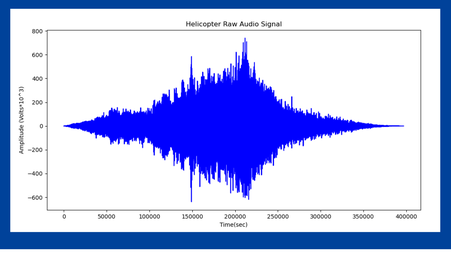

ICASA Aircraft Audio Surveillance System

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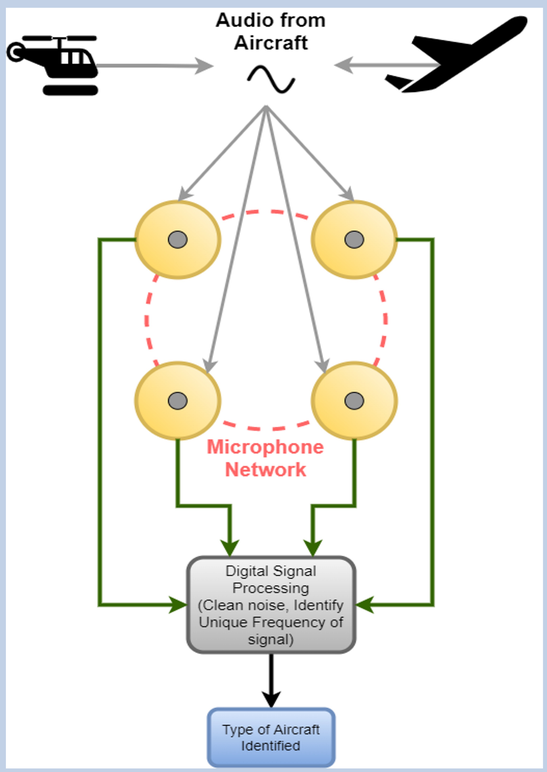
Goals/Objectives:

- Design an audio sensor array that would be able to identify aircraft by their frequency response and their location from peaks in amplitude readings from microphone.
- This audio sensor array will be used by ICASA in the town of Playas New Mexico to monitor air traffic activity in the area.

Background:

- Playas, a small town west of Las Cruces New Mexico, is home to The Institute For Complex Additive System Analysis (ICASA) testing site.
- To further develop this site's security, ICASA is in search of a new monitoring system for identifying aircraft flying in the area.



Figure(1): Working Principle of Design

Final Result:

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FFT Results: 433.851Hz. Aircraft Type: Jetengine
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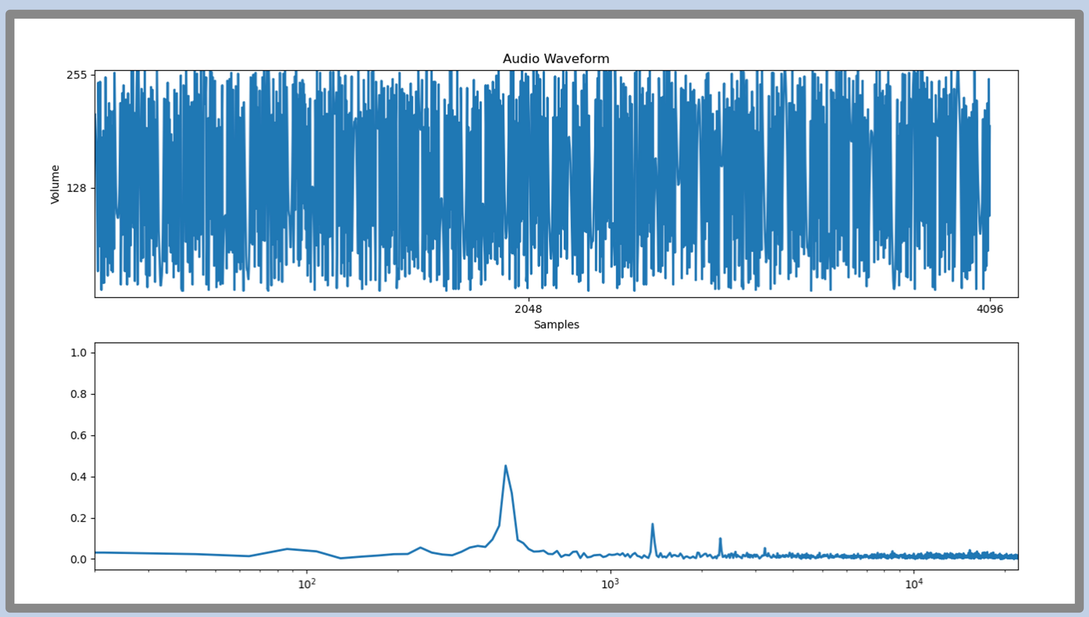
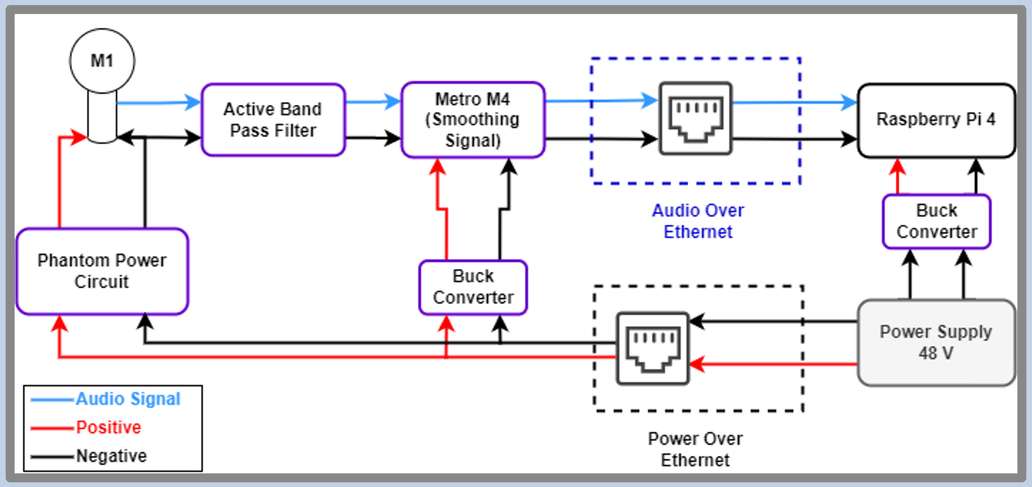


Figure(2): Real time Magnitude Spectrum Plotter Visual and Result

- The above figure shows the real time recording taking place on the Raspberry Pi.
- A recorded sample of a jet engine aircraft was played near microphone.
- Signal was amplified, smoothed through the Itsy Bitsy M4 DSP board, and ran through created python script.



Figure(3): Final system model of single channel

Specifications:

Criteria	Specifications
Location of Aircraft Accuracy	50 m - 100 m
Identification of Aircraft Accuracy	98% Success Rate
Weight of Audio Surveillance System (excluding microphones)	20 lbs
Weatherproof Components	Waterproof and UV resistant
IEEE-ISTO Power Standard 802.3	Less than 14.8 W

Current Status:

Microphone	• Successfully captured audio signals from 20 Hz - 7000 Hz • Need to increase sensitivity
Power Supply	• Obtained 48V over ethernet • Need additional nickel strips to weld battery charger
DSP Filtering	• Smoothes noisy signal. • Need to improve clock speed for more accurate sample points.
Raspberry Pi Algorithm	• Able to identify aircraft • Need to develop algorithm for localization

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