IoT Data Transmission System with LoRa Communication

Portable air quality monitoring

Objective:

The objective of this project is to collect air quality data with the assistance of a drone. I will establish a communication system between two LoRa devices for data transmission. The transmitted data will include air quality readings at the bare minimum and further expanding to get real-time GPS coordinates obtained from a GPS module, as well as temperature and humidity readings from a BME280 sensor. At minimum the air quality will be published to an MQTT server using the Adafruit dashboard and to exceed this will use Node-red. Additionally, a custom 3D-printed enclosure will be designed to house the circuitry.

Day 1-2: Setting up LoRa Communication **4/8/2024 – 4/9/2024**

* Acquire two LoRa devices and configure them for communication.
* Establish communication between the devices using LoRa protocols.

Day 3-4: Integrating GPS Module **4/10/2024 – 4/11/2024**

* Integrate a GPS module into the circuitry.
* C++ code to interface with the GPS module and retrieve real-time latitude and longitude coordinates.
* Implement data formatting to transmit GPS data over LoRa.

Day 5: Integrating BME280 Sensor **4/12/2024**

* Integrate a BME280 sensor into the circuitry.
* Develop C++ code to read temperature and humidity data from the sensor.
* Format the data and integrate it with the existing code for transmission over LoRa.

Day 6-7: Implementing MQTT with Node-RED **4/13/2024 – 4/14/2024**

* Set up a MQTT server (Mosquitto).
* Configure Node-RED for MQTT communication.
* Develop Node-RED flows to subscribe to the LoRa-transmitted data and publish it to the MQTT server.

Day 8-9: Designing and 3D Printing Enclosure **4/15/2024 – 4/16/2024**

* Design a suitable enclosure for the circuitry using CAD software.
* Ensure the enclosure design accommodates all components and provides adequate protection.
* 3D print the enclosure and assemble the circuitry within it.
* Test the assembled system for functionality, durability, and test flight.

Conclusion:

The project aims to achieve a fully functional IoT data transmission system utilizing LoRa communication. Real-time GPS coordinates, temperature, and humidity data will be transmitted between devices and published to an MQTT server. The custom-designed enclosure will provide physical protection and aesthetic appeal to the system.