



Tactio

DESIGN REVIEW

Austin Keener

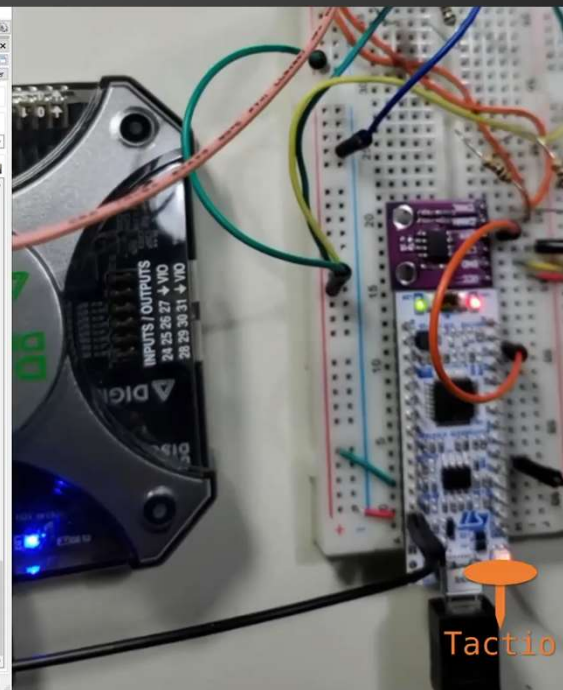
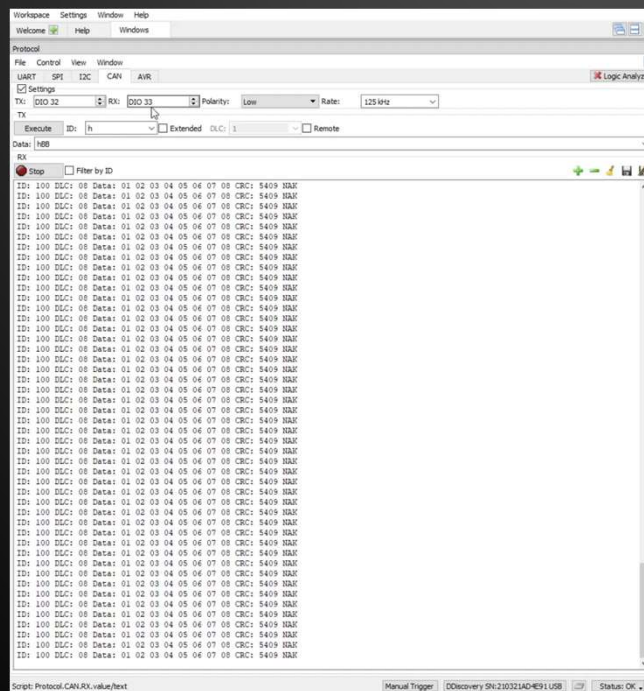
Joseph Spall

