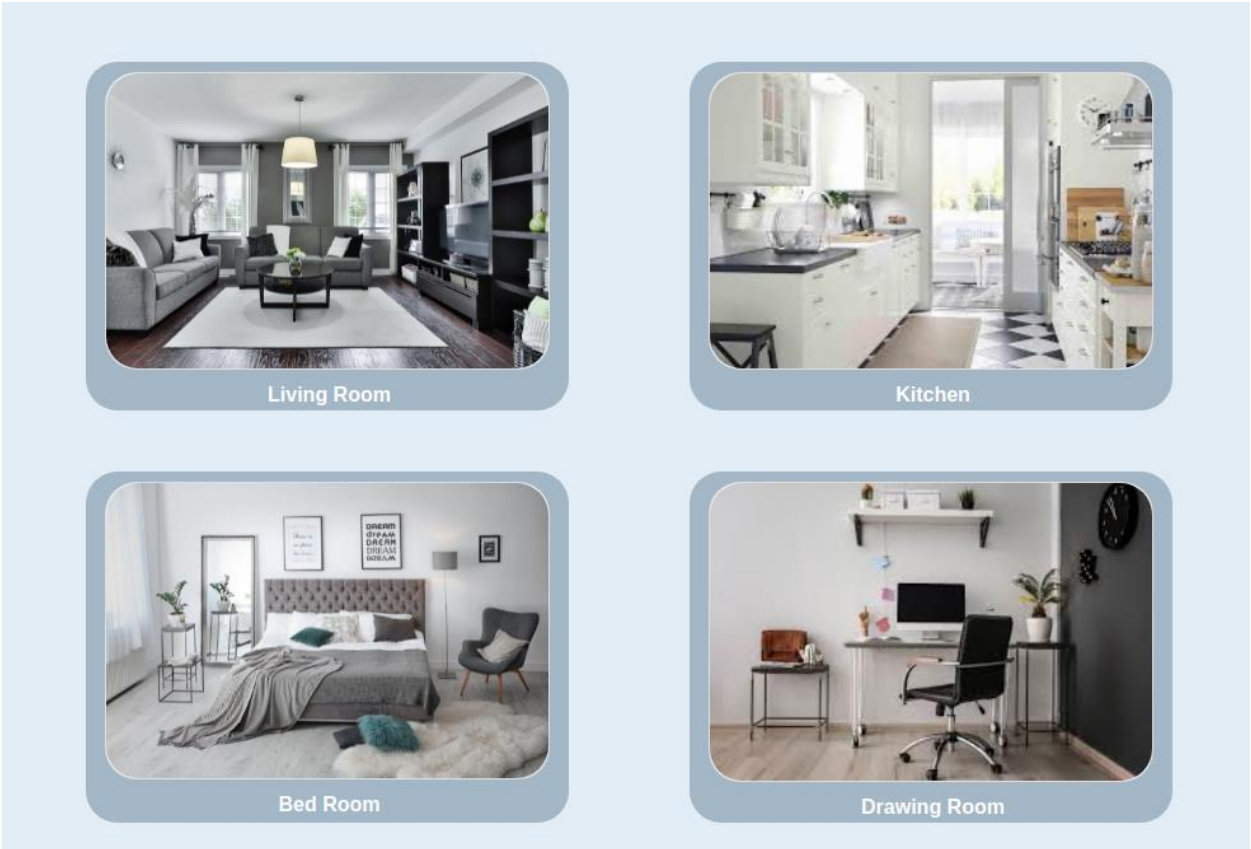

Figure 2 Different room overview

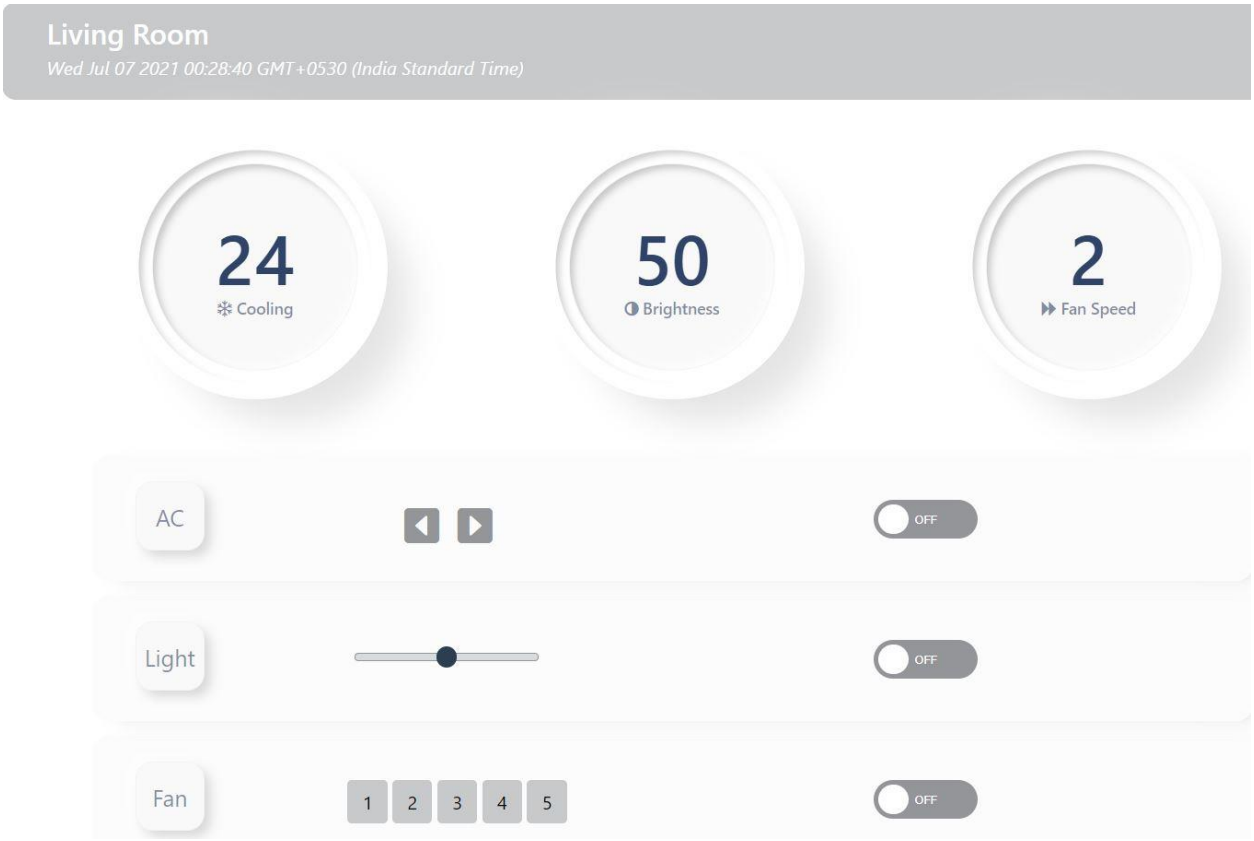

Figure 3 Living room UI

2.4 Hive MQTT dashboard overview

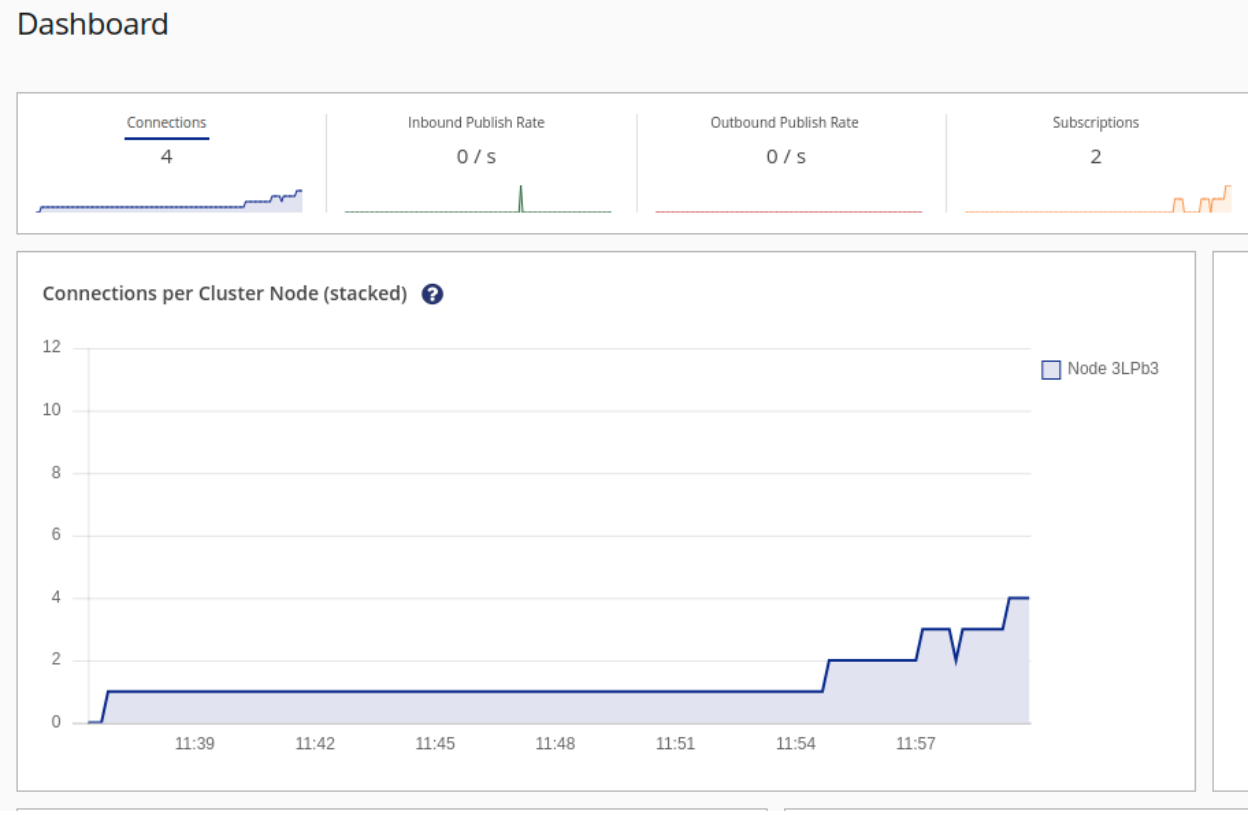

Figure 4 Dashboard overview

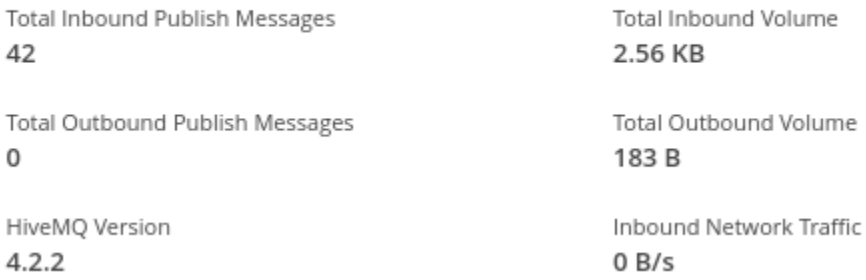

Figure 5 Message exchange on MQTT

4 Scene implementation

Scene is combination of commands used to control multiple device together based on certain condition like user profile or time based condition etc.

In current implementation we have included 2 scene controlling different set of deices in bedroom, living room, Drawing room, Kitchen etc.

