VXA SAFE ANNEAL

BY: Wendy

Situation

- The temperature of the propane torch head does not display on top line of a LCD screen.

- The a elapsed time per rotation does not display on bottom line of a LCD screen.

- Too many wires/cables and an inconvenient Arduino board were being used.

Problem

- For the temperature and elapsed time display on LCD, I can check the previous code or find introductions about LCDs, Hall sensors, and thermistors from the Internet.

- Too many wires and cables:
  - Fewer-wires LCD(LCD I2C)

- The inconvenient Arduino board(size):
  - Try different types of Arduino boards, such as UNO, Teensy 3.1, and Arduino nano.

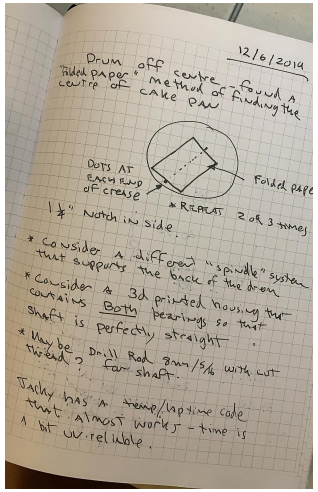
Investigation

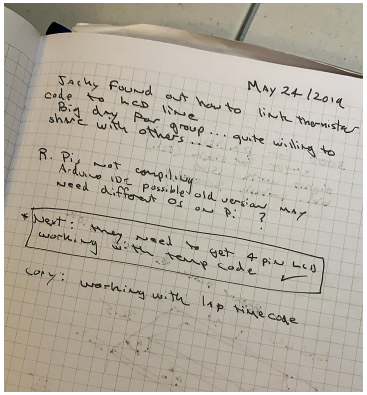
Since I got the material about this project from the former students:

- Logbook
- Codes
- Schematics

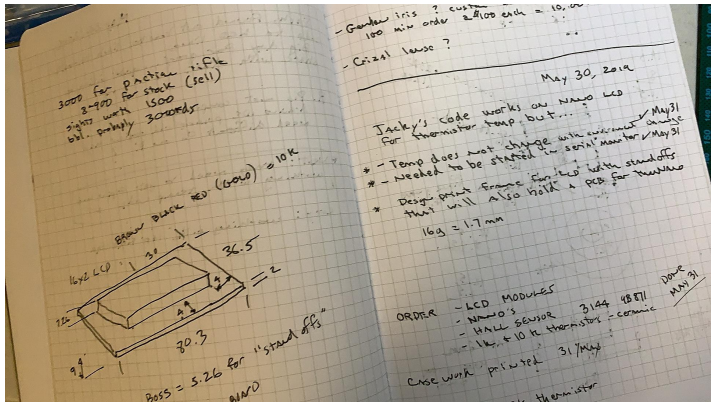
Exploring them was the first thing I did.

At the same time, I cleared my goals and made a step-by-step plan.





Previous notes



Investigation

1. LCD & Thermistor

After reading the logbook for an entire period, I started connecting electronic components(LCD and a thermistor) according to a random website.

FAILED

Done everything at one time is a delusion.

So, I tried LCD only.

Codes or instruction I found online

https://create.arduino.cc/projecthub/adrakhmat/temperature-monitor-with-dht22-and-i2c-16x2-lcd-3ddd39 LCD with an extra part on the back

https://lastminuteengineers.com/i2c-lcd-arduino-tutorial/ LCD IC2

https://www.circuitbasics.com/arduino-thermistor-temperature-sensor-tutorial/ thermistor

https://maker.pro/arduino/tutorial/how-to-use-a-hall-effect-sensor-with-arduino#:~:text=The%20Arduino%20Hall%20effect%20sensor%20code%20can%20be%20used%20to,voltage%20to%20its%20Vout%20pin. Introduction Hall Sensor

https://makersportal.com/blog/2018/10/3/arduino-tachometer-using-a-hall-effect-sensor-to-measure-rotations-from-a-fan

https://create.arduino.cc/projecthub/SurtrTech/interfacing-hall-effect-sensor-with-arduino-ee3bbe ←working hall sensor

https://create.arduino.cc/projecthub/andriy-baranov/fidget-spinner-rpm-counter-253ac0

Hall effect sensor rpm(May 10th)

https://support.arduino.cc/hc/en-us/articles/4412955149586-If-your-board-does-not-appear-in-the-port-menu#nano can't find fort(screenshot)

New thermistor:

Investigation

LCD I2C →

1.1 LCD

- What is the name of an LCD with easier wiring?