Joshua Oldenburg

Juan Elizondo-Villasís

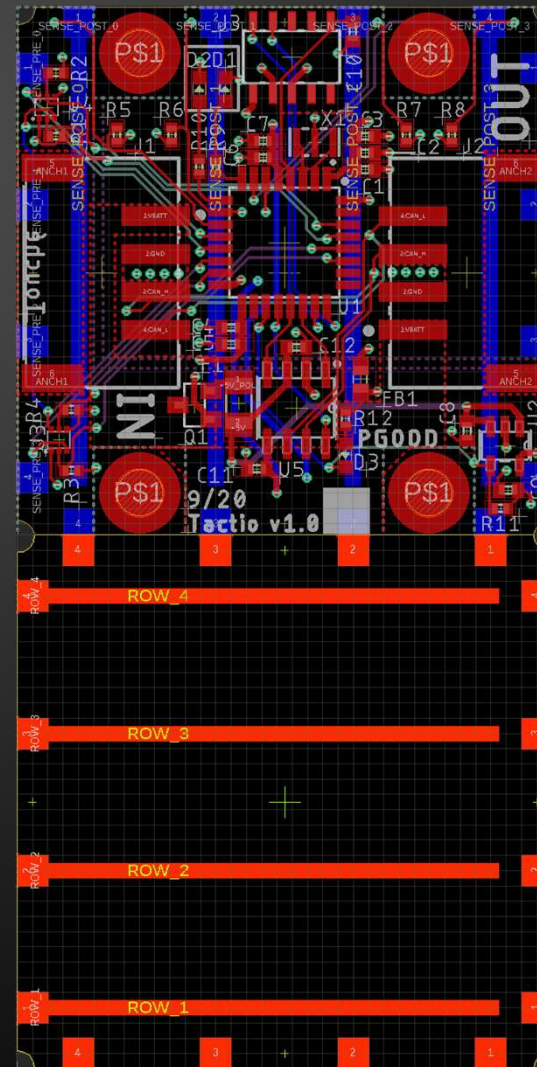
Varun Madabushi

FIRMWARE STATUS



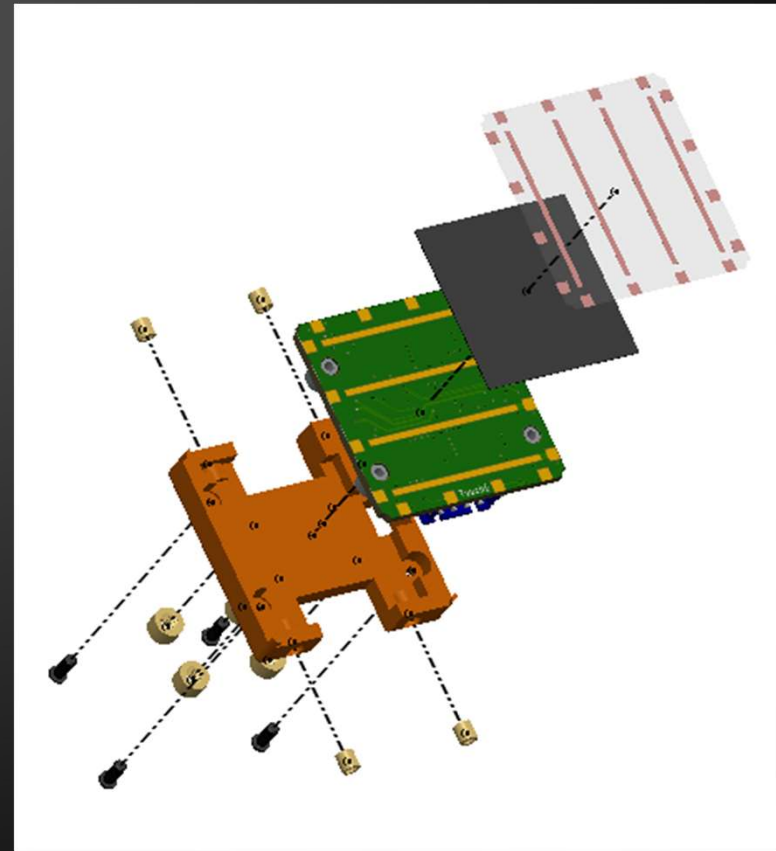
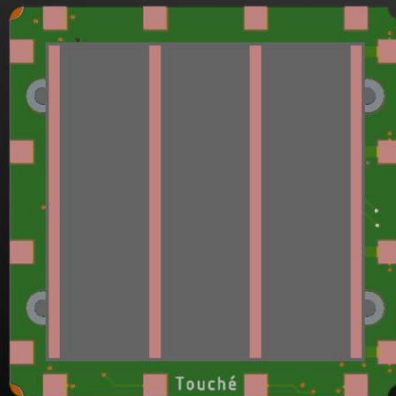
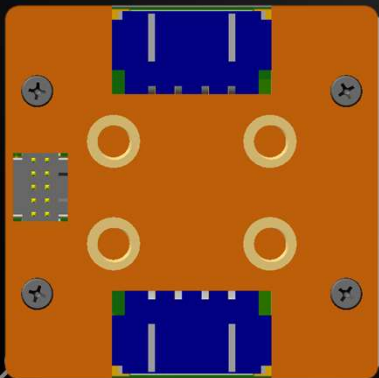
ELECTRICAL STATUS

- Boards were internally design reviewed
- Ordered most electrical elements
 - Rigid PCB from JLCPCB
 - Flex PCB from PCBWay
 - Components from Digi-Key
 - Received everything this week

