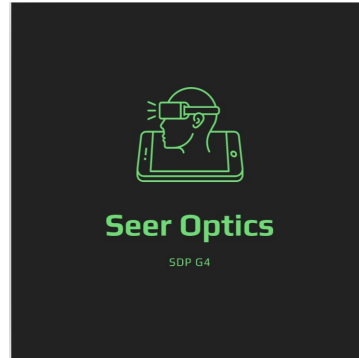


Mid-Year Design Review

SEER Optics

December 12, 2019



SDP20 Team 4



Prof. Dennis L. Goeckel
Team Advisor



Osiris Terry
App Developer



Daniel Gabriel
Interface Hardware

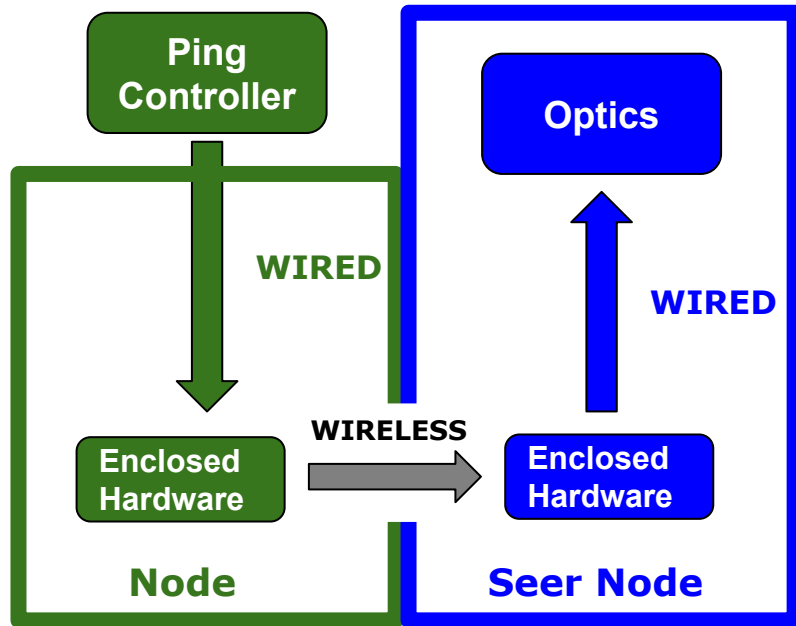


Sam Fick
Hardware Designer



Dhimiter Shosho
App Developer

Overview (Block Diagram)



Node: A Device that can transmit and receive GPS data.

Seer Node: A special node that has the hardware ability to display the data on the Optics.

Product Example: Environment (w/o SEER Optics)



Product Example: Environment (w/SEER Optics)



Product Example: Obstruction (w/SEER Optics)



Substandard Situational Awareness of Civil Services

Civil servants (i.e. firefighters, policemen, search & rescue) suffer from a lack of situational awareness when conducting their missions. This creates a fog of war that leads to friendly fire, team members missing in action, delays in missions and other unnecessary issues.

Tragic Bronx cop Brian Mulkeen killed by friendly fire: NYPD

By Tina Moore, Craig McCarthy and Aaron Fels

September 30, 2019 | 3:09pm | Updated

10 days after K9 shot in friendly fire, JPD admits internal investigation underway

Photos of missing firefighters from Florida: Justin Walker, Brian McCluney



New York police detective killed by 'friendly fire' while responding to apparent armed robbery

Current Solutions

- Verbal communication
- Line of sight tracking with lights/reflectors
- Blue Force Tracking
 - GPS tracking but seen at control centers not by individuals involved



Problem Statement

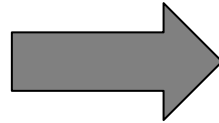
Our product, Seer Optics, will be designed to provide a visual aid that takes in teammates GPS data through radio and displays where they are. In addition, the product allows users to share a marked location using GPS data.



Design Decisions Since PDR

Microsoft Hololens

- Does not support serial inputs
- Bluetooth support is limited to few approved devices
- Little to no documentation
- Extremely limited support with databases



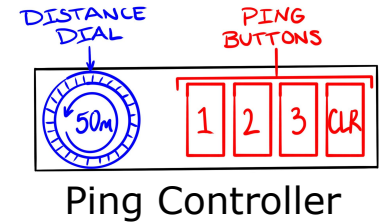
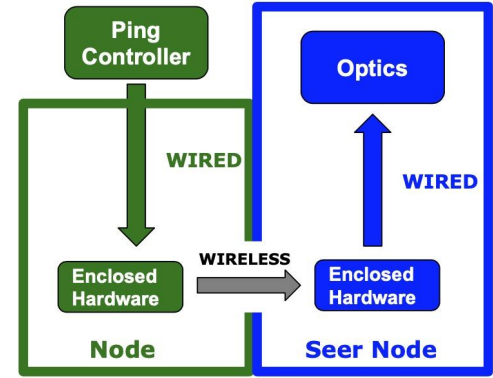
Google Pixel