  “LCD I2C”

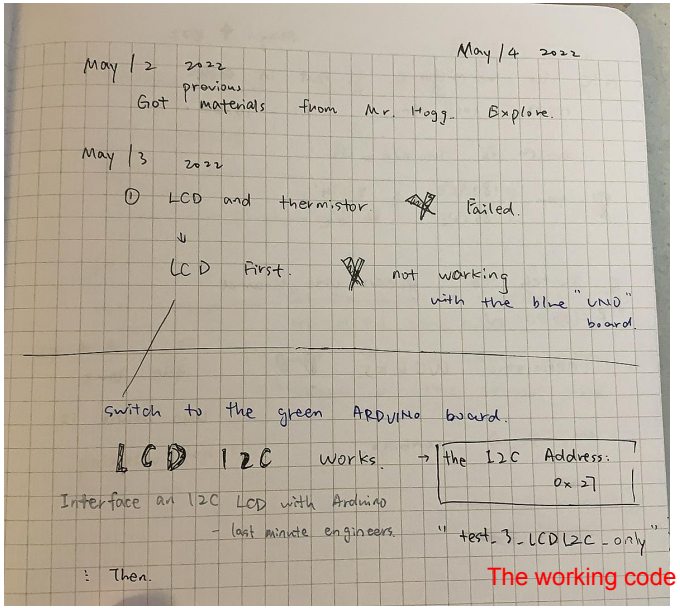
- What is the I2C Address for the LCD I got?

  “0x27”

- Why didn’t the LCD work?

  Try another LCD → Didn’t work.

  Try another *Arduino board* → Works!! There are things shown on the LCD.



The working code

Investigation

1.2 Thermistor

- What is the name of the two-pin thermistor with long a cable?

  “NTC 3950 100K Thermistor”

- Why the thermistor always read 180 C in a room temperature?

  Try a 100,000 K resistor → reading 83 C to 85 C in a room temperature

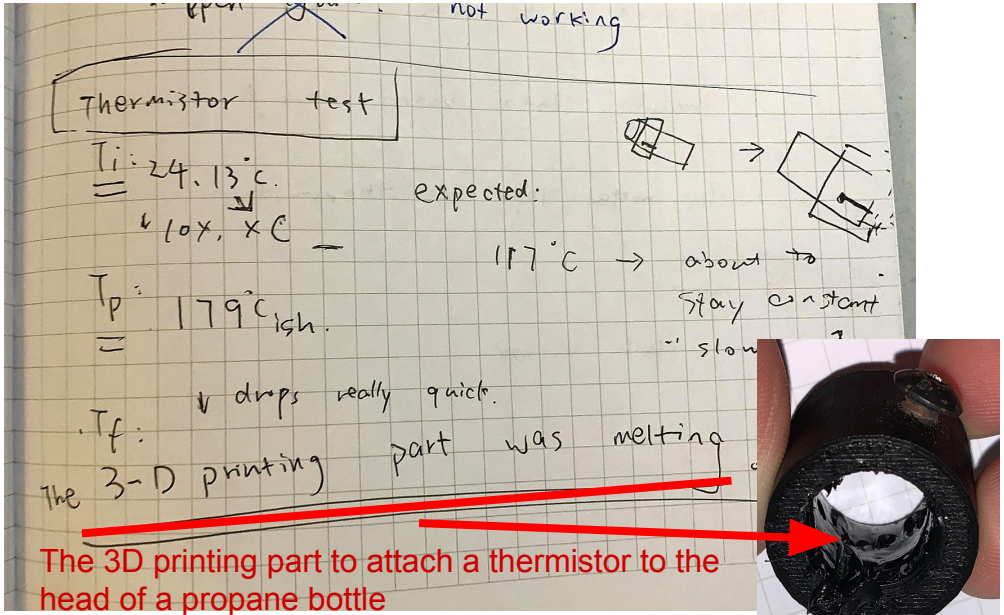
  Try set the R1 in code to 10,000 → didn’t work

  Wait… it might be the same problem with LCD. Try another *Arduino board* → Works!! The thermistor read 20 C to 21C, which was the room temperature.

