UC San Diego
JACOBS SCHOOL OF ENGINEERING
Computer Science and Engineering

Wireless Sensor Network Localization: Individual Group Updates—April 29, 2022

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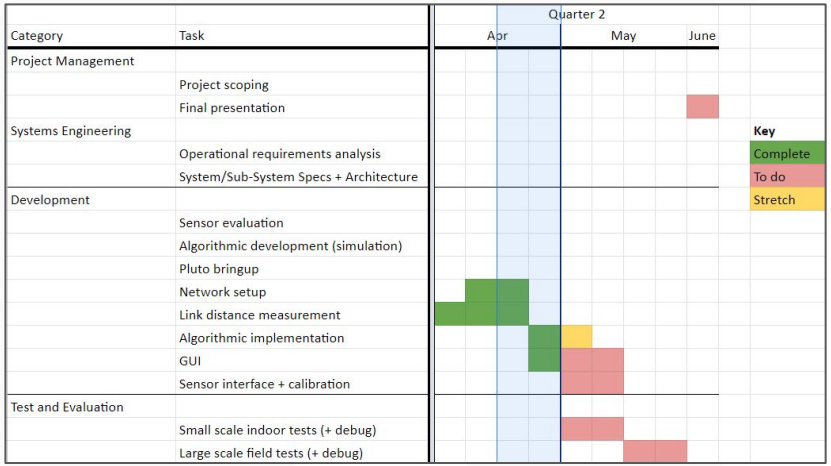
WES Spring 2022

Previous sprint progress: Overview

- **Goals:**
  - Finish ironing out network problems
  - Finalize ToF
  - Integrate link measurements into localization
  - Start visualization (GUI) work



Previous sprint progress: Demo

- 3 node network
  - Equilateral triangle topology
- Demonstrates:
  - Network stability + communication
  - Link distances computed from both RSSI and ToF
  - Localization alg (MDS) mostly works
  - Start of GUI work