- Supports serial communication
- Budget-friendly AR interface
- Android Documentation is abundant

System Specs

User Specs:

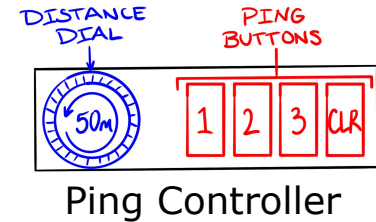
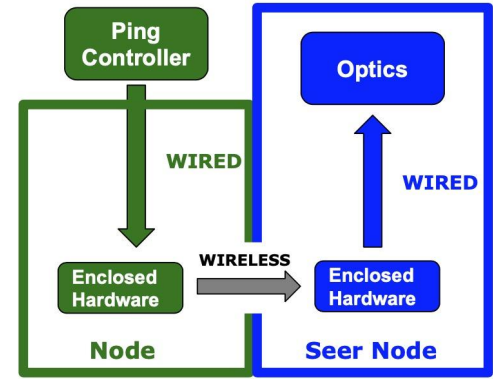
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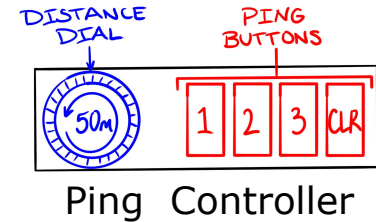
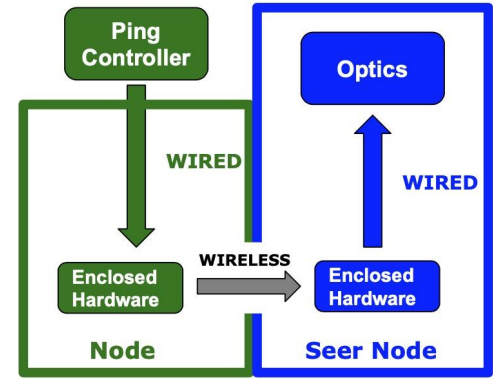
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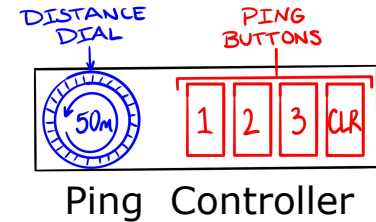
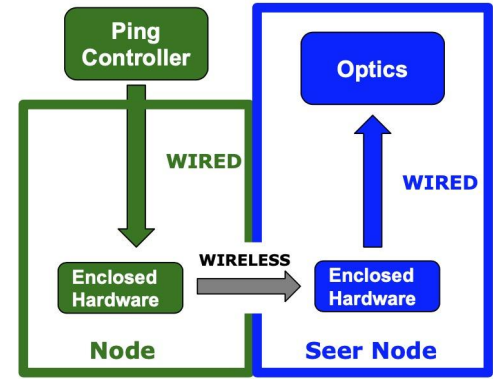
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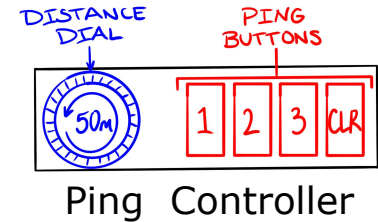
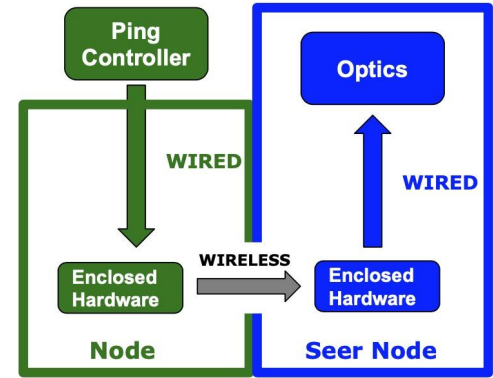
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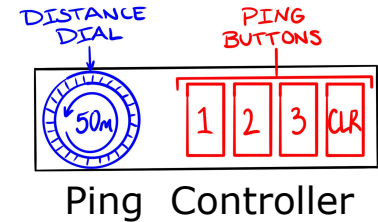
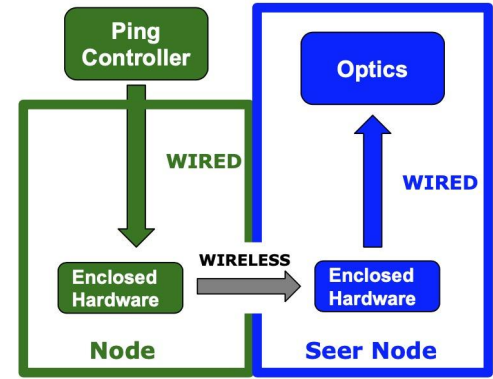