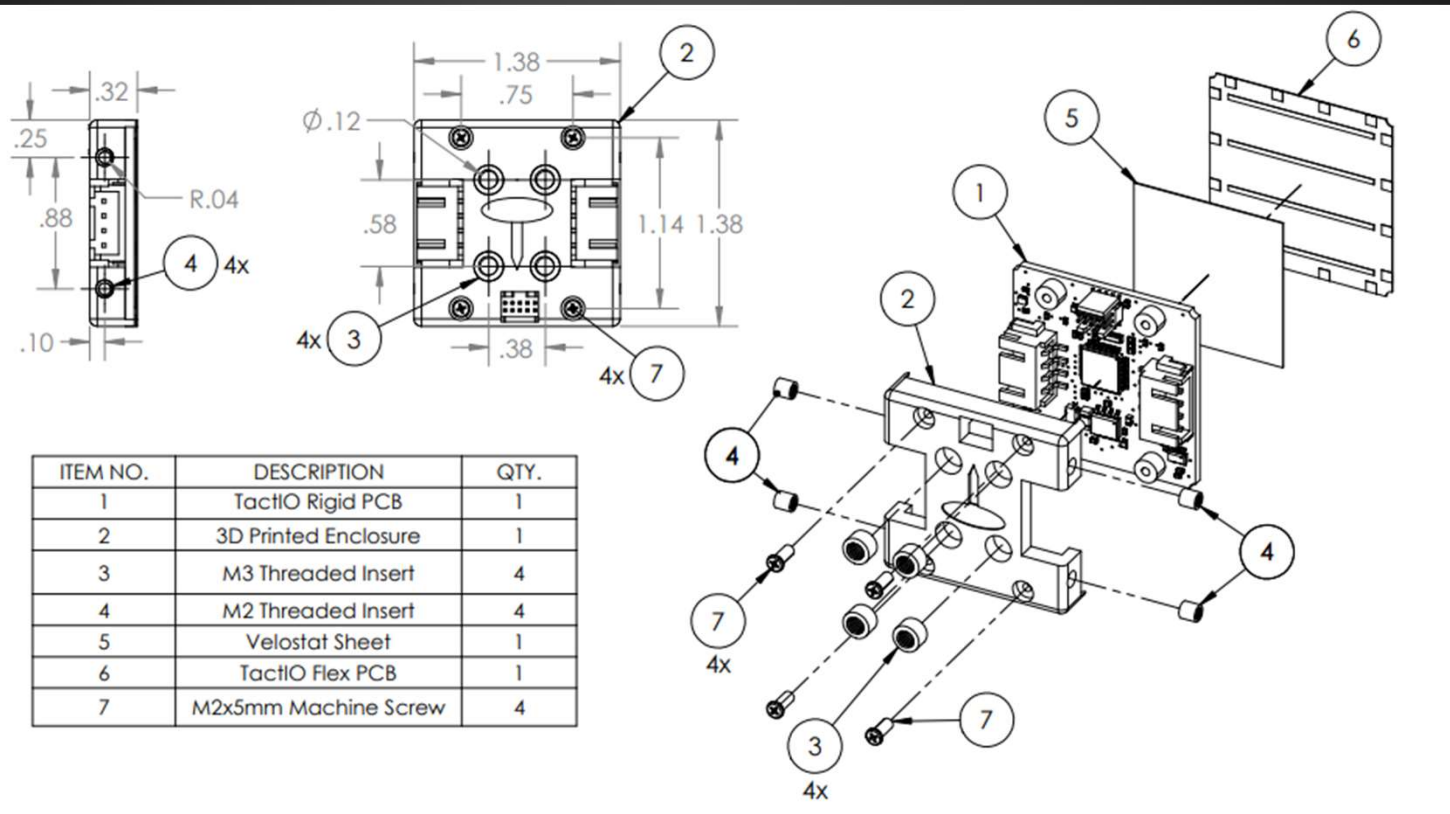


MECHANICAL STATUS

- Node mechanical design is complete
- Utilize threaded inserts for flexible mounting configurations
- Started test 3D print

