APF

Automatic Pet Feeder

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Abstract

The Automatic Pet Feeder (APF) is a pet feeding solution which is designed to aid busy pet owners. The APF allows pet owners to remotely schedule and manage their pet's meals right from their web browser. It is designed to accommodate various types of pets, allowing users to choose the time, frequency, and portion size of each meal.

The focus:

- Offer convenience for pet owners when they are unable to be present to feed their animals.
- Provide owners reassurance that their pets are receiving accurate and timely meals.

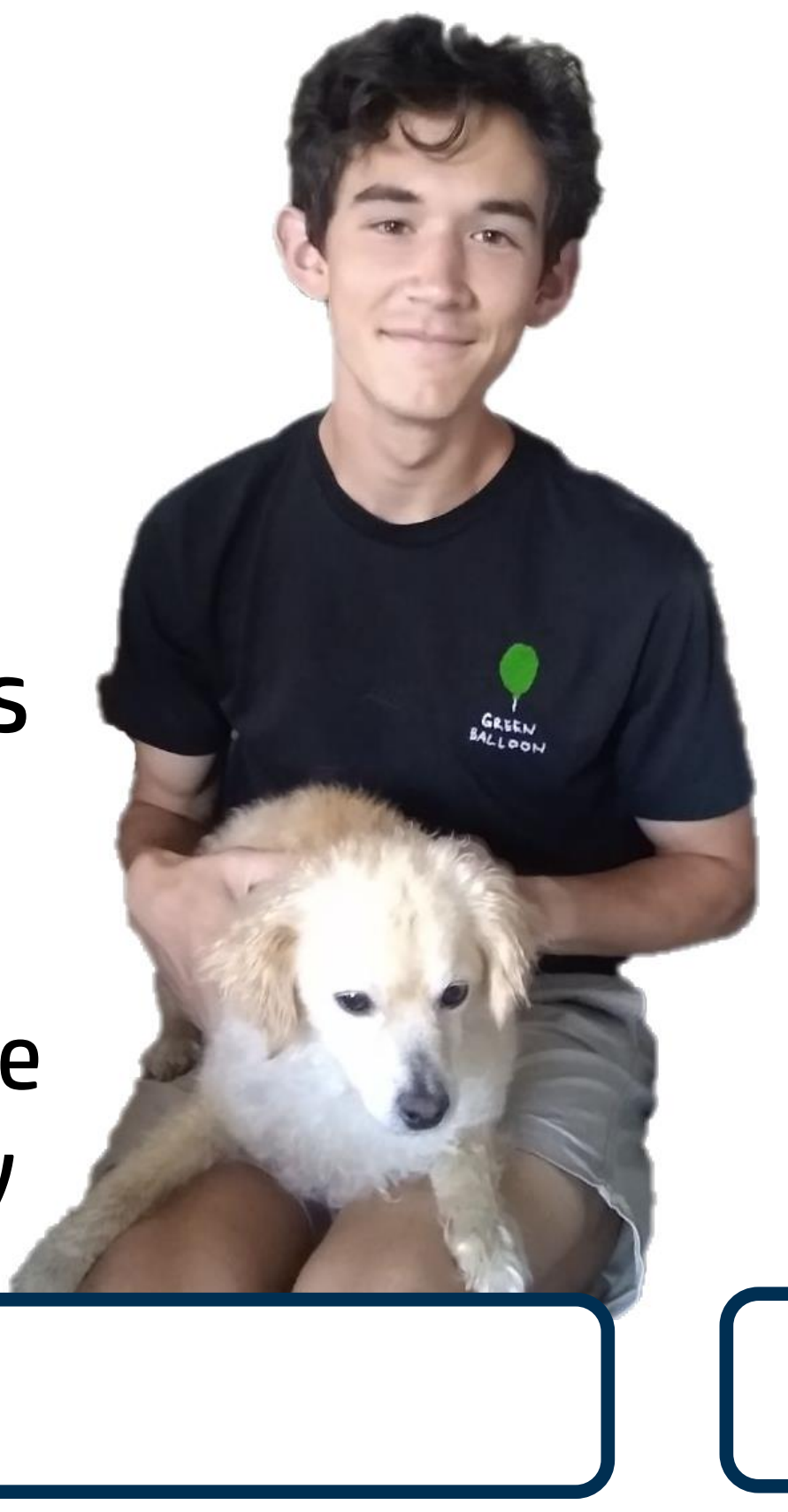


Figure 1: Me and Hurley

Challenges

Initial PCB Issues:

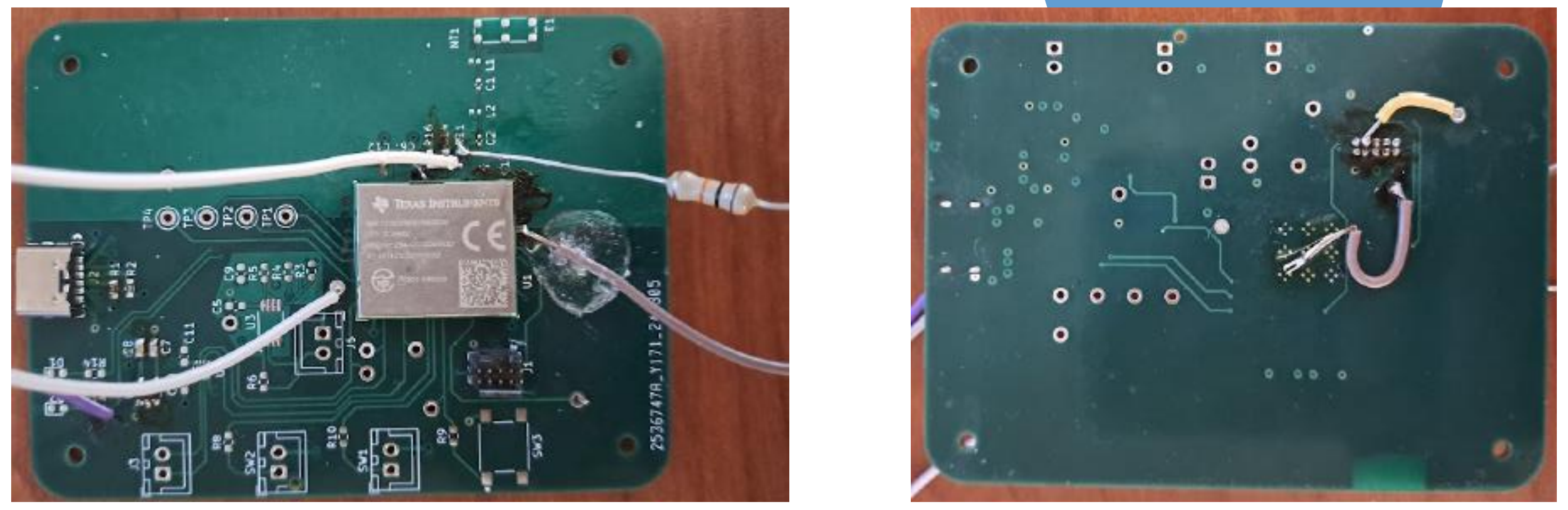
- Routing mistakes, not enough test points, ground vias under MCU, missing pull up resistors

Programming Issues:

- Development Mode vs. Production Mode
- Configuring internal pull up resistors
- Understanding the SimpleLink SDK

Additional Issues:

- Antenna, Ordered the wrong MCU



Figures 4 and 5: Initial PCB design (top and bottom)

Methods and Materials

Software

- My project uses a Texas Instrument MCU, so I relied primarily on TI's development tools which include:
  - **Code Composer Studio** (CCS), **Uniflash**, and **Sysconfig**
- **TI SimpleLink SDK** was used for Wi-Fi examples
- **Visual Studio Code** was used for HTML and JavaScript files