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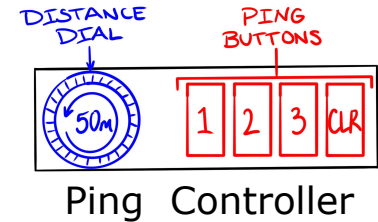
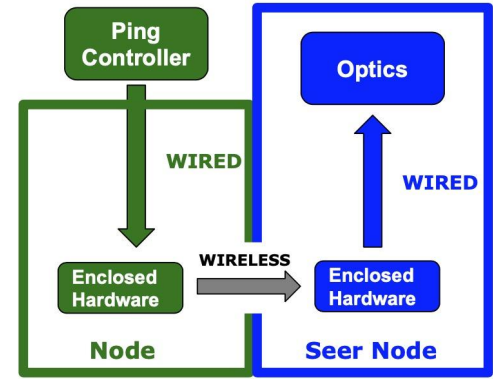
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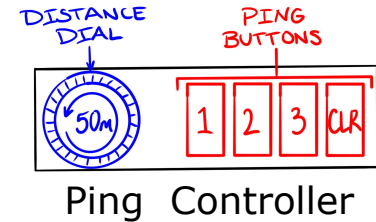
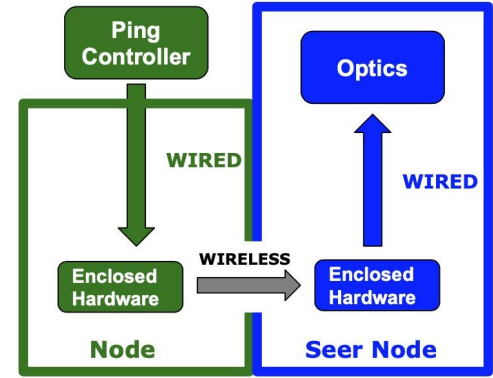
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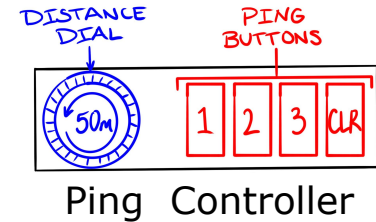
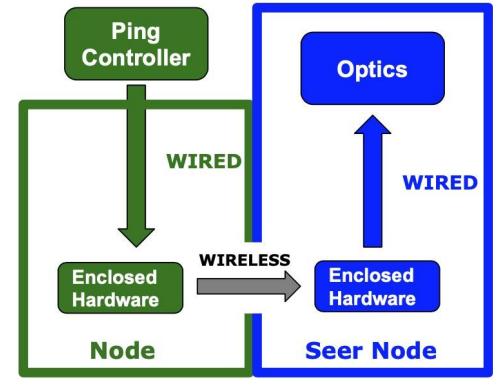
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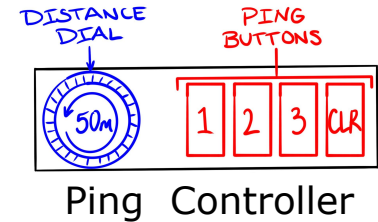
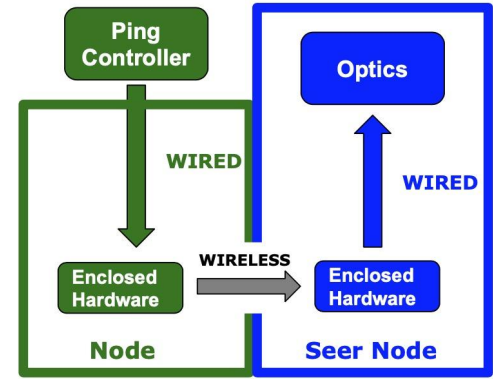
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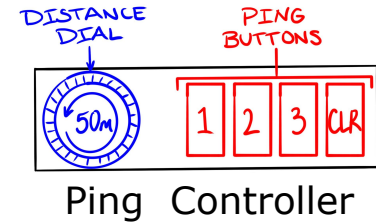
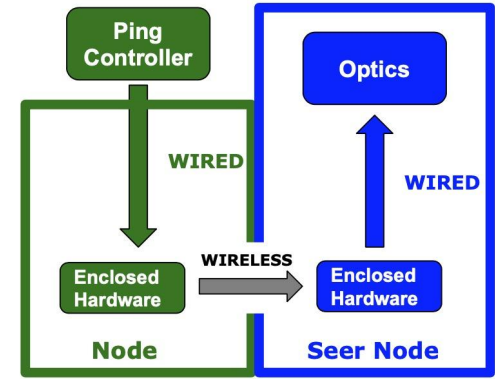
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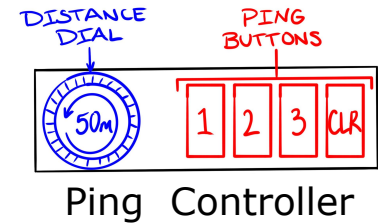
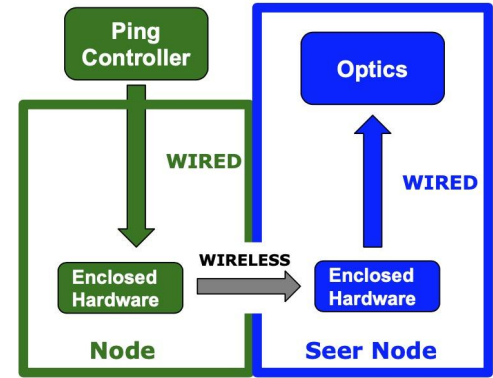