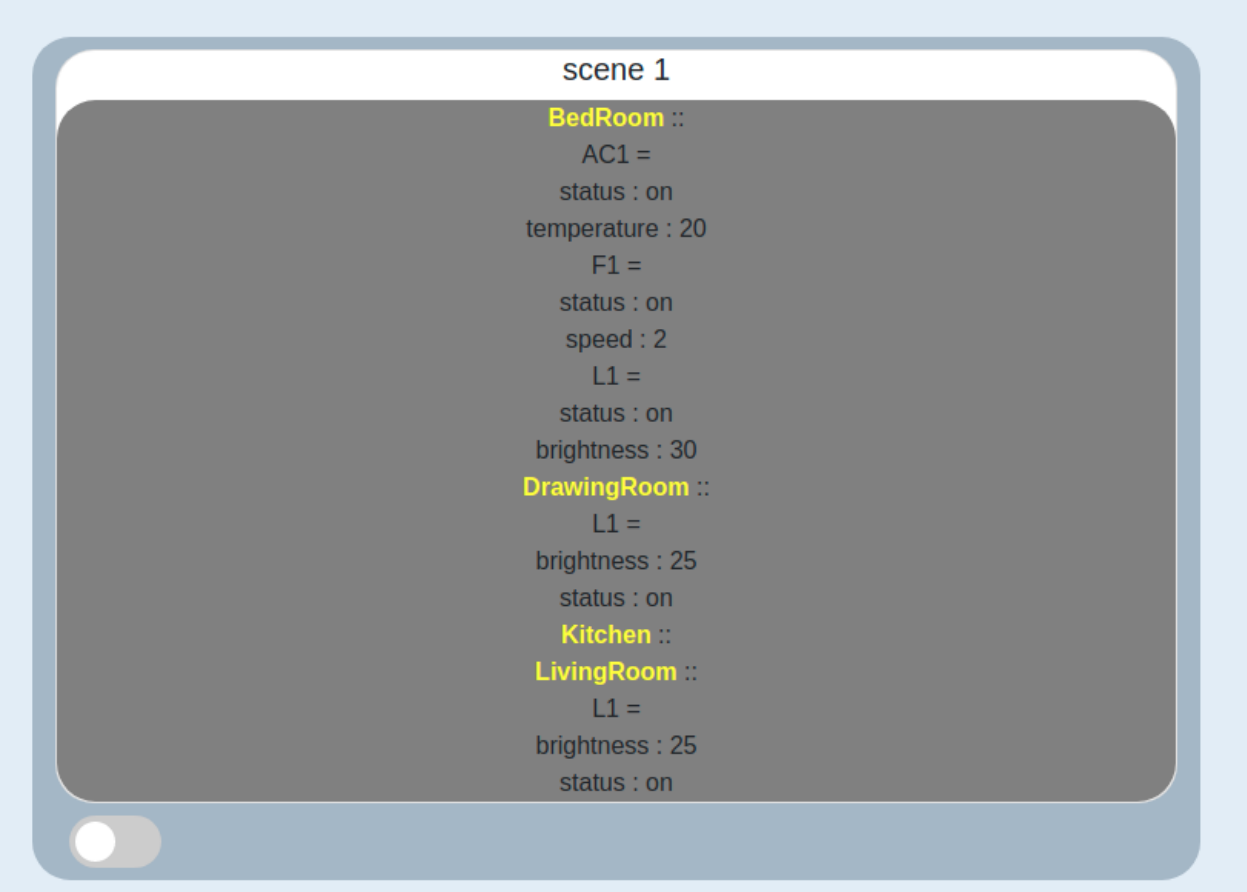

Figure 6 A overview of scene

3 External library and Language overview

3.1 Library's

For development of project following external library was used

- Hive MQTT: For communication between IoT devices and controller
- Eel: For communication between UI and controller
- Numpy

3.2 Language used

For development of various modules following language were used

- Python: For design of controller

- HTML/CSS & JS: For UI

Along with it JSON was used to store and read configuration of IoT device and bash script for automating the running of process.

4 Installation Guide

- Download Hive MQTT as MQTT broker from (https://www.hivemq.com/releases/hivemq-4.2.2.zip)
    - Unzip the file and run the broker
      $ unzip hivemq-4.2.2
      $ cd hivemq-4.2.2/bin
      $ ./run.sh
- Install eel library (prerequisite python 2.7.17 and pip version 9.0.1)
    - pip install eel
- Installing numpy (prerequisite python 2.7.17 and pip version 9.0.1)
    - pip install numpy

5 Know Issues/Bugs & missing feature

1. UI rendering completely after giving any command.
2. No asynchronous logging mechanism is used and logs are dumped directly into console.
3. No centralize DB used here.