The Design and Implementation of a Portable Aircraft Signal Procesor

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$532.7

Total project cost

2+ Years

From original emails to project completion

525,924+

Total Lines of Code and Generated Files

How My Device Works   (Not to Scale)

Step 1
Aircraft flies into radio range (200NM)

Step 3
Aircraft transmits periodic surface position
OR
ARTCC "interrogates" airplane for position

Step 5
Aircraft continues transmitting more frequent heading and speed updates. Device logs these and updates position of aircraft

Step 2
Device logs aircrafts ICAO address and waits for positional data

Step 4
Device logs current GPS coordinates, speed, and heading and displays on map

ADS-B Reception and Display

- Takes the output from the dump1090 software and put it on a map

- Gathers information from flight such as country of registration, speed, track and position

- Multiple map types available including aviation navigation maps, street maps, and satellite maps
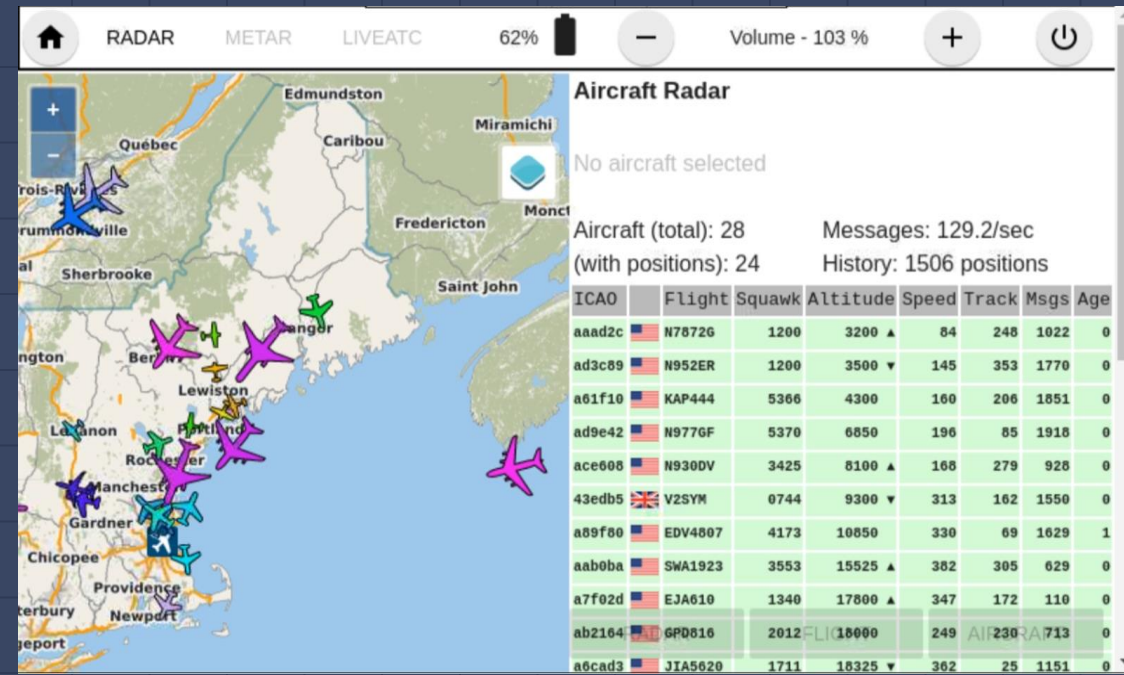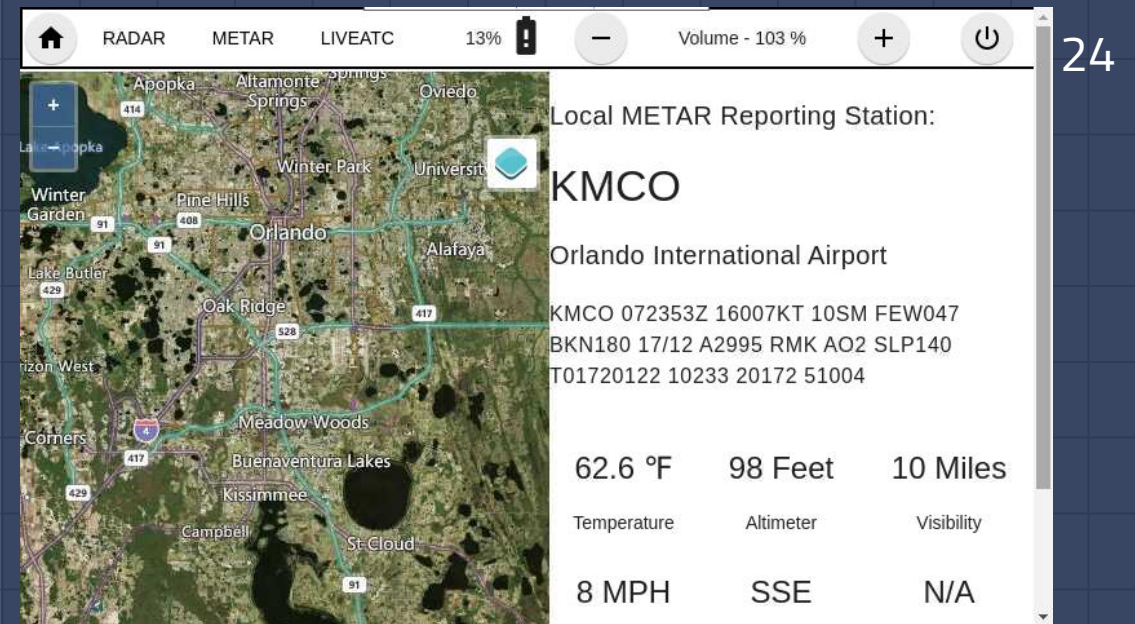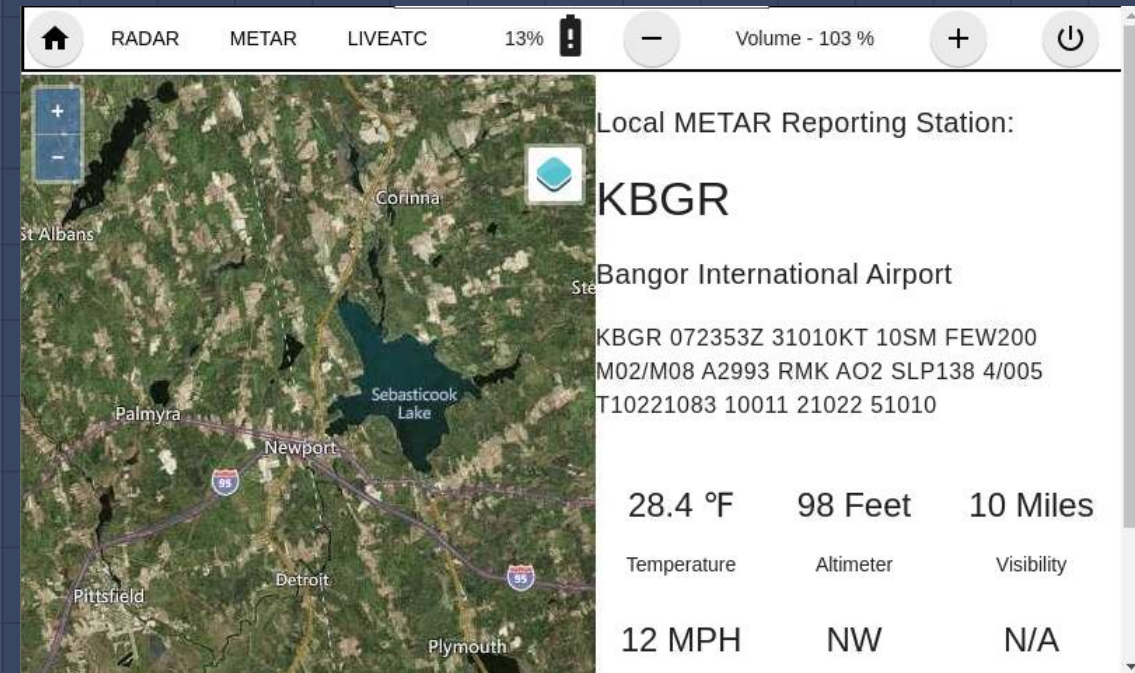

