

# Week 6 Update

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 statues 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?**