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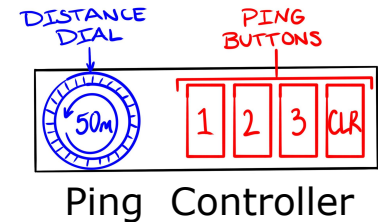
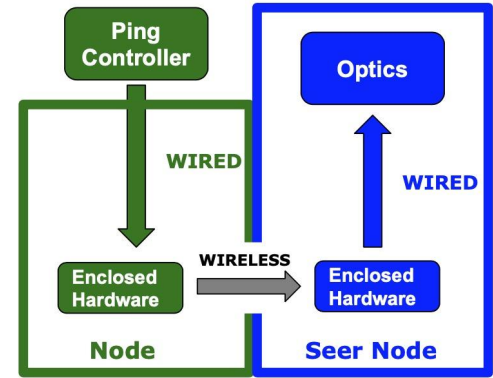
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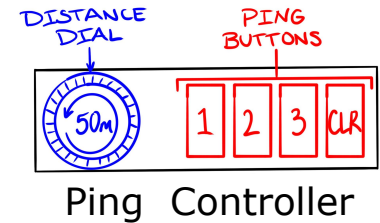
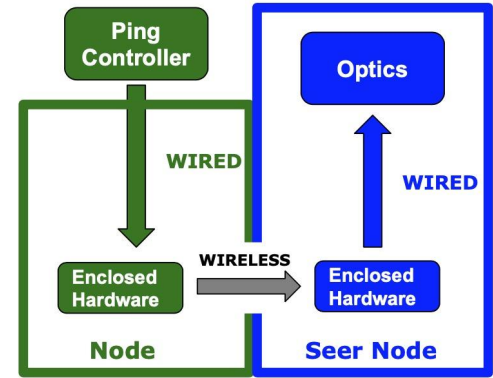
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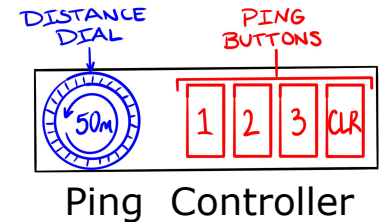
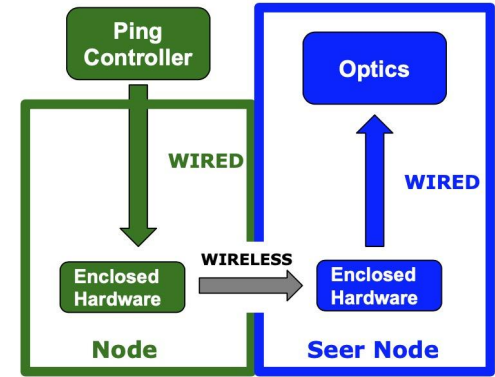
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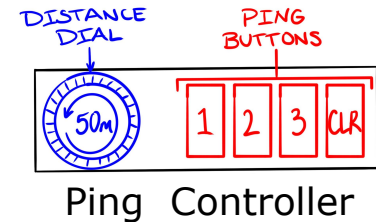
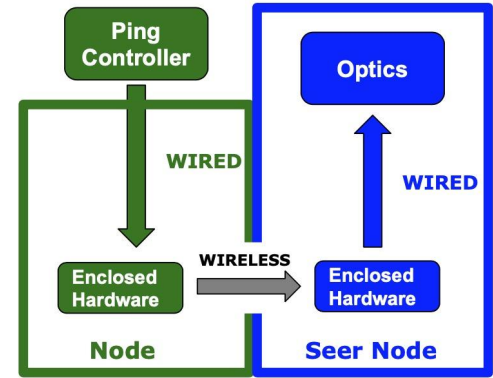
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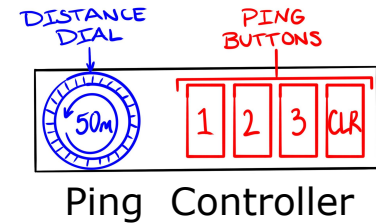
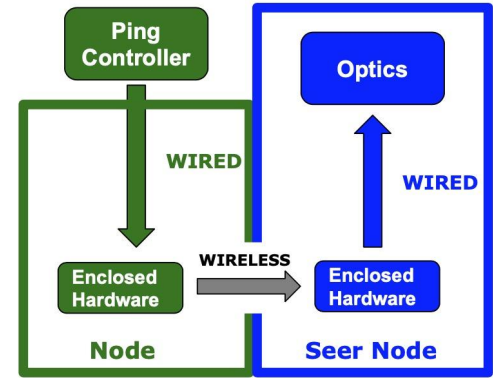
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- 5. Teammates GPS data updates every 500 milliseconds, 95% of the time



