

# ECE 448/528 – Application Software Design

## Spring 2025

### Project 7: Advancing Features

Due: Wednesday, May 7th, 2025, midnight

***NO EXTENSION ALLOWED***

<b>IMPORTANT:</b>	<b><u><i>You must sign and date below acknowledgment statement below on the title page of your report.</i></u></b> <b>Failing to do so, or any violation of this rule will result in an automatic failure for this course.</b>
<b>Acknowledgment:</b>	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, you will need to implement advanced IoT hub features. While a lot of things could be done to improve the current project, you are required to choose one of the topics listed below and come up with two user stories that you need to write by yourself for the chosen topic. You will need to design two testing procedures and provide demonstrations.

#### II. Project Requirements and Deliverables for Advancing IoT Hub Features

##### i. Secure MQTT Communication via TLS

Anyone can access the MQTT broker to control their plugs and to check if the 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.

##### ii. Persistence

While you may spend a lot of time creating groups and assigning members, all is 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 whether to use a database or not.

##### iii. 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.

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### **III. Deliverables and Grading**

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

Please submit a project report to Canvas before the deadline. Your report should first briefly discuss your choice and design. Then, your report should 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 Canvas together with the report, or include screenshots in your report and explain how they follow the test procedures. The 100-point 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 points for each meaningful user story for your choice of option
- Testing procedures (20 points): 10 points for each testing procedure that correctly addresses one user story.
- Demonstrations (20 points): 10 points 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.