

SP1 Presentation

LoRa

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Acomplishment

- Created a half-duplex peer-2-peer interface on 915MHz LoRa devices.
- Understand and preparing testing for understand Spreading Factor and bandwidth.
- Packet structure and protocol

Encountered Unknowns

Known Unknowns

- How to use and program LoRa devices (Via ESP32)
- How to create a half-duplex LoRa network
- How to structure LoRa packets
- Antenna regulations (different power regulations)

Unknown Unknowns

- The regulatory statutes on LoRa transmission
 - Duty Cycle limitations
 - 433MHz vs 915MHz frequency

Encountered Challenges

- Combination of incompatible 915MHz devices with 433MHz devices
- Managing multiple files in Arduino IDE

Learning With AI pt.1

- Being Direct and explicit matters
 - Don't query "*Tell me about LoRa FCC regulations*"
 - Too broad - it assumes only the 915MHz device
- *With who you chat with and what you query is*
 - As Cho said, the AI matters
 - ***ChatGPT***
 - more generic, good introduction to info
 - Feels like a *people pleaser*
 - ***Claude***
 - more technical and direct

Learning with AI pt. 2

Serialization

- Data converted to byte sequences
 - Sent sequentially through *usually* single line
- Most used today

Parallelization

- Data sent as multiple bits through multiple lines
- More cables = more expensive but also faster

Learning with AI pt.3

C++ pointers and references

- Reference
 - Avoids creating a copy of an object rather a reference to the original
 - More permanent
- Pointer
 - Stores the memory address of another variable
 - Great for data structure iteration
 - More variable, can be reassigned

Header files

- Storage declarations of functions, classes, and structures

Next steps

- Create testing simulation
 - Send test compressed audio file and compare to raw audio
 - Add GPS/GNSS module for accurate positioning
- Next sprint, start creating a LoRa mesh network.

Learning with AI - Next

- C++ memory management on memory limited devices
- Serialization vs. Parallelization in network comms

Questions?