ADS-B Radar Screen with Aircraft in Range
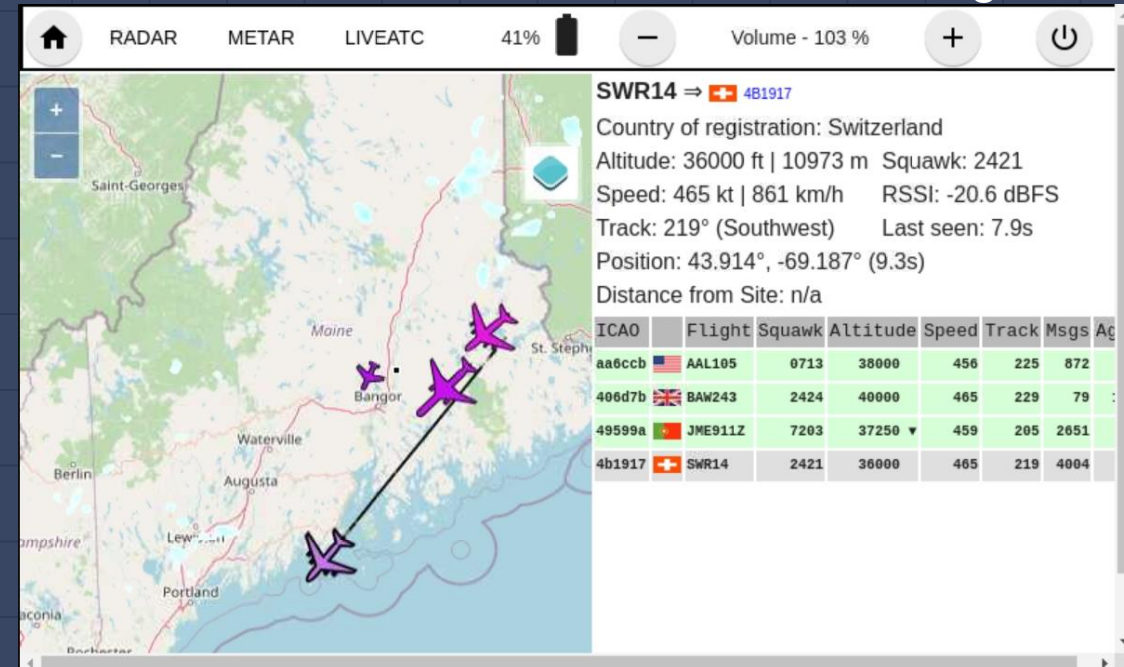
METAR Weather Information

- METAR: Meteorological Aerodrome Report.
- Gets the closest METAR report to the station in the middle of the map.
- Parses one line report into specific fields.
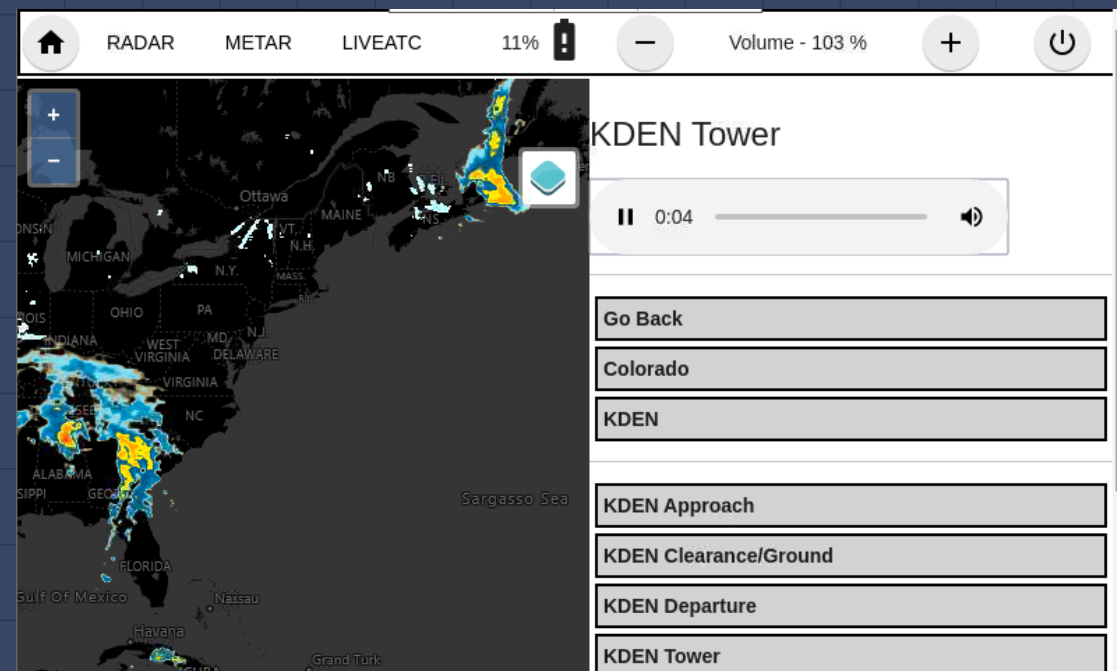- Services provided by AVWX.rest