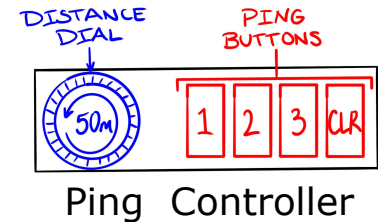
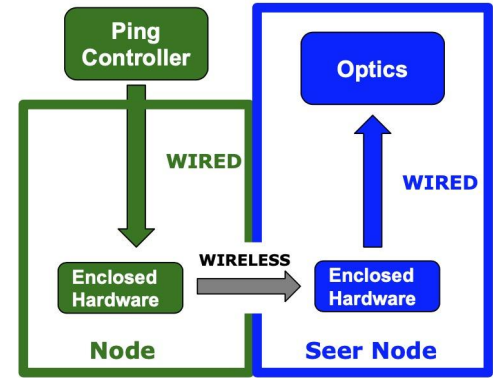
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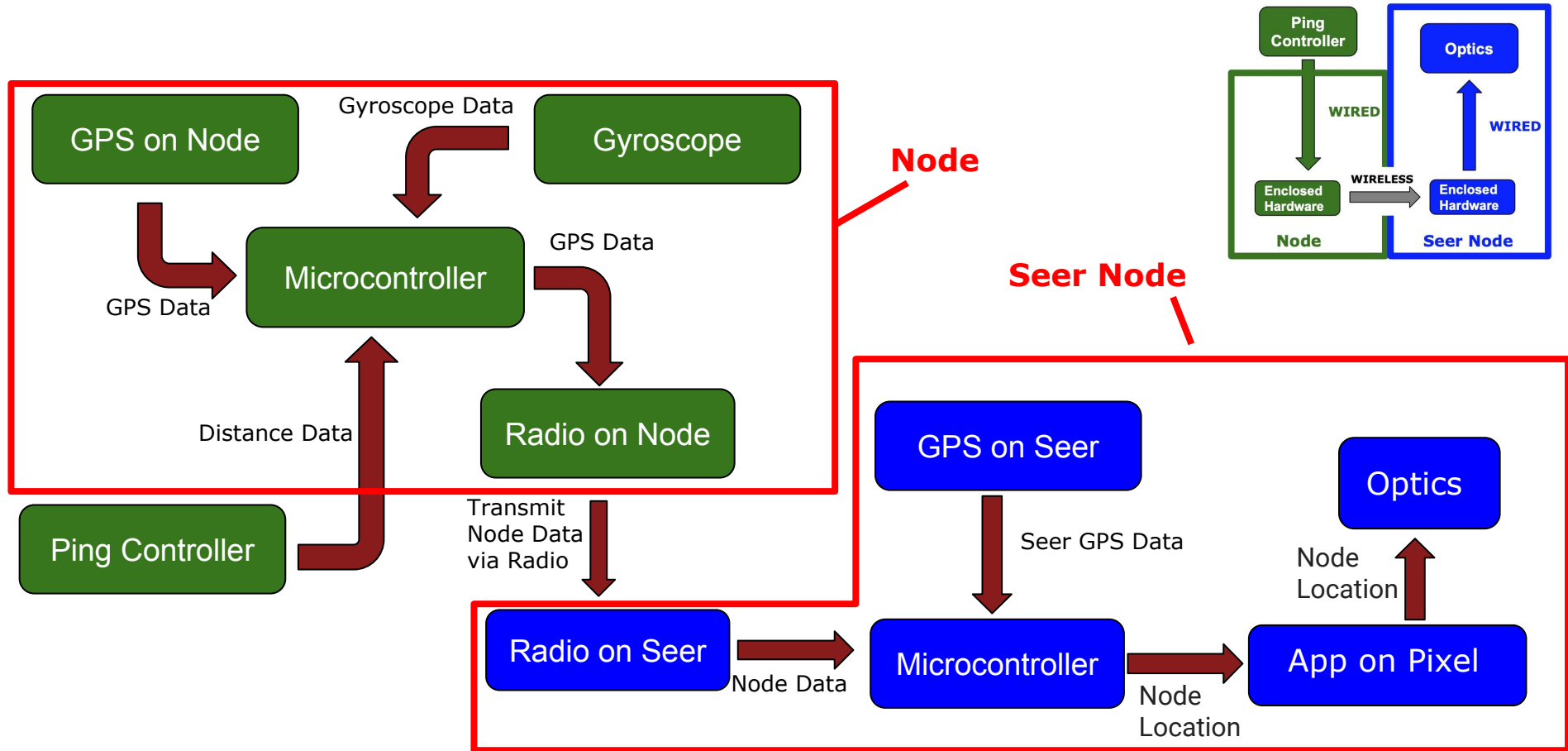