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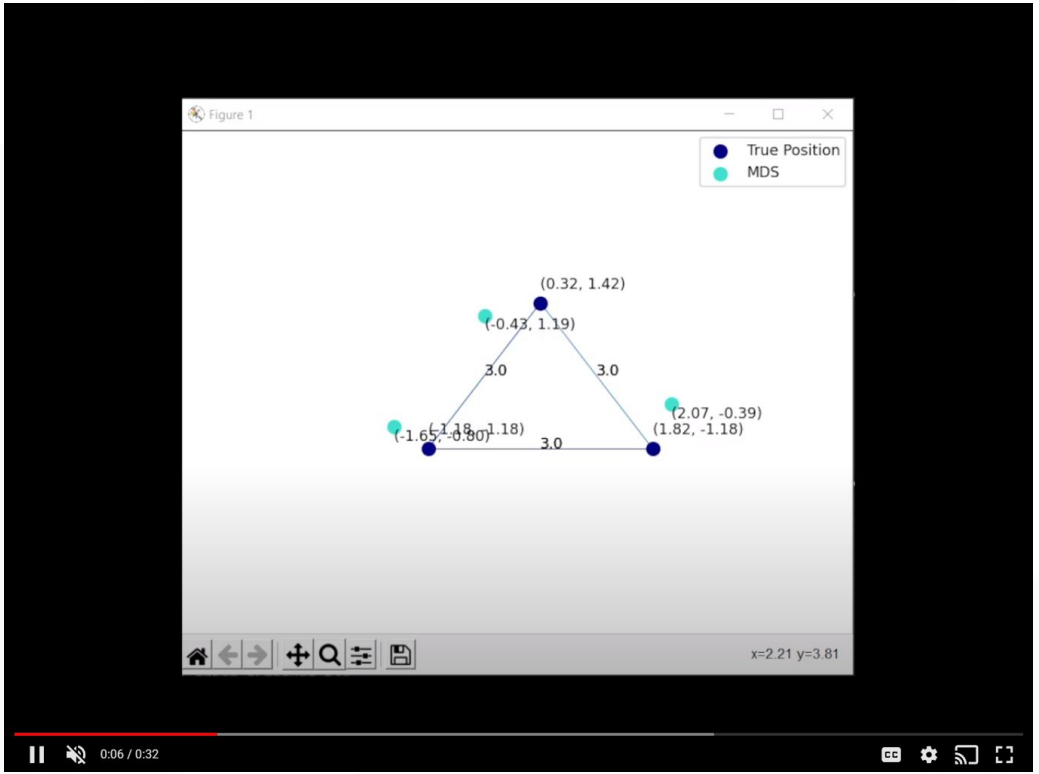
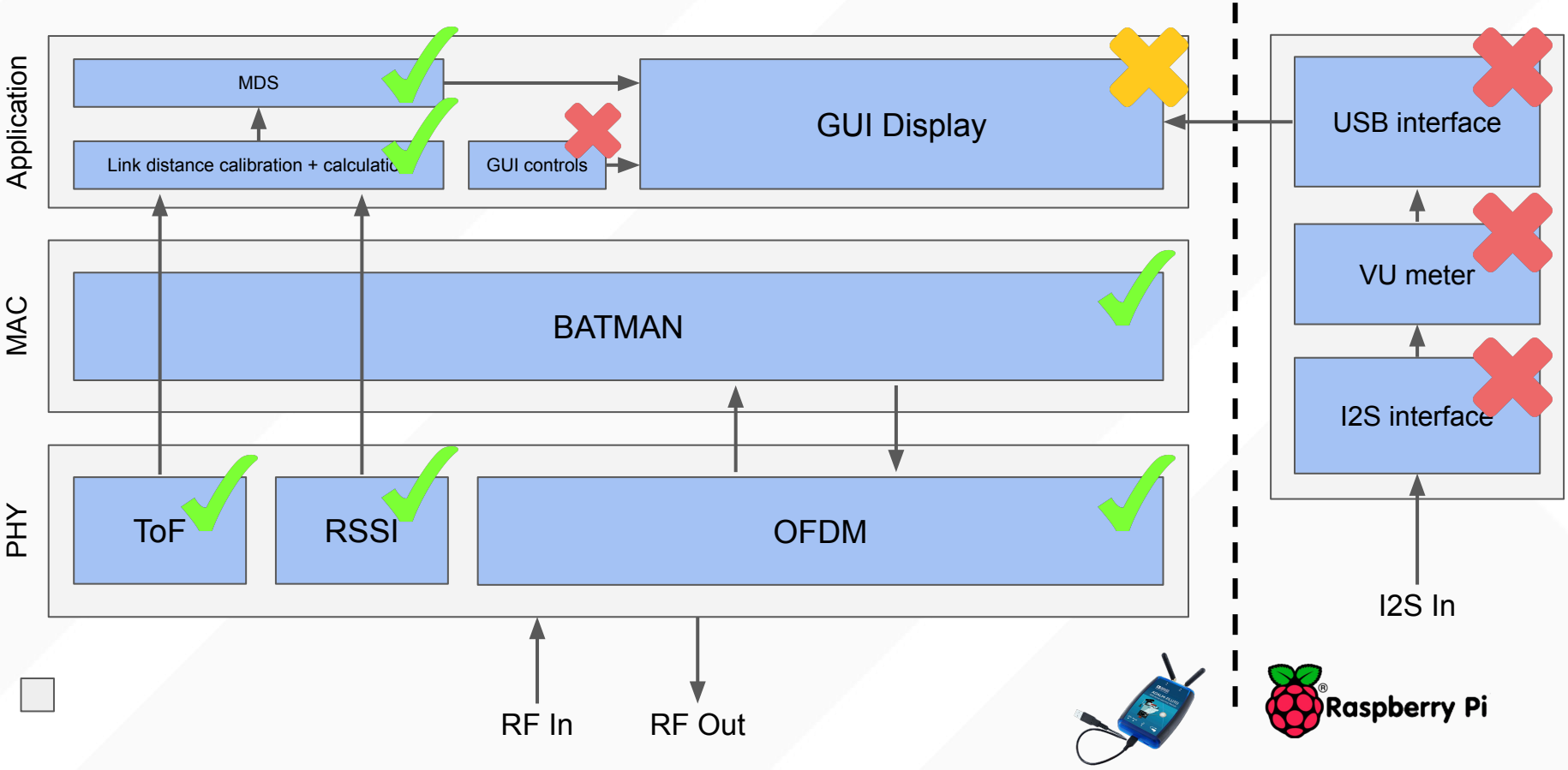


Previous sprint progress: Details

- Network stability + communication
  - Further increased training seq lengths to increase fine freq correction resolution
  - Found current upper limit on broadcast message rate: 0.5 Hz
    - Will need to quantify (via IPerf) overall network capacity w/ increasing amount of nodes at various broadcast message rates
- Link distances computed from both RSSI and ToF
  - ToF is higher variance than RSSI, but seems less susceptible to environment
  - Currently just averaging between the two types of measurements, and taking average of bidirectional measurement (i.e., average of A->B and B->A)
- Localization alg (MDS) mostly works
  - Moved from MATLAB's cmds() to Python's sklearn.manifold.MDS()
  - Slightly slower performance (likely due to running on Pluto rather than PC)
  - Still have fundamental issue of needing to derotate/anchor a point → to be solved via GUI
- Start of GUI work
  - matplotlib based for now, may switch to tkinter for interface control

Overall system progress



Next sprint progress: Overview

- **Next sprint goals:**
  - Finish Pi + sensor interface
  - Finish GUI
  - More field tests + debugging
  - If time, tinker w/ ToF/RSSI synthesis
    - Basically dynamically weight by degree of confidence. RSSI fluctuates much more at lower levels, for instance
- **Final sprint goals:**
  - Scale up to 5 nodes
  - Final debugging
- **End of quarter deliverable:**
  - 5 node demo measuring sound level out of a speaker at various points within the room