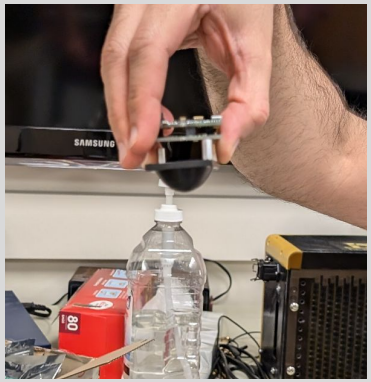
Lightning Talk 2

Problem and Users

Project Overview

- Millimeter wavelength 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

Scanning can be a time consuming process and there are often not enough scanners to go around. Simply buying a scanner would be an option if they were not exorbitantly expensive. Fortunately with a single millimeter wave radar scanner an an open source 3D movement system from a Voron printer we can build a cheap scanner with large scan volume. With the addition of a simple user interface that can be remotely accessed; Scanning at CNDE will be better than it ever has been for the technicians, leadership, and clients.

List and description of users

1 Tabey

- Lead researcher at the CNDE lab
- In charge of imaging systems
- Uses scanners frequently
- Realizes a need for more scanners

2 Eli

- Student at Iowa State
- Works in the CNDE lab
- Enjoys research
- Gets unmotivated if work is slow

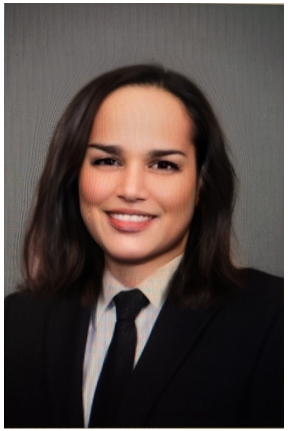
3 Magnum

- In his 40s
- Has had a career in reverse engineering
- Works in a federal agency or military
- needs to receive a high quality scan

4 Ted

- 32-year old product developer
- Works for a startup company
- Seeks cutting edge trends in imaging and sensing technologies

Tabey



- Functional
  - It needs to be able to do millimeter wave scanning
  - It needs to fit within the existing lab environment
- Resource
  - It should be cheap to build
  - Build time should not be longer than one month
  - The time it takes to operate should be the same if not less than other scanners
- Physical
  - It needs to be able to be implemented on a Voron printer
  - It needs to cover an area of 300 x 300 x 300 mm
  - It needs to make use of the in house millimeter scanner
- Aesthetic
  - The app should look sleek while still providing good user experience
  - The scanner should look sturdy and professional
- User experiential
  - Lab technicians should be able to operate easily
  - The scanner should be able to be remotely started and stopped

Eli

- Functional
  - Needs a scanner that works in the millimeter wave frequency range
  - Needs the scanner to be able to move in 3 dimensions
- Resource
  - This system needs to be able to connect to a web app or computer to control
- Physical
  - Should be large enough to scan the things his boss gives him (which will be a max size of 300 mm x 300 mm x 300 mm)
- Aesthetic
  - The app should look good enough that it is easy to use and understand
- User experiential
  - Needs the software to be easy to use either from a web app or a computer connected to the device
  - Needs it to export a file of the data to be analyzed

Magnum

- Functional
  - Reliable and repeatable results
  - Analysis even through thin opaque materials
  - Non destructive investigations
  - Reasonable scan times
- Resource
  - Time it takes to perform the scan is valuable to this type of user
- Physical
  - Maintain the safety and integrity of the item to be evaluated
  - Could need anywhere from 30cm x 30cm x 30cm to 1m x 1m x 1m or possibly more
- Aesthetic
  - High fidelity scan results
- User experiential
  - Simple ordering experience

Ted

- Functional
  - It needs to be able to do millimeter wave scanning
  - Scanner must be able to identify various materials within scanning area
  - System should provide API for integration with other applications
- Resource
  - It should be cheap to build
  - Scanner should not require more than 4 GB of RAM
- Physical
  - Could need anywhere from 30cm x 30cm x 30cm to 1m x 1m x 1m or possibly more
  - Total weight should not exceed 5 kg for ease of portability and installation
- Aesthetic
  - Scanner exterior should have modern design
  - App should have a sophisticated design and be user friendly
- User experiential
  - Company associates should be able to operate easily
  - Software interface should be intuitive with clear visual indicators and real-time feedback
- Environmental
  - System should be able to operate indoors and outdoor environments

Conclusions

In conclusion, our users have a variety of requirements, but many of them share some common needs. One of these common requirements is that the scanner must operate with millimeter waves. Another common requirement is a reasonably short scan time to promote efficiency. It also must be able to scan a 300mm x 300mm x 300mm region. Additionally the product should look professional and have a user interface that is easy to understand, and overall easy to operate.