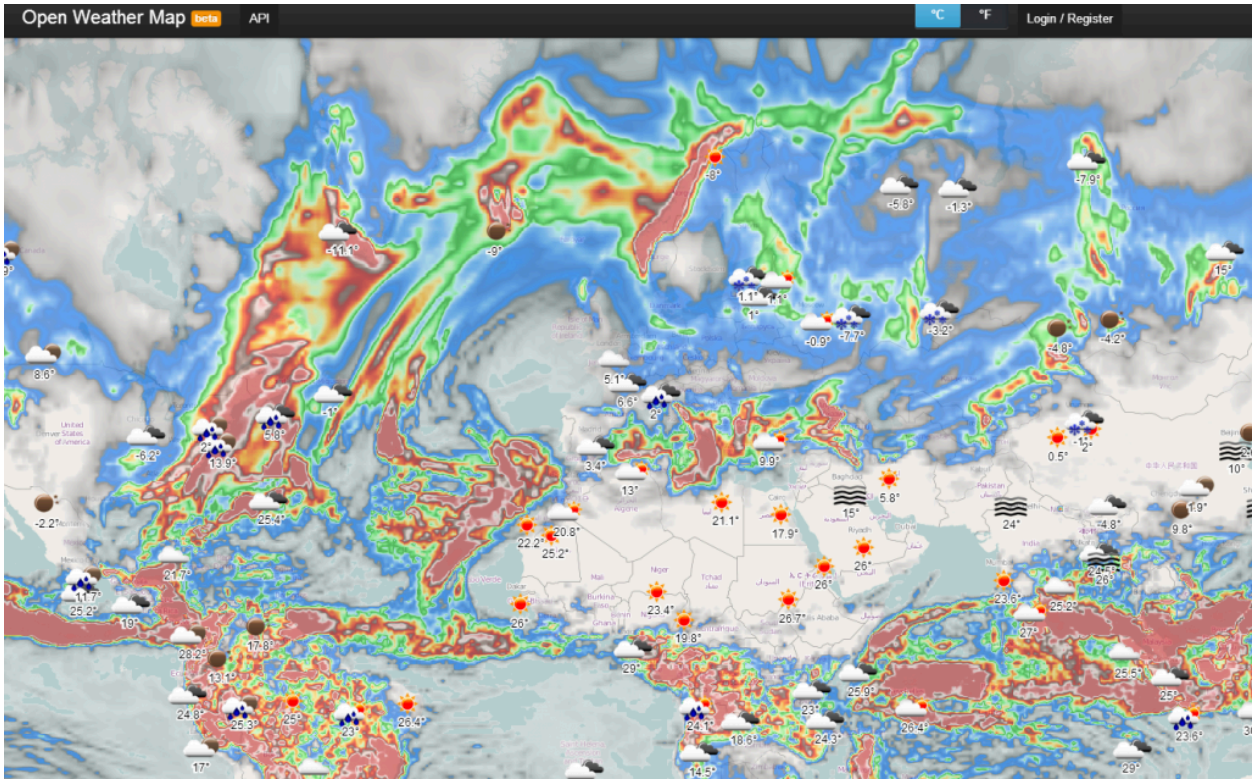
CECS 447 Fall 2023
Project 5: An embedded Weather Quest



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Use ST7335R LCD screen to get weather status from WeatherQuest

Introduction:

In this project, we will build an Internet of Things (IoT) application called "Embedded Weather Quest" using the skills we have learned over the semester. The project's goals include reviewing the material from both the current semester's and the two previous courses on embedded systems, with a concentration on GPIO, hardware timers, interrupts, UART, color LCDs, SSI, and WiFi.

Operation:

In order for the system to work, the .c and .h files would have to be downloaded. Once all the files are downloaded, run the files on Keil V5 with the board connected CC3100 Booster Pack. For this demo, you will need:

- LaunchPad
- Jumper wires
- Tera Term
- Breadboard
- CC3100 Booster Pack
- ST7735R 128x160 Color LCD