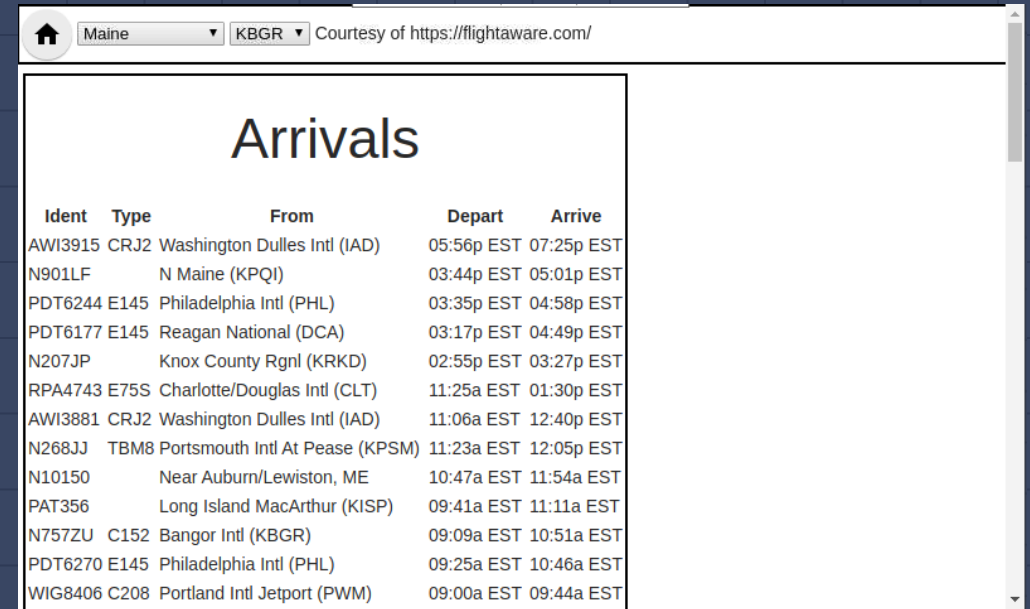METAR Information Screen

Live Aircraft Audio by LiveATC

- Draws information from custom generated file

- Fetches audio streams from liveatc.net

- Wrote the file generation script, the web crawler, and the interface all myself

Live Air Traffic Control Screen
(Audio Excerpt from KDEN Tower)
1/7/2021
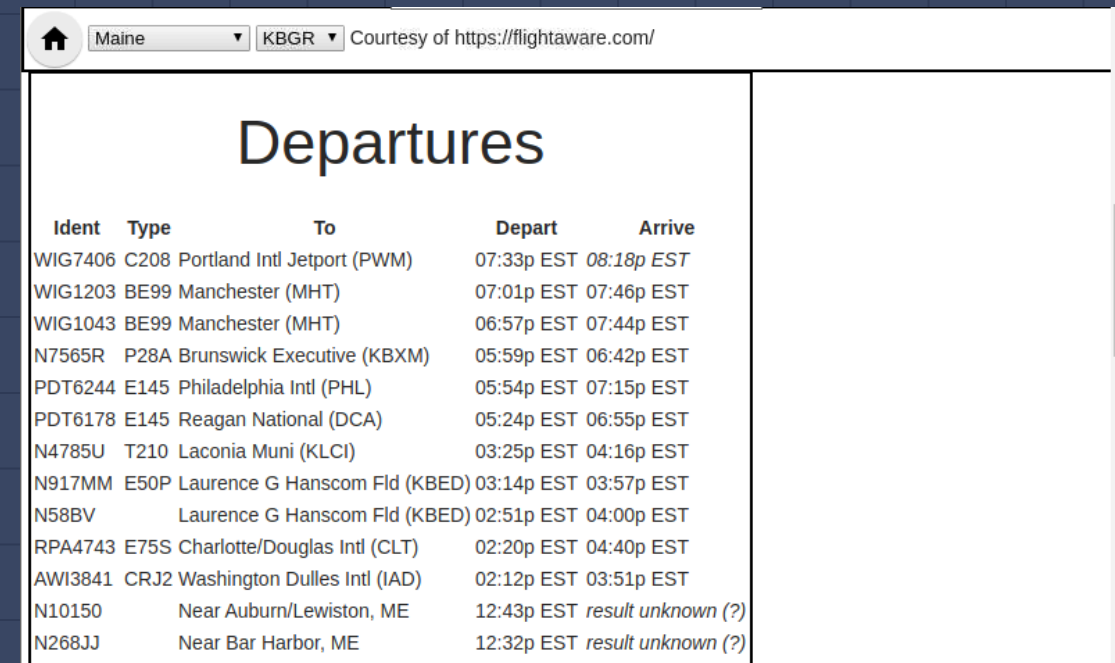
Airport Arrivals and Departures

