

Engineering Project

Student: Team of up to 3 Students

Start date: As soon as possible

Topic: *A LoRa Tracking System for Stratospheric Balloon Missions*

Goals

Develop a ready-made Radio Unit capable of sending APRS beacons using LoRa technology, tailored for the provided hardware.

- Implement basic APRS beacon transmission over LoRa.
- Create software tools to configure and manage the device.
- Document the project as a GitLab repository with structured comments and user-friendly readmes.

Tasks

Requirement Definition:

- Understand the APRS protocol and LoRa communication basics.
- Define functional and non-functional requirements for the radio unit.

Hardware Integration:

- Configure and test the provided hardware components for LoRa communication.
- Develop firmware for the microcontroller to implement APRS encoding and transmission.

Software Development:

- Write Python-based scripts or tools for configuring beacon parameters and uploading them to the device.
- Ensure compatibility with various LoRa gateways.

Validation and Testing:

- Test beacon transmission under varying conditions to ensure reliability.
- Simulate and verify APRS decoding on standard receivers.

Documentation:

- Prepare a GitLab repository containing:
- Source code with comments.

- Detailed README for setup and usage.
- User guide for beacon configuration.
- Deliver a short report summarizing the approach, results, and challenges faced.

Presentation:

- Create a final presentation demonstrating the prototype and the results of the tests

Requirements

- Basic knowledge of Python and C/C++
- Basic familiarity with microcontrollers/embedded Systems (e.g. Arduino, STM32, Raspberry Pi)
- Basic understanding of RF communication principles

Expected results:

- A functional LoRa-based APRS beacon capable of transmitting standard APRS messages
- A simple software tool for setting up the device
- A GitLab repository with source code, documentation, and a user manual.
- A concise report and presentation summarizing the project's methodology and results.

Supervisor



Jaspar Sindermann, M.Sc.
Phone: +49 89 289 – 55753
E-mail: jaspar.sindermann@tum.de