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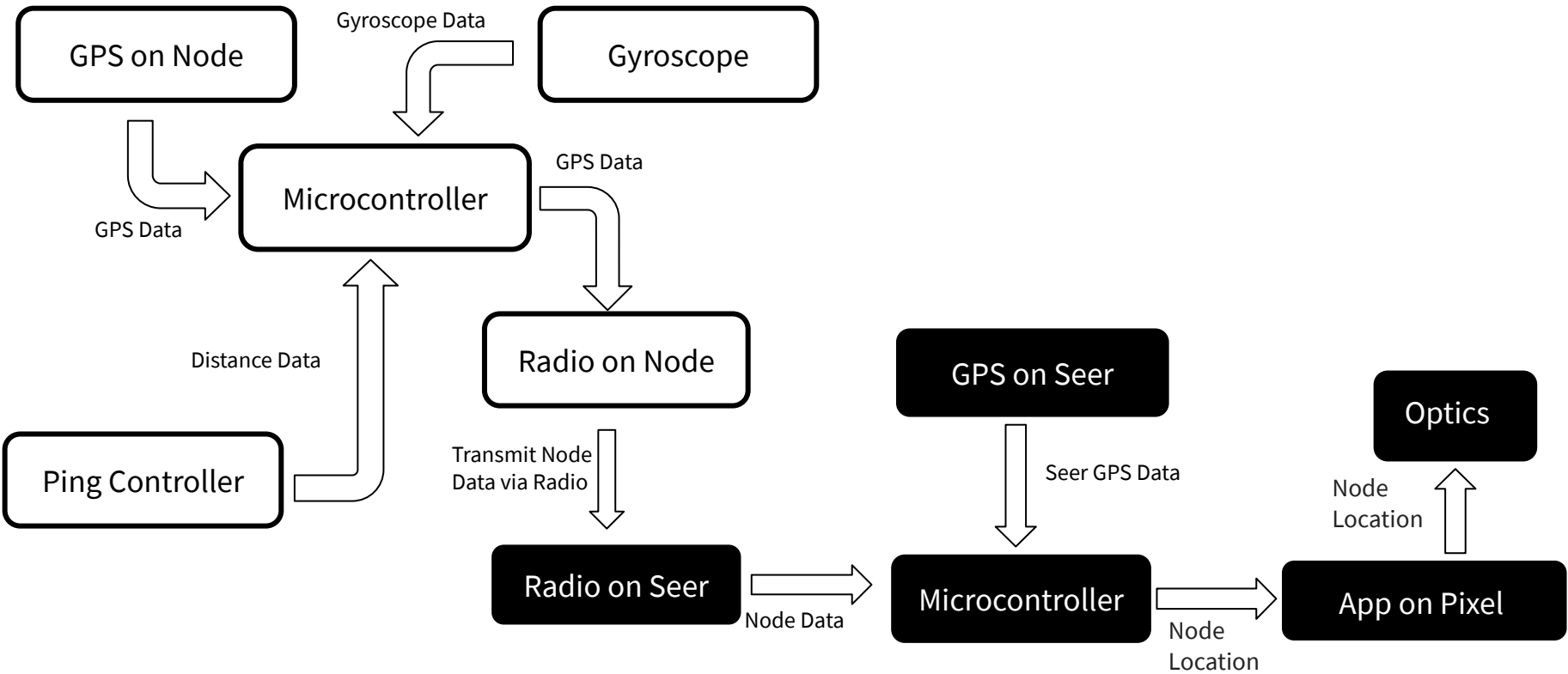
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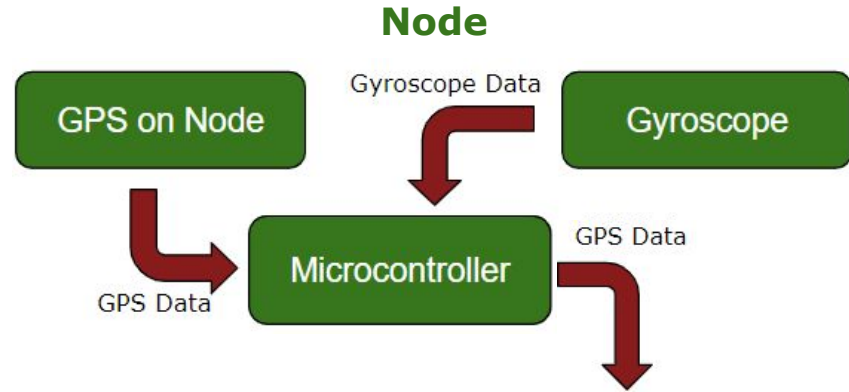