- Pulls airport arrivals and departures from selected airport

- Created the api and generated the lookup file
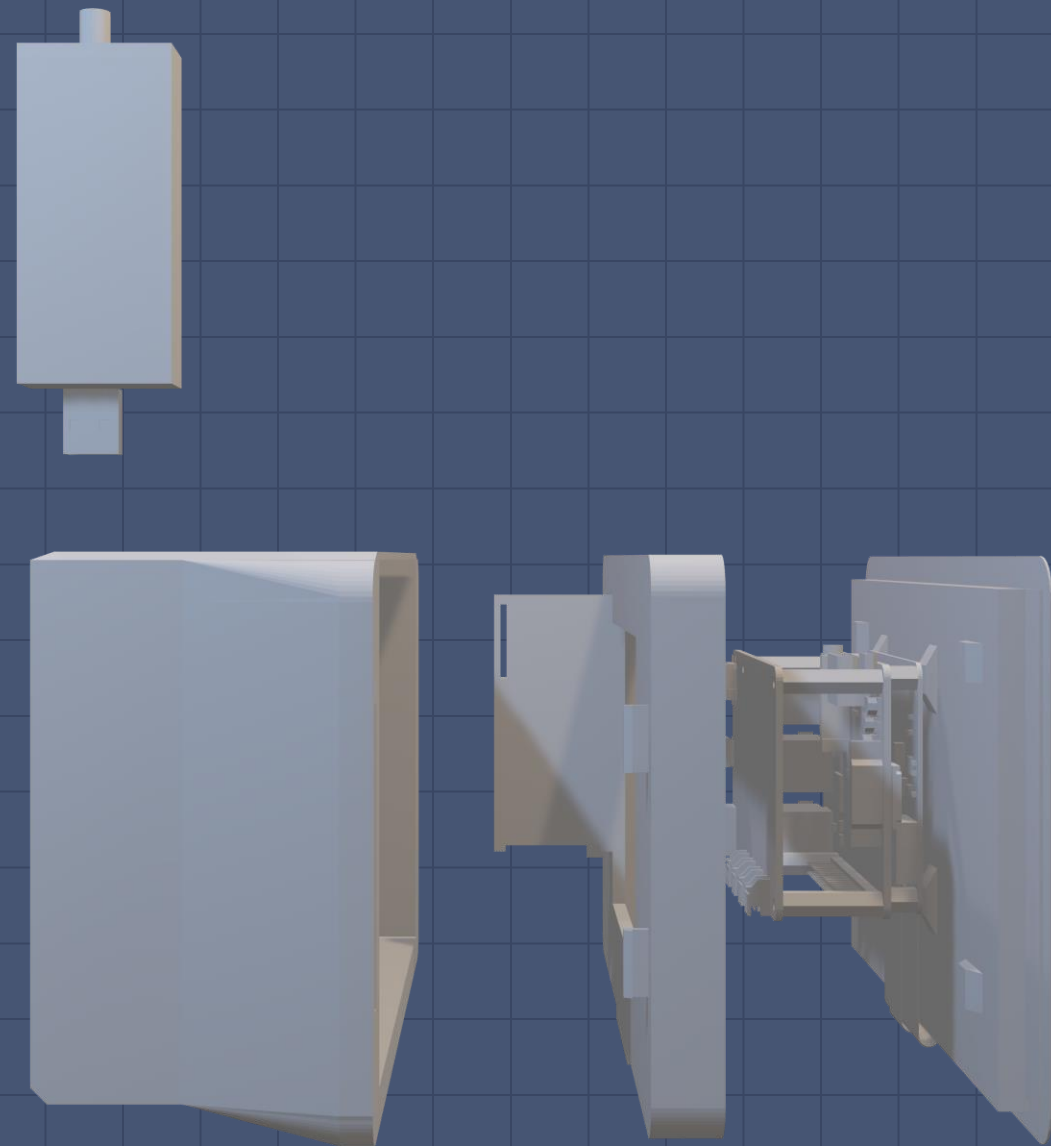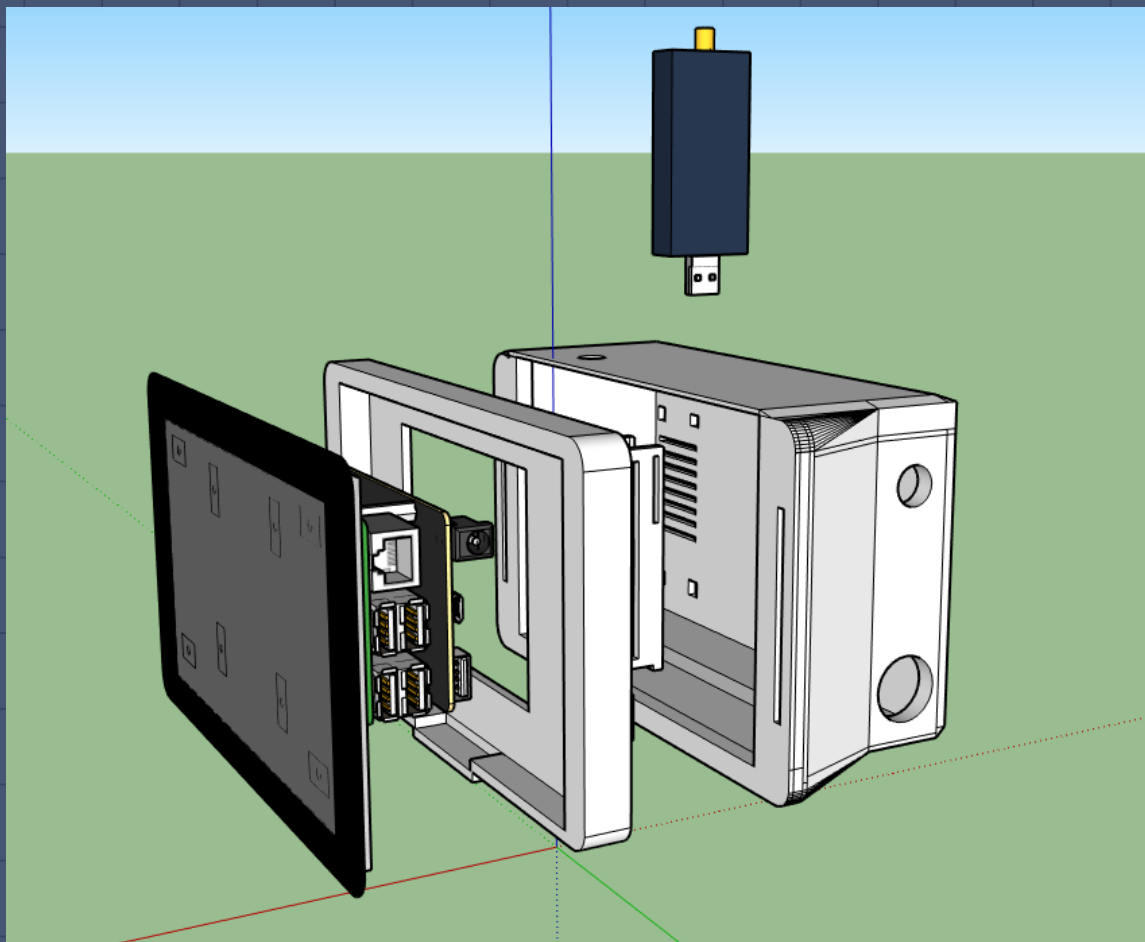
- Data fetched from flightaware.com