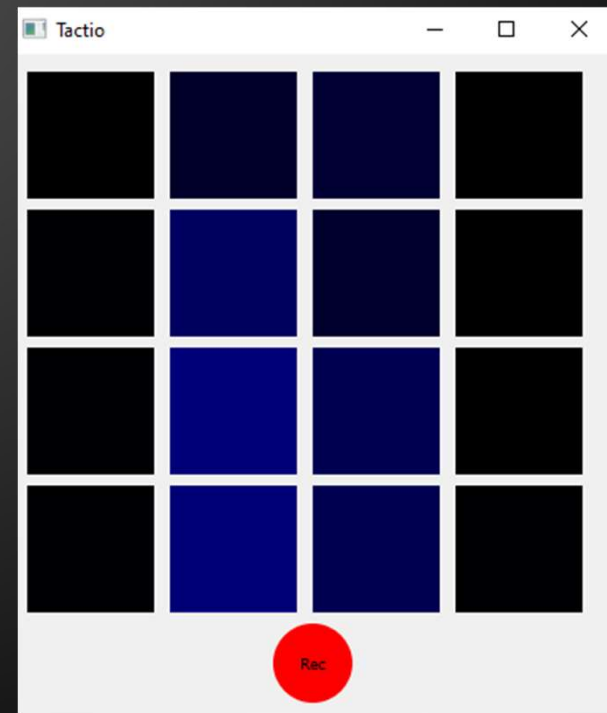


MECHANICAL DESIGN



SOFTWARE STATUS

- Microcontroller sends PC sensor ID and values
 - Extendable to multiple devices
- Can organize multiple sensors for viewing
- Can record and save sensor values for later processing
 - Stored in JSON format



BILL OF MATERIALS

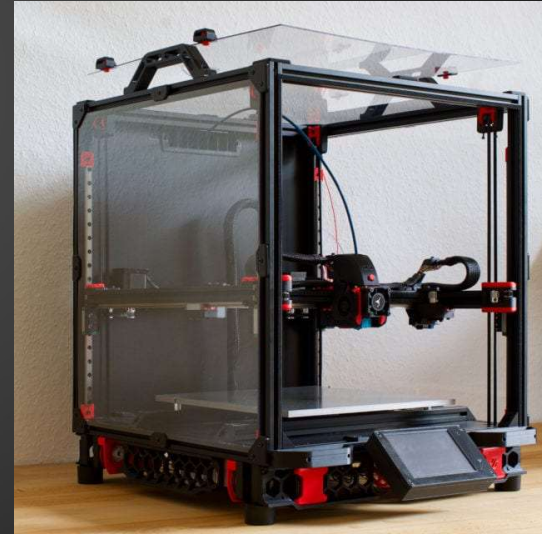
- Ordered:
 - 36 flexible PCBs
 - 30 rigid PCBs
 - Enough components for 20 sensors
- Final cost of production per sensor at our prototype volume:
 - \$35.79

Component	Cost per Sensor
Flexible PCB	\$3.02
STM32 MCU	\$2.66
Rigid PCB	\$1.88

Table 1. Highest cost components

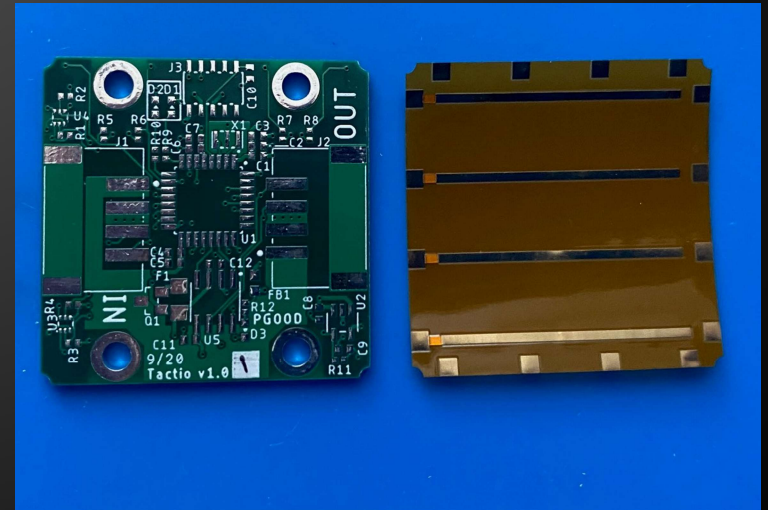
NEXT STEPS: MECHANICAL

- Check fit with PCB to verify tolerances
- Mass production of enclosures
- Node assembly
- Design and make demo platform



