Lightning Talk 6

Design Check-In

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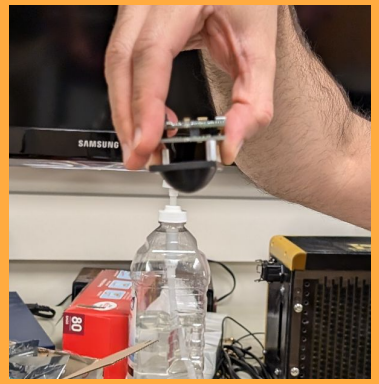
Project Overview

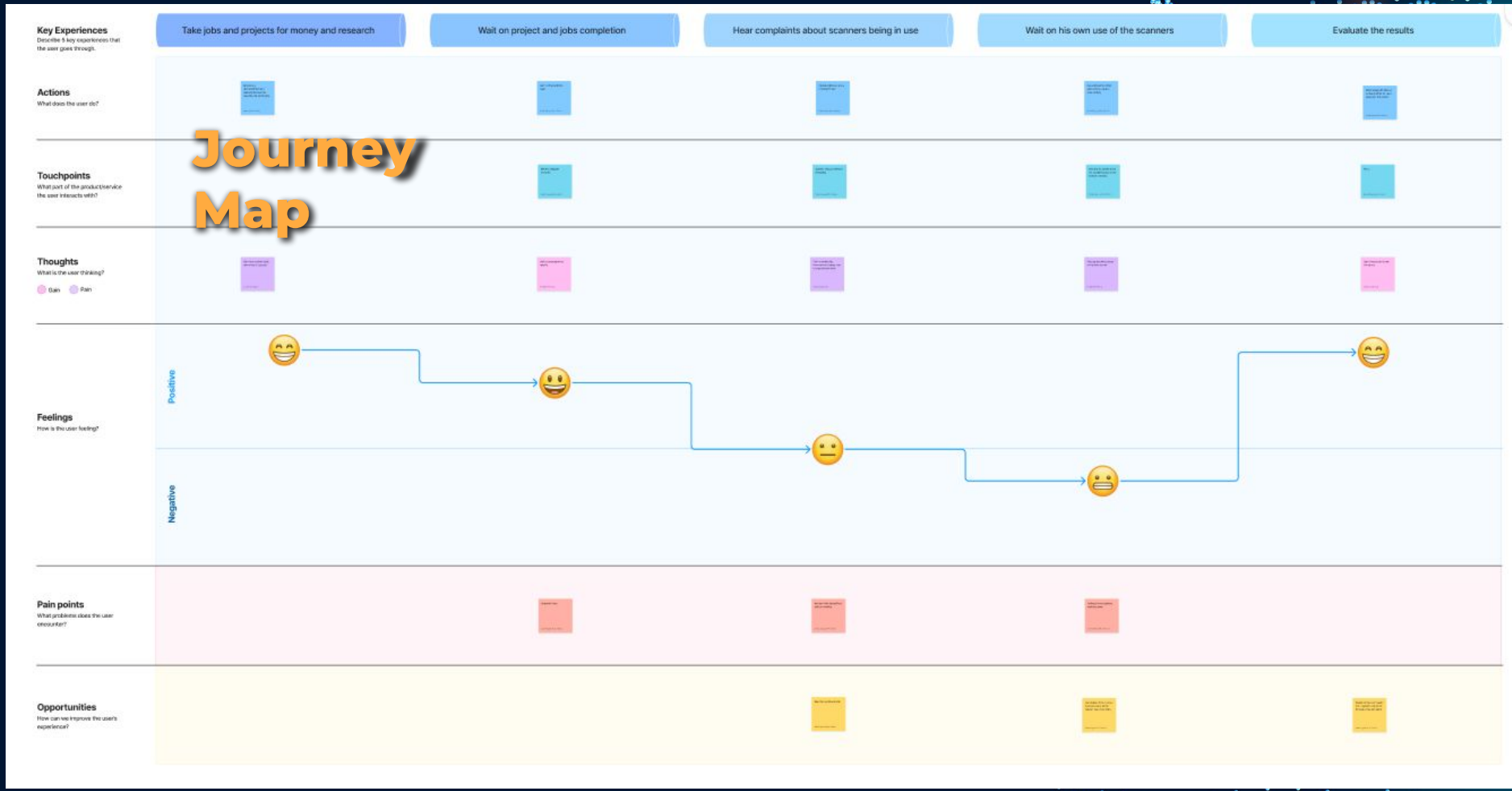
- **M**illimeter wavelength **A**rmed **V**oron (**MAV**inator) scanner
  - Voron 3D printer platform
- 3D Scanner design
  - Stepper motor
  - Belt driven gantry
- User interface
  - Web enabled application
  - Python
- Predetermined path to cover the scan bed



Problem Statement

- Time consuming process
- Not enough scanners
- Expensive

- Build cheaper scanner
  - Large scan volume
- Simple user interface
  - Remotely accessed
- Better than ever


Key Experiences
Describe 5 key experiences that the user goes through.
Take jobs and projects for money and research
Wait on project and jobs completion
Hear complaints about scanners being in use
Wait on his own use of the scanners
Evaluate the results
Actions
What does the user do?
Journey Map
Touchpoints
What part of the product/service the user interacts with?
Thoughts
What is the user thinking?
Gain
Pain
Feelings
How is the user feeling?
Positive
Negative
Pain points
What problems does the user encounter?
Opportunities
How can we improve the user's experience?

Pros and Cons

Pros:

- Will decrease wait times to use scanner
- People will be more efficient in the lab
- Real time updates on line -> uses web app
- Can view the image as you are scanning
- Results display as 3D after SAR processing
- Is relatively cheap compared to other scanners
- Can work at a higher frequency

Pros and Cons

Cons:

- Has a smaller scan area than the rest of the scanners in the CNDE
- The designed pcb has been having technical issues in testing for previous users
- Web app could have bugs that cause the scanner to work incorrectly
- Some assembly required

Complexity Analysis - Human

- Addresses user needs well
- Our mentor and main user has asked that we create a millimeter wave scanner
  - Utilizes a Voron printer and a predesigned pcb
- Started building the Voron and have assembled the pcb
- Creating a GUI and web app
  - Controlled remotely

Complexity Analysis - Economic

- Implements a phone application to interface with
  - Other solutions use a PC
- Operates at higher frequencies
- Will have full control over X, Y, and Z axis
- More affordable than existing solutions
- Has a more limited scan area
  - Less volume than existing solutions

Complexity Analysis - Technical

- Voron printer assembly
  - Use ability to understand machinery and effectively read a data sheet
- Solder and programmed two PCBs
- Create GUI and web application
- Utilize SPI interface and FTDI cable
- Generate GCode to control sensor movement
- Use SAR algorithms to analyze data

Conclusions

- Building a high accuracy millimeter wavelength scanner
  - Easy to operate
  - Reasonable scan times
- 3D printed Voron parts for scanner body
- Klipper firmware for the GUI and sensor operation
- Possible areas of concern:
  - PCB functionality
  - Linear Rail Bearings
  - Project Timeline

Thank you