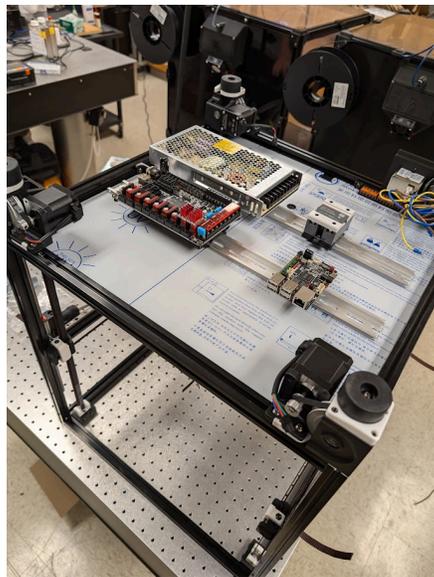

EE/CprE/SE 491 WEEKLY REPORT 7
10/25/2024 – 10/31/2024
Group number: sdmay25-15
Project title: Millimeter-wave 3D Scanner
Client &/Advisor: Mohammad Tayeb Al Qaseer
Team Members/Role:
Nathan Reff
Luke Post
James Peterson
Daniel Ripley-Betts

Week's Overview

This week we made a lot more progress on the build of the Voron Scanner. The whole team came together wonderfully for a large push on the build. Near the beginning of the week, we built the components for the gantry system of the scanner (drive trains, rails). Then the next build session we put the components together to build the gantry system. We then assembled the gantry system into the scanner. Lastly, we implemented the belts into the scanner and tensioned them to finalize the z axis. It will soon be time to begin construction of a prototype sensor housing and control software. We also made good progress on the testing of the PCB. After figuring out that there was an issue because power was not being supplied to any of the LEDs, we took off some of the ICs and resoldered them until we found out that the oscillator was the issue and fixed the soldering on that component.

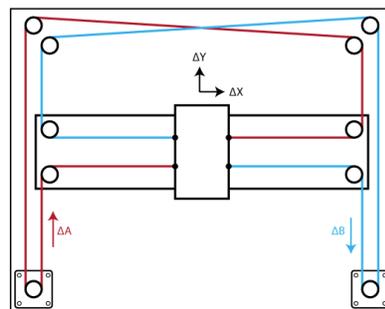
- **Key Accomplishments:**

- Nate: More construction on the scanner, finished the gantry system and implemented the z axis in the scanner



- Luke: Began testing the PCB
 - Discovered power was not getting to the LEDs which signified something was shorting out.
 - Tested all of the paths back from the LEDs to find the shorts
 - Removed all of the ICs because I found no shorts anywhere
 - Figured out the issue was the oscillator
 - Resoldered everything back on and now we have power!
- Daniel: The scanner is fully assembled outside of the electronics. Found a simple way to rack the gantry.

Reference Mechanism



Equations of Motion:

$$\Delta X = \frac{1}{2}(\Delta A + \Delta B), \quad \Delta Y = \frac{1}{2}(\Delta A - \Delta B)$$

$$\Delta A = \Delta X + \Delta Y, \quad \Delta B = \Delta X - \Delta Y$$

This reference mechanism is functionally identical to the last figure in the prior section. Two additional pulleys have been added to shift the belt cross-over outside of the working envelope.

- James: Assisted in Voron build, learned how to do heat setting and put motors together.

- **Challenges/Issues:**

- Nate: Gantry system didn't seem to square up perfectly with the Voron
- Luke: PCB was shorting out somewhere. Figured out where that was and got it fixed already though.
- Daniel: Finishing the electric side of the scanner build by the end of next week will be tight. Physical build ran into a couple unforeseen issues resulting in delays, keep an eye on linear rails missing bearings.
- James: None

Individual Contributions

Name	Individual Contributions	Hours this week	Hours cumulative
Nate	Assisted in the construction of the gantry system and z axis of scanner. Inputted belts	8	31
Luke	Began testing and fixing the circuit board. It was shorted somewhere. Learned it was at the oscillator after lots of testing and resoldered all the ICs and oscillator on the board.	6	29
Daniel	Assisted construction of the x/y gantry, tensioning z-axis belts, and doing all the heat-set inserts.	8	30
James	Continued build of Voron and learned techniques used in building.	7	29

Upcoming Week's Plan

- Nate: implement the a/b belts and finish the construction of the scanner and work on electronic portion of build
- Luke: Continue testing the PCB. Now that we have power I have to make sure no ICs got fried in the process and make sure the board is functioning properly. Also help to build the Voron printer if I have time
- James: Continue to build the printer and look into housing options
- Daniel: wire up the electronics, interview users,

Advisor Meeting Summary

- **Key Discussions:**
 - We did not meet with Dr. Tayeb this week
- **Action Items:**
 - Discuss open source option