

531-project

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I. PROJECT SYNOPSIS

The most common method for aircraft to report their system state involves the use of the Automatic Dependent Surveillance-Broadcast (ADS-B) transmission method. An open transmission method used to broadcast an aircraft's position, enabling the ability to track the aircraft.

Throughout the Spring 2024 semester, we have worked with the ADA Pluto Software Defined Radio (SDR) to receive and transmit signals in multiple ranges of frequency bands. We have implemented pre-made signal processing blocks in GNURadio signal flow graphs and then implemented them on the ADA Pluto for applications such as FM Radio and AM radio. Our project would like to work on solving the "1090 MHz Riddle".

What is the 1090 MHz Riddle you may ask? For many Software Defined Radio (SDR) enthusiasts, being able to capture, decode, interpret, and transmit ADS-B signals involves an understanding of how signals are manipulated in the RF spectrum, both for transmission and modulation.

In our particular case, we would like to implement the use of the 1090 MHz frequency band to communicate with public aircraft information.

We have found pre-made GNURadio block that implement ADS-B communication protocols, however, we would like to explore a custom implementation using only a GNURadio signal flow graph and the QT GUI elements.

After implementing a simple receiver and transmitter, we would like to expand the project scope to receive real ADS-B signals transmitted by aircraft. If this project goal is met, we would like to decode and interpret the data by plotting received data on a map.

A. Project Goal Summary

- Build a custom antenna for use in the proper frequency band.
- Transmit ADS-B signals for testing.
- Receive and decode the signals that have been transmitted
- Receive actual signals from ADS-B transponders (aircraft)
- A table containing real received data. (Tail Number, Latitude, Longitude, Direction, Speed)
- Plot the data on a map