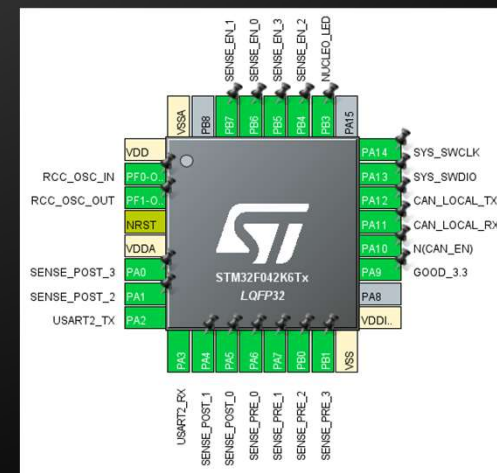
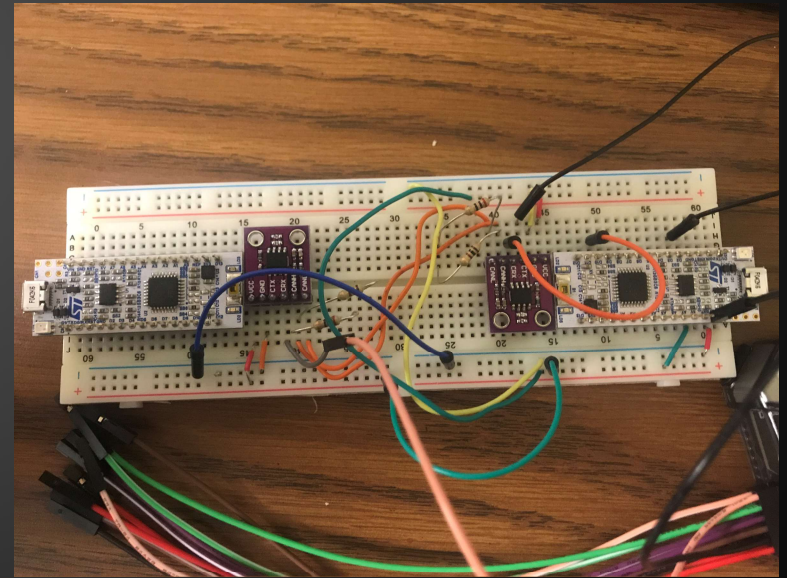
NEXT STEPS: ELECTRICAL

- Subsystem assembly and testing in this order:
 - Power system
 - Grid sensing system
 - Communication system
- Full system assembly of all sensing boards to allow testing of firmware and software