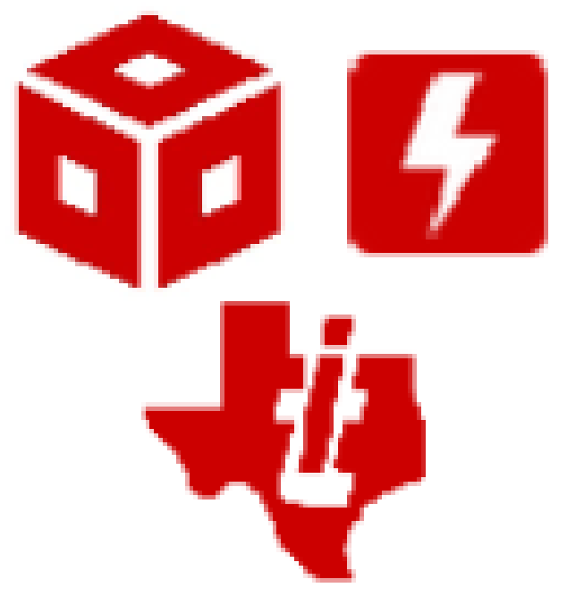


Figure 2: Texas Instruments development tools

Hardware

- The PCB and schematic were designed using **KiCAD**.
  - MCU: **CC3235MODSF**
- Hardware tests were done using oscilloscope and multimeter
- The enclosure with dispensing mechanism was purchased on Amazon.