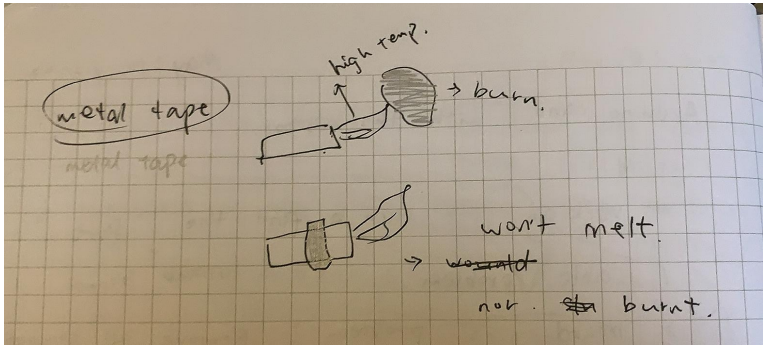
So, the blue Arduino board was found to be damaged and doesn’t work any more.

Investigation

1. LCD & Thermistor TEST



The 3D printing part to attach a thermistor to the head of a propane bottle



A piece of metal tape would work

Investigation

2. Hall sensor

Keywords while doing research: RPM, Hall Effect sensor…

- First, I got the code to count how many time had the hall sensor being triggered. I got some ideas, but they all slipped away.
- Then, Mr. Hogg said that I can check the “stopwatch code” from the former students. Additionally, I explored some stopwatch codes online.
- Connect to the codes I did in CMP 521 and 621, the code for the hall sensor to record a elapsed time per rotation was determined.

Investigation

2. Hall sensor

However, there was a problem – it took 1.5s to 2s for the elapsed time to show on the LCD.

I tried to adjust the sensitivity of the hall sensor and replaced it with another hall sensor, but it still reacted slowly.

Mr. Hogg said that I could change the code: So, I changed the “delay” for LCD and the data showed faster on LCD.

I will make video or a gif to compare of the two situations. HERE

Investigation

2. Hall sensor

- What can I do to refine the hall sensor using
  - Show two decimal places for the time

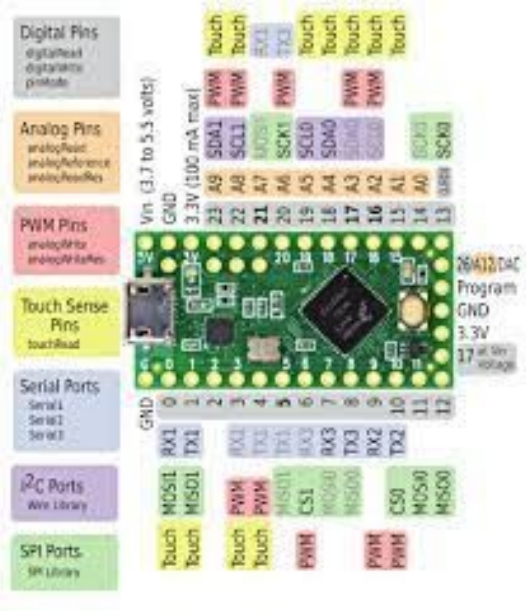
    “Switch the variables names from ‘int’ to ‘float’”
  - Instead of using a hall sensor with extra components, 3144 or U18 hall sensor are preferred.

    “Adding a resistor and reconnecting the cables”

Investigation (Working)

Different arduino boards:

Teensy LC



Arduino Nano