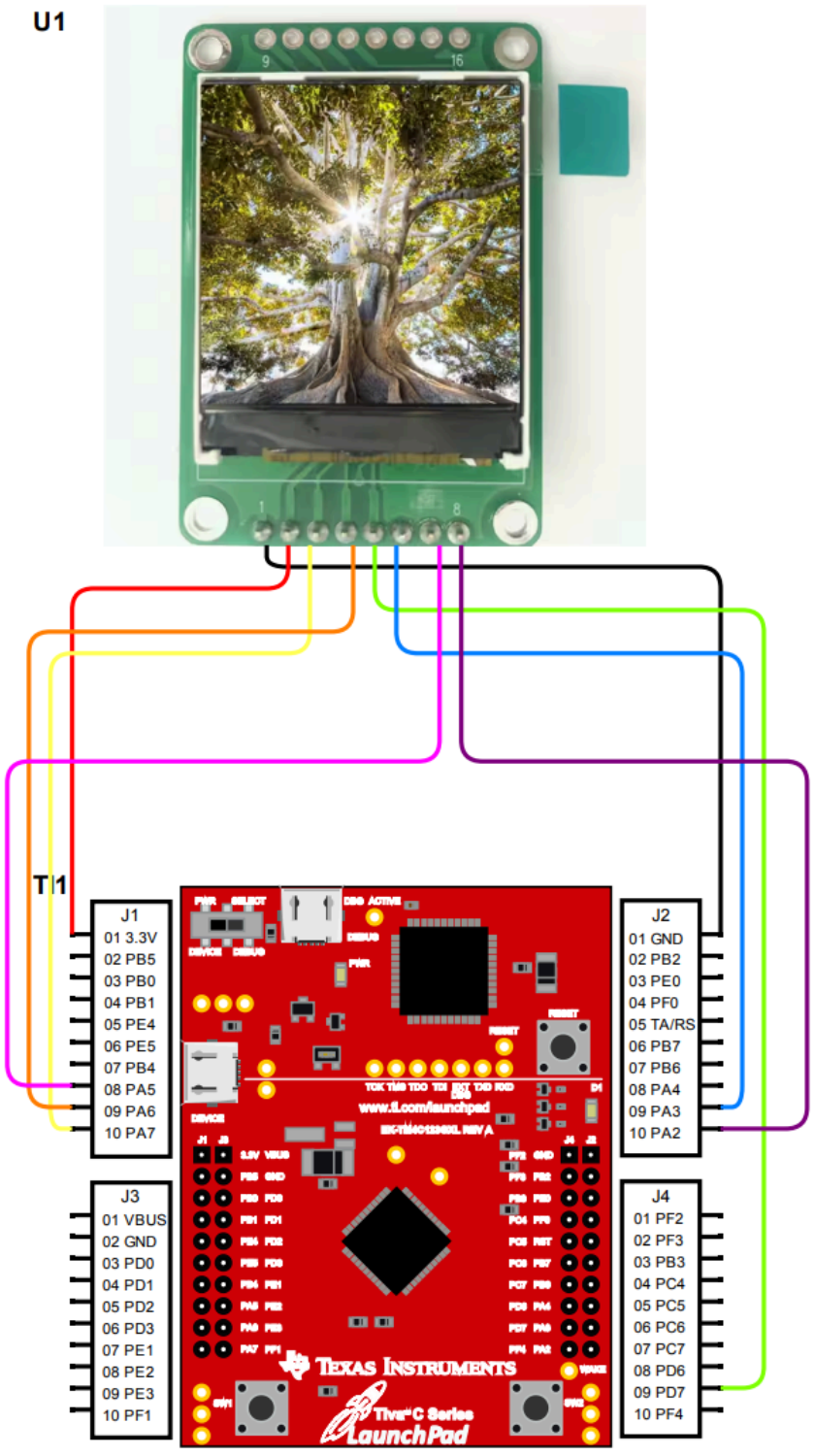
Lab Demo Link: DEMO

Theory:

Our assignment is to develop an embedded system with WiFi capabilities. The system will accept requests from users via a laptop's serial terminal, send them to openweathermap.org, an open web server that provides weather information for any city in the United States, receive their response, and display the requested city's weather data on both the laptop's serial terminal and a color LCD. The color LCD should display an animation on the right hand side of the LCD for the following three weather conditions: sunrise, cloudy, rainy

Port table	**Connection**
GND	Ground
VCC	Power(3.3 - 5.0V)
Reset	PA7
Data/Command	PA6
Card_CS	PD7
TFT_CS	PA3
MOSI	PA5
SCK	PA2

Hardware Design:



Schematic of hardware design

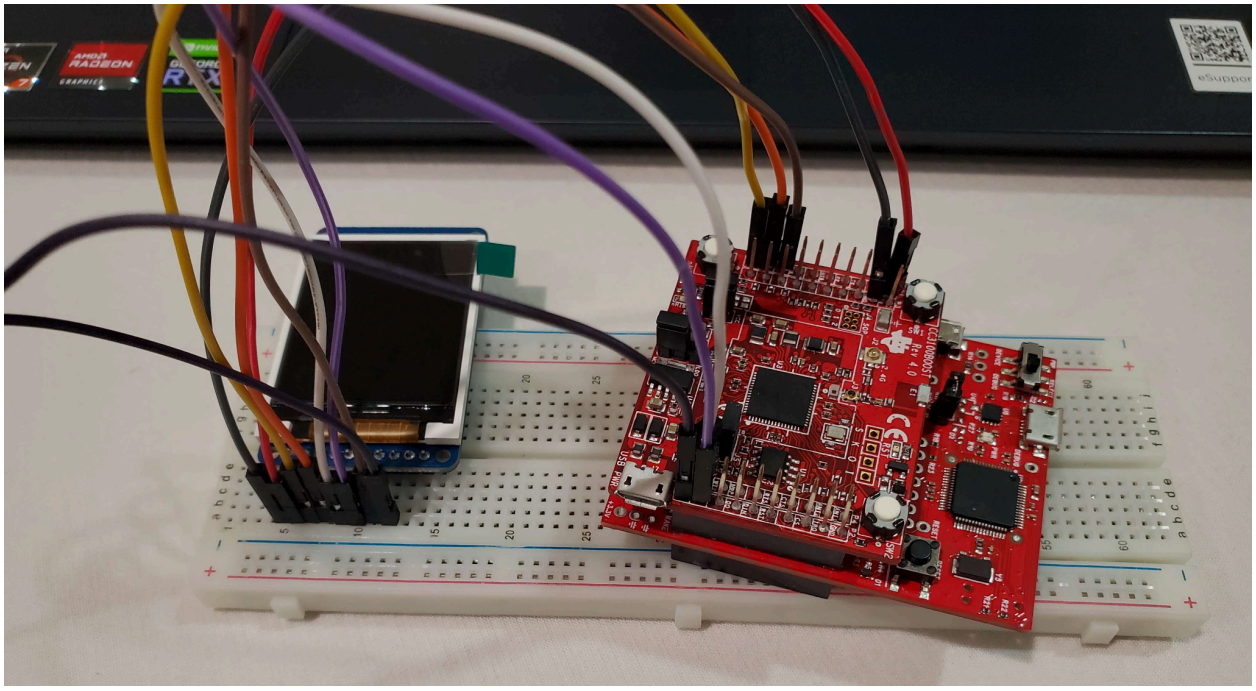


Photo of hardware

Software Design:

The first part of the project was to enable data entry by hand. We gave users options to search for places using manual inputs such as zip code, city name, city ID, and geographic coordinates by displaying a menu on the terminal. Strings were combined using the concatenation function (strcat), and the necessary API instructions were found on the https://openweathermap.org/current website. Although some modifications were required to create the proper REQUEST command, the website's content and a process of trial and error were adequate to find the solution. It was also required to have an APP ID, which could be obtained by making an account.

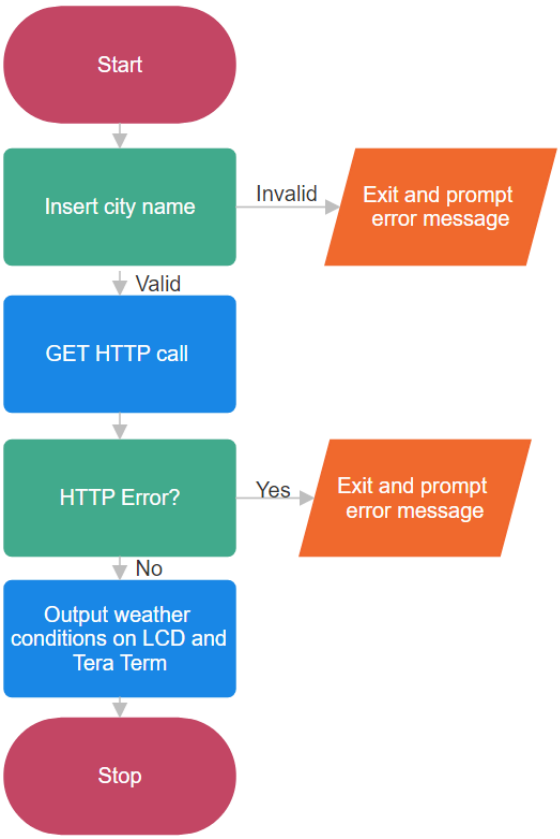


Diagram of design

Conclusion:

When it comes to the complexities of APIs and the Internet of Things (IoT), the CC3100 has shown to be an incredibly useful tool. Its features have greatly increased our understanding of the communication protocols between two devices and highlighted the critical role APIs play in enabling smooth data transfer. Our understanding of IoT has improved as a result of this final project, which has also highlighted the significance of APIs as essential building blocks for creating effective and networked systems. We believe that this will be helpful and a useful thing to know especially in the field we are in!