Node

- 9V Battery to power Node
- Custom PCB power circuits to distribute power
- Custom enclosure to house components
- GPS & Gyroscope - SparkFun Breakout
- Microcontroller - Arduino UNO
- Radio transceiver operates on low power and at low frequency

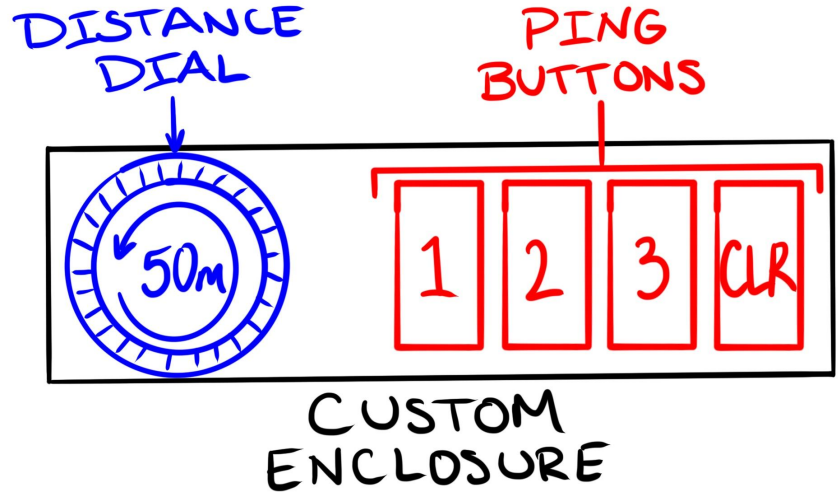


Additional Equipment/Interfaces

Google Pixel With Custom App



Ping Controller



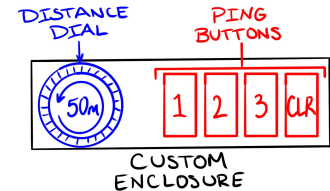
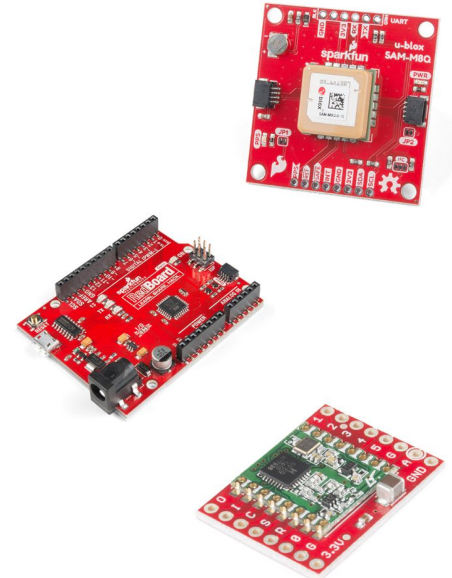
Significant Hardware Component

Our significant hardware component is comprised of our PCB components:

- SAM-M8Q GPS Chip
- Arduino UNO Microcontroller
- 915MHz RFM69 Radio Transceiver

