Name: \_\_Replace with your name(s)\_\_\_\_

EID: \_\_Replace with your EID(s)\_\_\_\_\_

Semester: Spring 2025

Course: ECE445L

1. ***Requirements Document:***
2. The Project Requirements Document is complete (Type yes if true): \_\_\_\_
3. Both partners have agreed to the [team contract](https://docs.google.com/document/d/1b0H_l2s_C3Buwb_I0p0ZEJCIzjKjUqObAgL3oR6PWzI/edit?usp=sharing) (Type yes if true): \_\_\_\_\_

B) ***Objectives*:**

1. In a few sentences, summarize the goal of this lab.

C) ***Hardware Design*:**

1. Deliverable 1: Schematic of the hardware to connect the ESP8266 to the TM4C123.

D) ***Software Design Deliverables:***

1. I have pushed my code to GitHub for grading (Type yes if true): \_\_\_\_\_
2. Briefly describe the system design. Alternatively, create a system call graph.

E) ***Deliverables:***

1. Deliverable 2: Take screenshots in the debugger showing incoming data dumps, and jitter measurements, collected using your dump.c code.
2. Deliverable 3: Take at least three screenshots on the phone illustrating the features of your system.
3. Deliverable 4: Report the total current consumption, and how you measured it for the following conditions: 1) just the clock; 2) alarm on; and 3) during Wi-Fi
4. Deliverable 5 (5pt EC): Show the web interface of the sensor you interfaced, and explain how you calibrated its output.

F) ***Analysis and Discussion Questions:***

1. Explain the differences between frames and iFrames.
2. Explain what console.log is used for? Show how it is used on your Web App Page.
3. Explain why the functions are called from **mqtt\_app.htm** and executed in **clock\_page.js**? How are these functions in the same scope?
4. In the client server paradigm, explain the sequence of internet communications sent from client to server and from server to client as the client saves data on the server. Assume the client already is connected to the WiFi AP and the client knows the IP address of the server
5. What is the purpose of the DNS?
6. What is the difference between UDP and TCP communication? More specifically when should we use UDP and when should we use TCP?

F) ***Project Requirements Document:***

1. Overview

1.1. Objectives: Why are we doing this project? What is the purpose?

The objectives of this project are connect to an MQTT server. With this pub-sub connection the operator can observe/control the robot.

1.2. Process: How will the project be developed?

The project will be developed using the TM4C LaunchPad attached to the RSLK robot with a ESP8266 wifi interface. The ESP8266 allows connection to the internet. A MQTT server will be deployed. Both the web app and the robot can subscribe and publish, creating the two-way communication.

1.3. Roles and Responsibilities: Who will do what? Who are the clients?

ECE445L students are the engineers, and the TA is the client. Student 1 will xxx. Student 2 will xxx. Student 3 will xxx. Student 4 will xxx. All students will work to collect performance measurements and perform final testing. *(Note to students: you are expected to clarify exactly the responsibilities of each student. Students are allowed to divide responsibilities of the project however they wish, but, at the time of demonstration, all students are expected to understand all aspects of the design.)*

1.4. Interactions with Existing Systems: How will it fit in?

The system will use the microcontroller LaunchPad and the RSLK robot. The circuit diagrams for the robot are in the **RSLK2\_Description.docx** file.

1.5. Terminology: Define terms used in the document.

For the terms wifi, publish/subscribe, MQTT, and TCP.

1.6. Security: How will intellectual property be managed?

The system may include software from the class website and from the book. No software written for this project may be transmitted, viewed, or communicated with any other ECE445L student past, present, or future (other than the lab partner of course). **It is the responsibility of each team to keep its EE445L lab solutions secure.**

2. Function Description

2.1. Functionality: What will the system do precisely?

2.2. Scope: List the phases and what will be delivered in each phase.

Phase 1 is the preparation; phase 2 is the demonstration; and phase 3 is the lab report. Details can be found in the lab manual.

2.3. Prototypes: How will intermediate progress be demonstrated?

A prototype system running on the LaunchPad and RSLK robot will be demonstrated. Progress will be judged by the preparation, demonstration and lab report.

2.4. Performance: Define the measures and describe how they will be determined.

2.5. Usability: Describe the interfaces. Be quantitative if possible.

2.6. Safety: Explain any safety requirements and how they will be measured.

We expect each motor current to be less than 120 mA. Please place a current probe on the 7.2V power during initial testing to make sure your system is behaving correctly. However, under heavy friction this current could be 2 times higher. Therefore, please run the motor unloaded. Connecting or disconnecting wires on the robot while power is applied will damage the microcontroller. Operating the circuit without a snubber diode will also damage the microcontroller.

3. Deliverables

3.1. Reports: How will the system be described?

A lab report described below is due by the due date listed in the syllabus. This report includes the final requirements document.

3.2. Audits: How will the clients evaluate progress?

The preparation is due at the beginning of the lab period on the date listed in the syllabus.

3.3. Outcomes: What are the deliverables? How do we know when it is done?

There are three deliverables: preparation, demonstration, and report. *(Note to students: you should remove all notes to students in your final requirements document).*