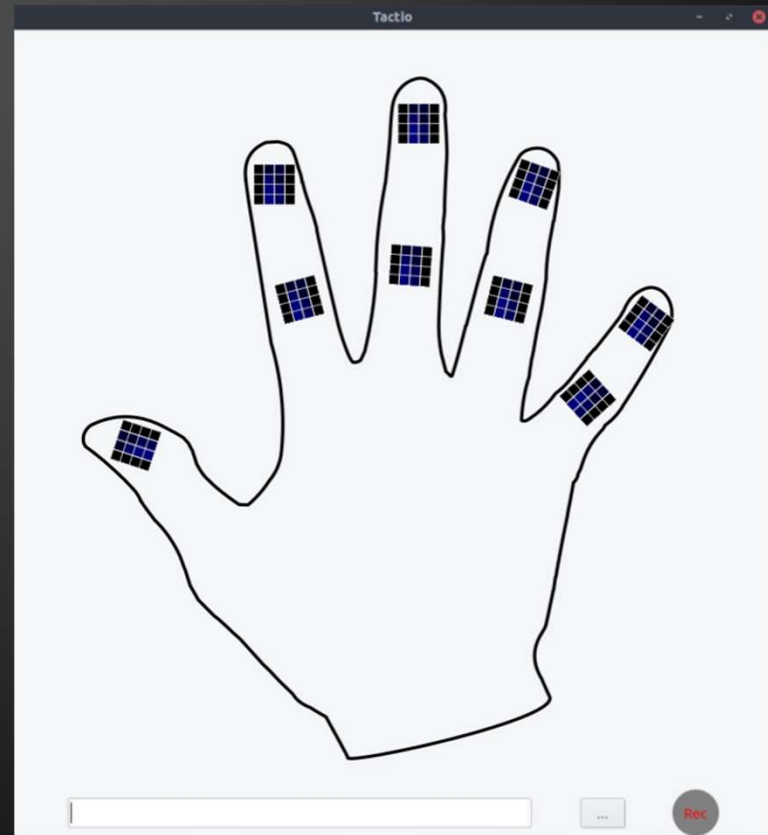
NEXT STEPS: FIRMWARE

- Test firmware on real devices
- Design and implement calibration
- Implement DSP algorithms (if needed)
- Finalize Mbed network controller firmware



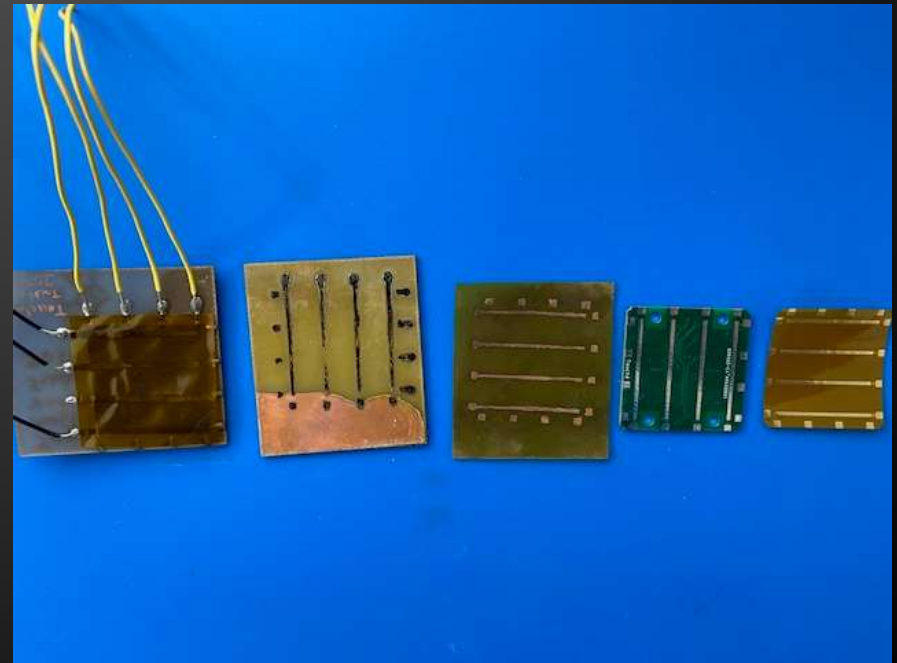
NEXT STEPS: SOFTWARE

- Test desktop software with functional hardware
- Utilize protobuf for serialization of objects
- Run multiple sensors on a bus



OPEN QUESTIONS: ACCURACY

- Activations on the prototype sensor did not correlate exactly with the location of force applied
- Solutions:
 - Improved manufacturing and assembly
 - Data recording software
 - Calibration
 - Real-time DSP development



OPEN QUESTIONS: VISUALIZATION

- Sensor hardware supports multiple configurations
 - Visualization software must reflect this
- User-defined XML file to define preferred visualization

```
<?xml version="1.0"?>
<data>
  <sensor name="Zero">
    <id>39</id>
    <x_pos>100</x_pos>
    <y_pos>50</y_pos>
  </sensor>

  <sensor name="One">
    <id>13</id>
    <x_pos>200</x_pos>
    <y_pos>200</y_pos>
  </sensor>
</data>
```

The slide features a dark gray background with the word "QUESTIONS?" centered in white. The corners are decorated with stylized circuit board traces in orange and light gray. These traces form various geometric shapes and end in small circles, resembling electronic components or connection points.

QUESTIONS?