Example Arrivals and Departures Screens

3D Modeling

Aviation Assistant
ADS-B   METAR   LiveATC
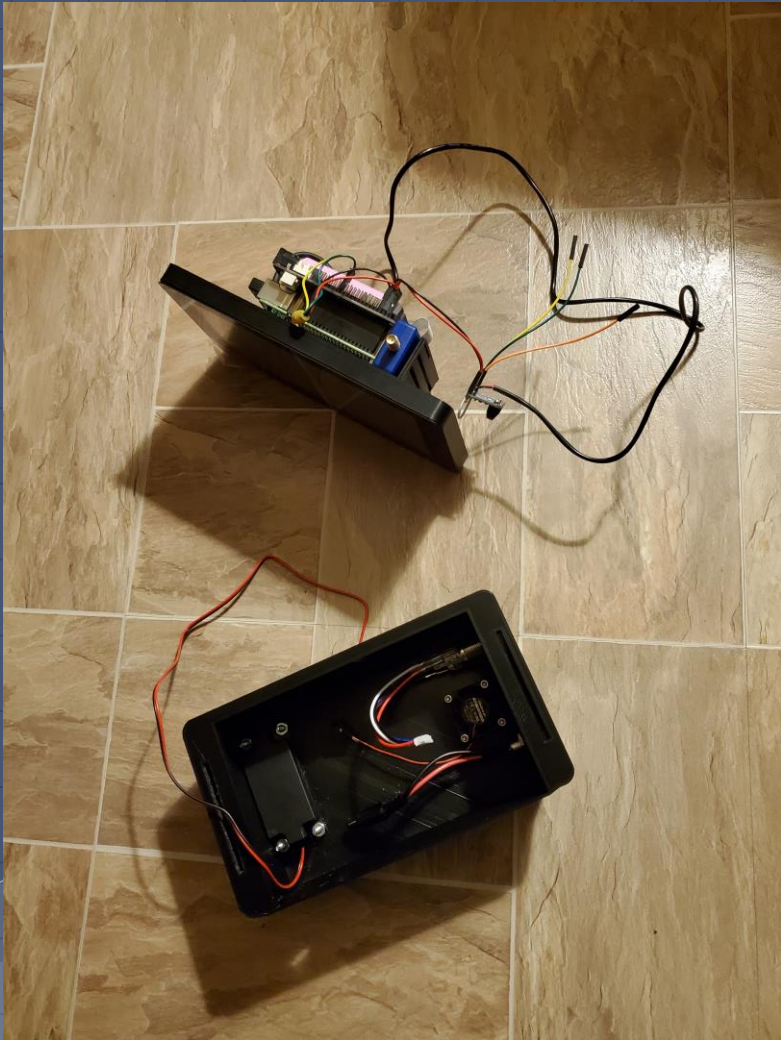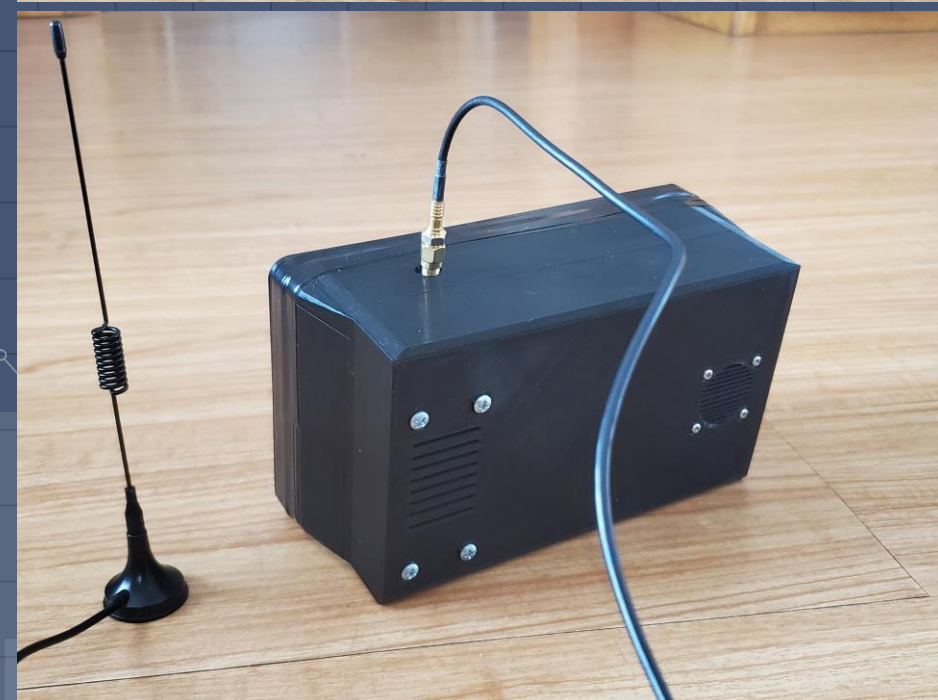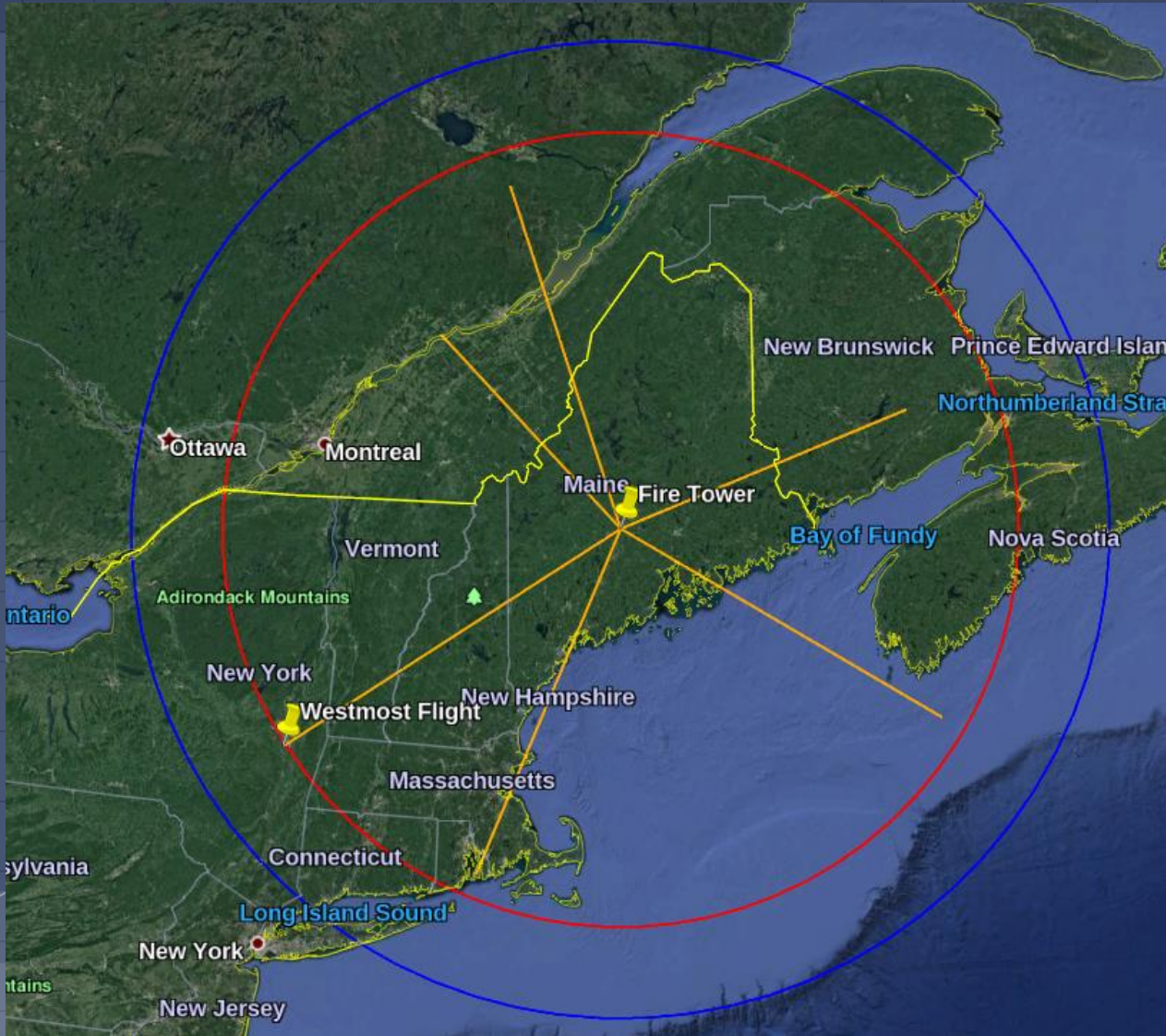Secondary Case Printing
12/31/2020 - 1/2/2021

3D Printing

Assembly

Final Result

Field Test – 1/15/2021

Total Concurrently Tracked Aircraft:	**Maximum Tracked Aircraft Range:**
31	261 Miles

Total Surface Area Received:	**Total Line Of Sight (L.O.S) Range:**
214,095 Square Miles	322 Miles

Average Signal to Noise Ratio (S.N.R)	**Peak Signal to Noise Ratio (S.N.R)**
15:1 dB	29:1 dB

Key:

- Total Line of Sight
- Total Recorded Range
- 6 Recorded Aircraft Bearings and Ranges