



CECS 447 Spring 2025

Project 4 (Group 9)

By

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**Goal:**

The goal for project four is to create a weather quest using a TM4C using a CC3100 wifi booster and display it on a ST7735 LCD screen.

## Introduction:

This project has two main parts other than the TM4C launchpad. The first component we set up was the ST7735 LCD, ensuring we could display multiple different things on the LCD. Some things we wanted to ensure we could draw on the LCD were colored shapes like rectangles and circles, filled or not, text of multiple font sizes and colors, and bitmaps allowing us to display pictures of anything that could be displayed on it's 128x160 colored pixel screen.

Once we were confident about writing on the screen we initialized the CC3100 wifi module and used it to query [weathermap.org](http://weathermap.org), retrieving information about the temperature, humidity, and general weather from most places around the world.

Finally we displayed the weather information from our wifi module on the LCD screen giving us our final weather quest project.

**Operation:**

Link to our video:

[https://csulb-my.sharepoint.com/personal/cesar\\_hernandez01\\_student\\_csulb\\_edu/\\_layouts/15/stream.aspx?id=%2Fpersonal%2Fcesar\\_hernandez01\\_student\\_csulb\\_edu%2FDocuments%2F20250328\\_003315000\\_iOS.MOV&nav=eyJyZWZlcnJhbEluZm8iOnsicmVmZXJyYWxBcHAiOiJTdHJlYW1XZWJBcHAiLCJyZWZlcnJhbFZpZXciOiJTaGFyZURpYWxvZy1MaW5rIiwicmVmZXJyYWxBcHBQbGF0Zm9ybSI6IldlYiIsInJlZmVycmFsTW9kZSI6InZpZXcifX0&ga=1&referrerScenario=AddressBarCopied.view.d530de40-4bc2-43d1-abce-53853c87e61c](https://csulb-my.sharepoint.com/personal/cesar_hernandez01_student_csulb_edu/_layouts/15/stream.aspx?id=%2Fpersonal%2Fcesar_hernandez01_student_csulb_edu%2FDocuments%2F20250328_003315000_iOS.MOV&nav=eyJyZWZlcnJhbEluZm8iOnsicmVmZXJyYWxBcHAiOiJTdHJlYW1XZWJBcHAiLCJyZWZlcnJhbFZpZXciOiJTaGFyZURpYWxvZy1MaW5rIiwicmVmZXJyYWxBcHBQbGF0Zm9ybSI6IldlYiIsInJlZmVycmFsTW9kZSI6InZpZXcifX0&ga=1&referrerScenario=AddressBarCopied.view.d530de40-4bc2-43d1-abce-53853c87e61c)

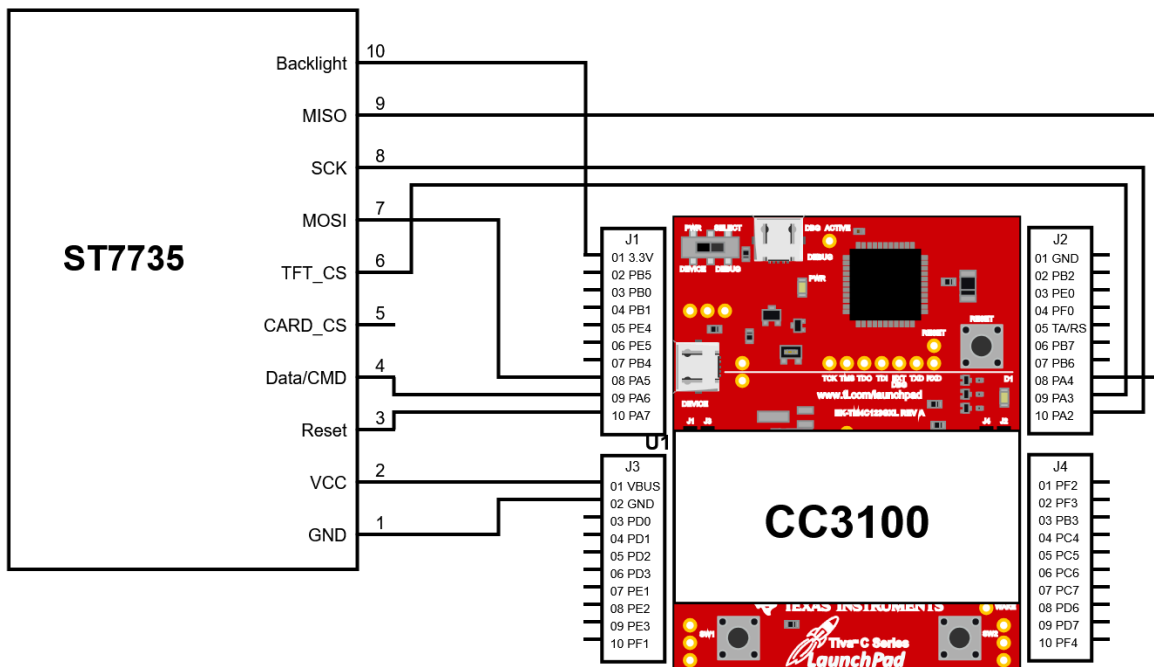
**Theory:**

The theory of project four revolved around the two new components we were introduced to for this project, the ST7735 LCD and the CC3100 wifi module.

The ST7735 was very straight forward and functioned similarly to the Nokia5110, another LCD that we have used before. The main differences with the new LCD is that it has color functionality, slightly more pixels, and a different communication scheme. The most important of these differences is that we used serial communication with a synchronized clock (SSI) rather than an asynchronous clock communication protocol like UART. The size of the screen didn't bring many changes apart from being able to write more but the color did mean that we had to include an extra 4 bit word for each pixel to determine what color it would be.

The CC3100 was more challenging than the LCD because we hadn't worked with wifi networks before but it was still relatively straight forward when we followed the protocol. Once we created a Client-Server connection socket after ensuring all names and passcodes are correct we were able to easily send requests and reads from the internet to our device.

## Hardware Design:



## Software Design:

Our software begins by initializing the system including the clock, UART baud rate, timers, and SSI module. A welcome message is then displayed on the UART terminal and the LCD. The program then configures the Wi-Fi connection using our defined security credentials to connect to our phone's hotspot. Once the Network is successfully connected, our program connects to OpenWeatherMap's IP server and establishes a socket connection. It sends a request to the API and receives a JSON response containing weather data. The response is then parsed to extract relevant information. Based on the extracted weather condition, the variable `current_weather` is updated to reflect the appropriate state so our SysTick handler can accurately animate the LCD screen. This process continues in an infinite loop, fetching and updating the weather data per the user's request.

## Conclusion

In conclusion, we were successfully able to make an embedded weather quest that gets information from the internet using an LCD and a wifi module. We used `weathermap.org`'s library to access many cities across the world and fetch their local weather information. To make our system user-friendly we included animated graphics to create a screen that is easy to read and learn the weather from any given city.