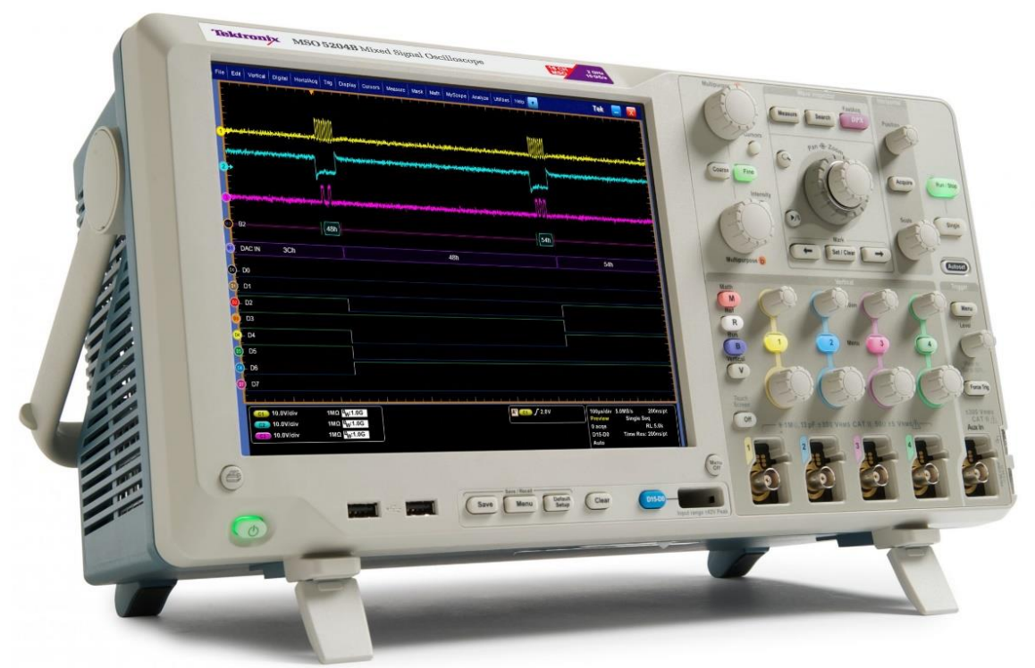


Figure 3: Oscilloscope

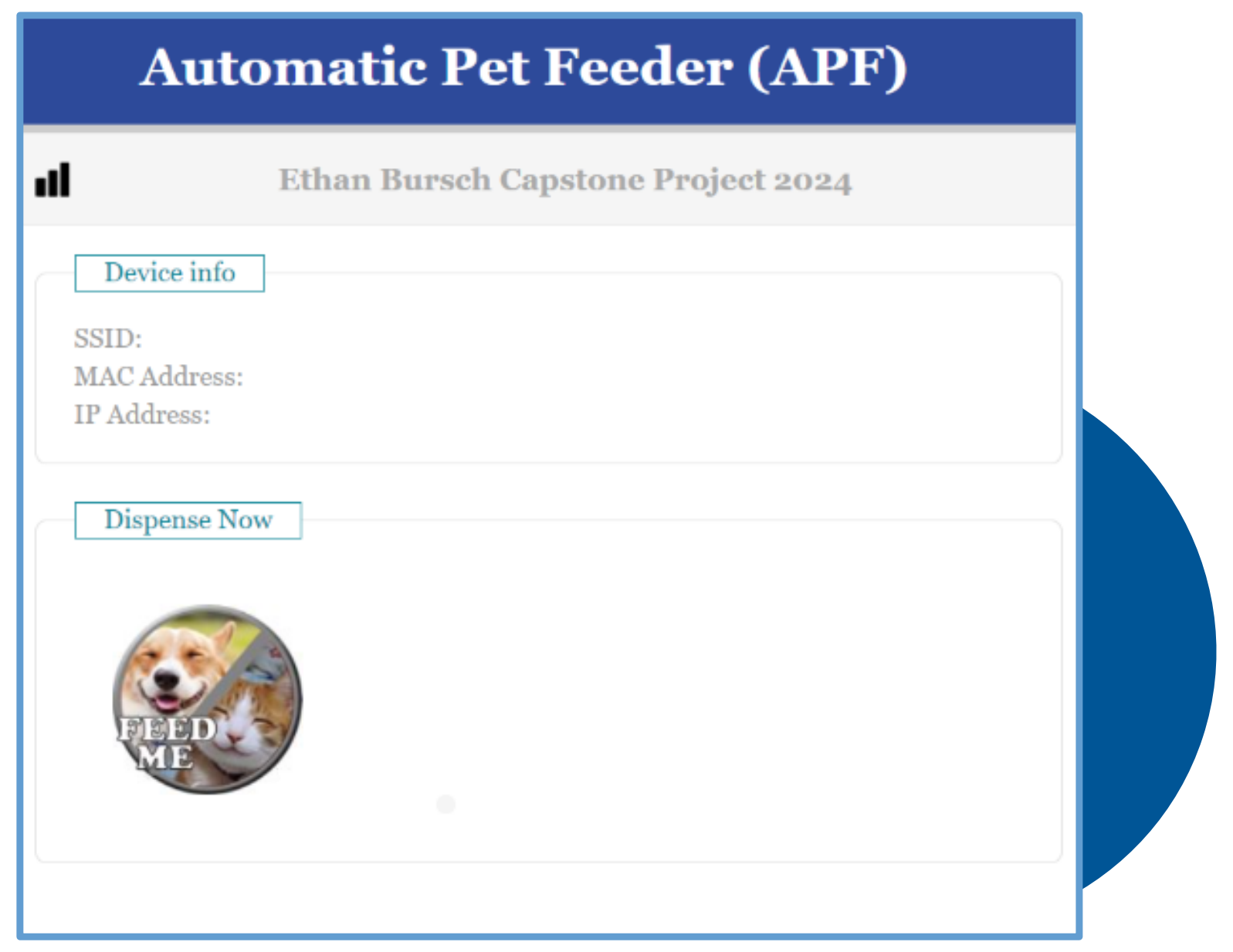
Results

Due to the numerous issues I faced with my custom PCB and a lack of time, I decided to switch to using my dev board instead. This allowed me to focus on software and eventually complete a working demo of my product.

My design features a TI CC3235SF LAUNCHPAD (dev board), my custom PCB which is used for the motor driver, **two off-board limit switches**, and an off-board **5V DC motor**.

The APF is connected to local Wi-Fi networks while in **provisioning mode** via TI's **SmartConfig** tool. Once connected, users can access the APF web client through the web browser on their phone or computer.

Currently, the only feature that I have added is **"Dispense Now"** which activates the dispensing mechanism once the **"Feed Me"** button on the webpage is clicked



Automatic Pet Feeder (APF)

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Device info

SSID:
MAC Address:
IP Address:

Dispense Now

Figure 6: Screenshot of the APF web client

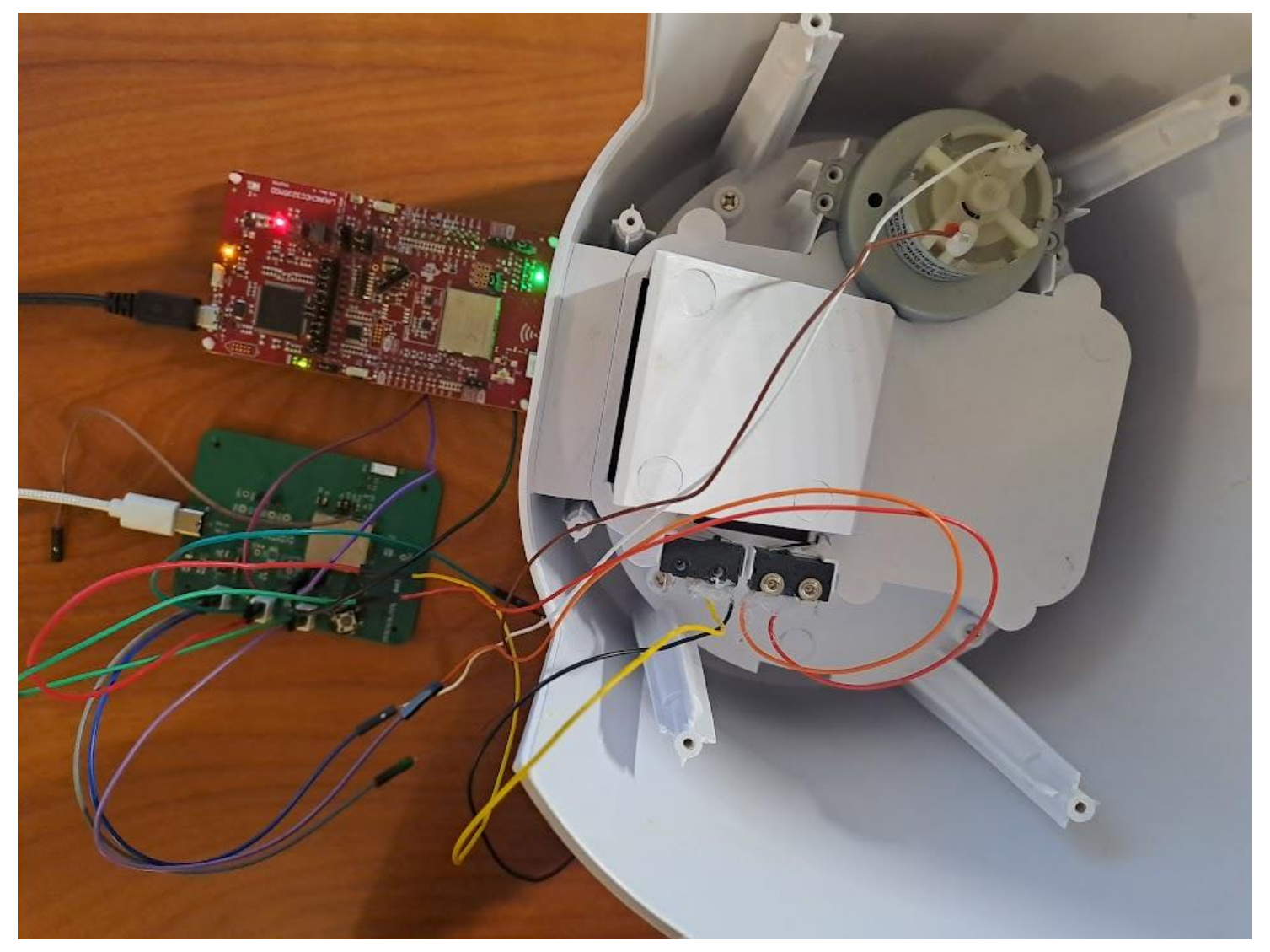

Figure 7: TI Launchpad and custom PCB with off-board switches and DC motor

Conclusion

Ultimately, the APF is an incomplete project. I was not able to add many of the features I hoped it would have. However, given its current status, I am **confident that with enough time I could complete the product as intended.**

Still, **I am extremely proud** of all the work I have put into this project and the many skills I learned along the way.

Two things I would keep in mind if I were to do this project again:

1. **Know your time constraints**
2. **Research your MCU**

Future Direction

Given the project's current state, there are a number of features which would be fun to add in the future:

- Variable meal sizes
- Scheduled feeding times/frequency
- Notifications for dispensing events and connection status
- Dispensing tone/message
- A sensor which detects the amount of food remaining

I am also interested in getting the project to work solely on my custom PCB :)

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WWU

Capstone Project

Electrical and Computer Engineering Program