Nakuja Internship

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Week 2 progress report

Tasks last week

[#1 Research on data transmission]

[#43 Test and receive over LoRa]

[#44 Test send image over LoRa]

[#48 Test max distance of LoRa]

[#45 Test speed and bandwidth of LoRa]

Findings

Data transmission

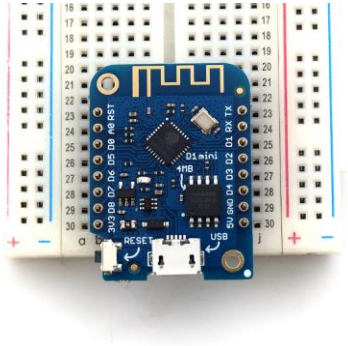
- I configured the ESP32 flight modules to access Wi-Fi and send data
- I wired the LoRa Module on ESP32 to test for the speed and data transmission bandwidth

#43 Test and receive over LORA

Hardware used

1. RF96 LoRa Module

2. LOLIN(Wemos) ESP8266 board



Factors affecting lora range

Spreading factor

- Supported value- 6 – 12. I choose 12 as the max SF.
- Max power attainable at SF 12 is +17dB
- Choosing a larger value increases the traversing time making data transmission slower

Transmitting power

- This value was not experimented because higher transmission power increase the range

Bandwidth

- A low signal bandwidth gives more range theoretically. The transceivers did not communicate at a low bandwidth ~7.8kHz so we choose a larger value ~125kHz

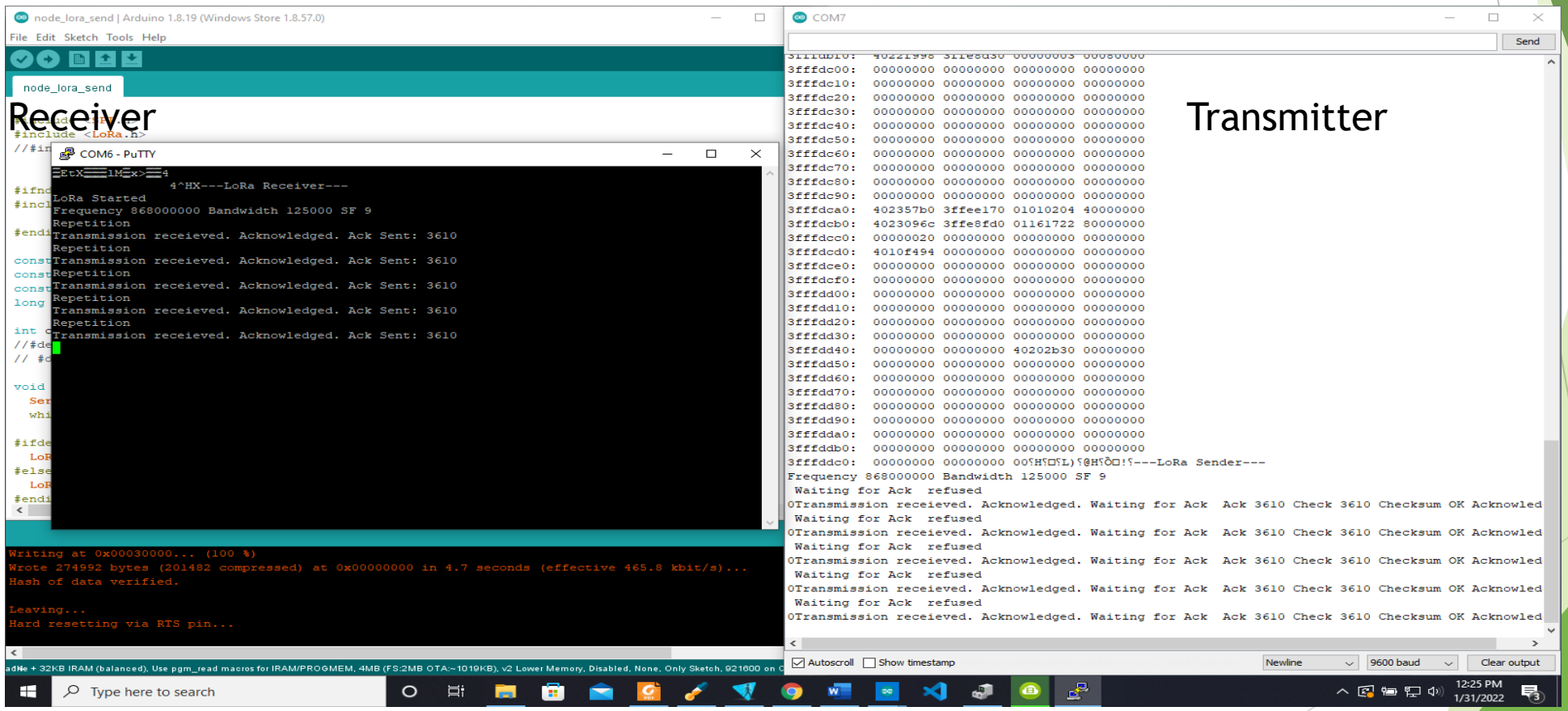
Antenna parameters

- I used two generic antennas with a signal gain of 2.0dBi and a RSSI(Received signal Strength Indicator) value of ±4dB

Ranges obtained

- I tested the range to be within the apogee limit of N2 which is 500m
- The data recovery was found to be fairly bad in line with our requirements though I did not receive any faulty packets. The message was able to be transmitted as is.
- Speed of transmission was very low which rules out the need to use LoRa For transmission

LoRa data transmission and reception test



#44 Send and receive image over Lora

- Lora can support JPEG compressed image transmission without loss of data packets
- The downside is that it cannot support video transmission because of very low bandwidth and transmission speed

#48 Test max distance of Lora

As stated above in regards to distance:

- I tested the range to be within the apogee limit of N2 which is 500m
- The data recovery was found to be fairly bad in line with our requirements though I did not receive any faulty packets. The message was able to be transmitted as is.
- Speed of transmission was very low which rules out the need to use LoRa For transmission

#45 Test speed and bandwidth of Lora

- Since there are no given specifications on the Speed and bandwidth of LoRa modules, I wrote code to log the different timestamps at which the message was received at the receiver an compared it with the time the message was dispatched.
- Relating this distance and the size of the data packet being sent gives you the speed of transmission with the distance between the transceivers being held constant

Tasks this week

- [#23 Avionics bay design]
- [#18 Launch pad design]
- [#30 Research on camera module]