And our ancillary device:

- Ping Controller



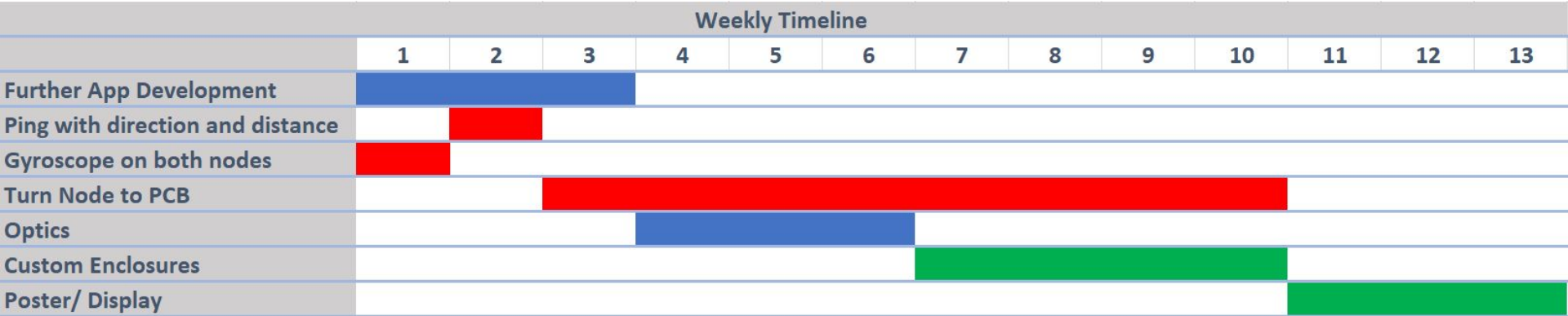
Main Challenges

- Interfacing sensors to microcontroller
- Communicating between Node and Seer Node
- Communicating with the Optics

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- ✓ ■ Communicating between Node and Seer Node
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Gantt Chart

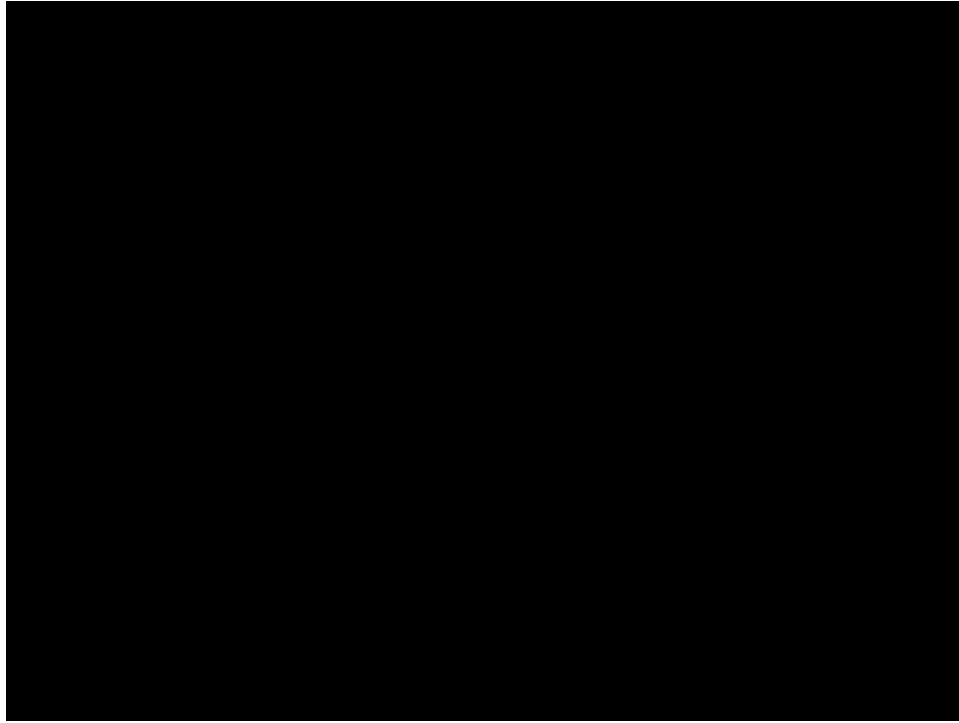


Key	
Everyone	Green
Dhimiter and O'siris	Blue
Daniel and Samuel	Red

MDR Demo

- Seer stands in front of Knowles oriented towards North
- Node walks in front of/behind Marston and is visible to Seer on the Optics
- Node pings objects in front of/behind Marston and are visible to Seer on the Optics

Demo Video (12/12/19 @11:50 a.m.)



Thank You

Questions?