ECE 448/528 – Application Software Design
Spring 2023

Project 7: Advanced Application Features

Due: 05/03 (Wed.) by midnight Chicago Time

IMPORTANT:	***You must sign and date below acknowledgment statement on the title page of your report.*** **Failing to do so, or any violation of this rule will result in an automatic failure for this course.**
Acknowledgment:	I acknowledge all works including figures, codes and writings belong to me and/or persons who are referenced. I understand if any similarity in the code, comments, customized program behavior, report writings and/or figures are found, both the helper (original work) and the requestor (duplicated/modified work) will be called for academic disciplinary action.

I. Overview

In this project, we are going to explore a few options to greatly enhance our IoT hub application.

You need to choose one option among the ones presented in the next section. While a lot of things could be done, you are required to consider the approaching project deadline to limit the requirements to two user stories that you need to write by yourself. You will need to design two testing procedures and to provide demonstrations.

II. Options for Advanced Features

1. Amazon Echo Integration

Want to control your plugs via voice commands? A good idea is to integrate either our IoT simulator or our IoT hub server backend with Amazon Echo. Please refer to the page https://github.com/makermusings/fauxmo for technical details. Note that to choose this option you'll need to have an Amazon Echo at hand, or be willing to purchase one.

As an end-user, I want to see available plugs and their states, so that I can know what plugs are there and whether they are on or off.

2. Secure MQTT Communication via TLS

Anyone can access the MQTT broker to control your plugs and to check if lights are on or not. That's not safe and a solution is to protect the communication by TLS. Please refer to the page http://www.steves-internet-guide.com/mosquitto-tls/ for technical details.

3. Persistence

While you may spend a lot of time to create groups and to assign members, all are lost if the server backend restarts. You'll need to find a way to persist the groups as well as the members to the disk so that when the backend restarts, they can be recovered. It is up to you to use a database or not.

4. Data Visualization

Our IoT simulator reports power readings every second. While our application will display the power readings at the current moment, it will be a better idea to show a waveform of recent readings. Both the server backend and the web frontend need to be updated to support such data visualization requirements.

III. Deliverables and Grading

Please push your code to the Git repository before the deadline. Although there is no auto-grading for Project 7, our TA will check your code to evaluate its quality and will run your code to verify your demonstrations.

Please submit a project report to Blackboard before the deadline. This report should first discuss your choice and your design briefly, and then present two user stories and two testing procedures. Any necessary system setups and configurations should also be included. Similar to Project 6, submit the demonstration video to Blackboard together with the report, or include screenshots in your report and explain how they follow the test procedures.The 100 points project grade will be evaluated using the following criteria:

- Source code quality (40 points):
  - Properly formatted source code (10 points): with indentation and reasonable line width.
  - Reasonable implementation (10 points): meaningful names and purposes for JavaScript variables, methods, and classes.
  - Project report (20 points): explanation of your choice and your design, instructions for system setups and configurations as needed.
- User stories (20 points): 10 point for each meaningful user story for your choice of option
- Testing procedures (20 points): 10 point for each testing procedure that correctly addresses one user story.
- Demonstrations (20 points): 10 point for each successful demonstration of one testing procedure that can be verified by the TA using the code you have pushed to the Git repository.