

# The Design and Implementation of a Portable Aircraft Signal Processor



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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

## Step 1

Aircraft flies into radio range (200NM)



(Not to Scale)

## 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

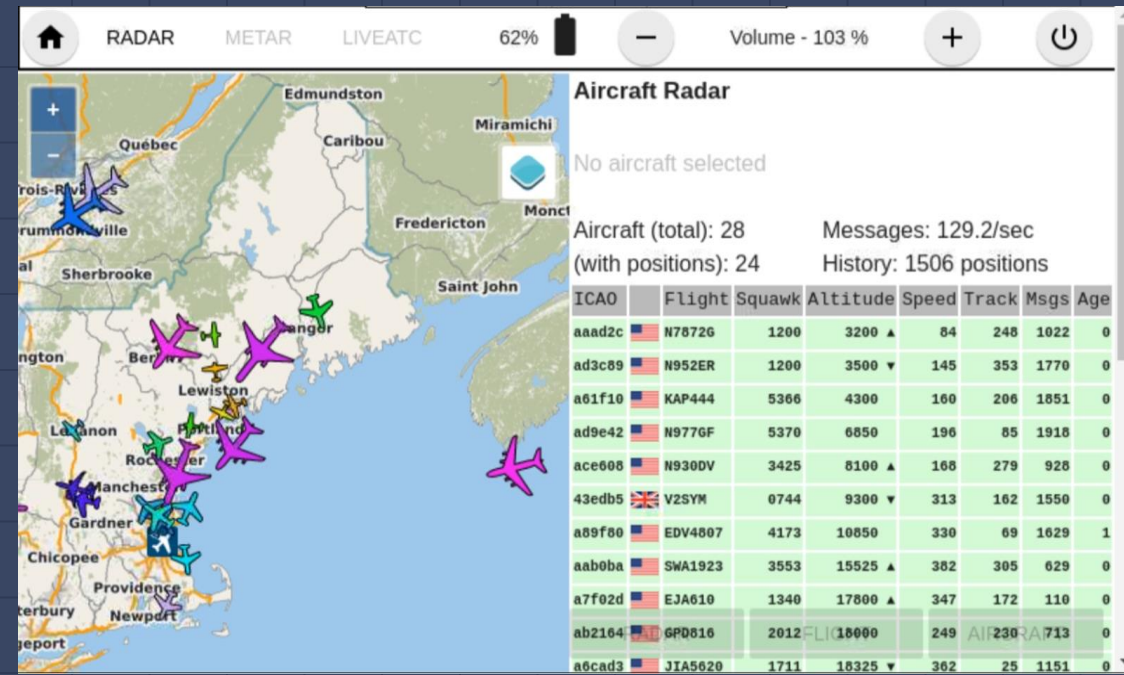


## Step 4

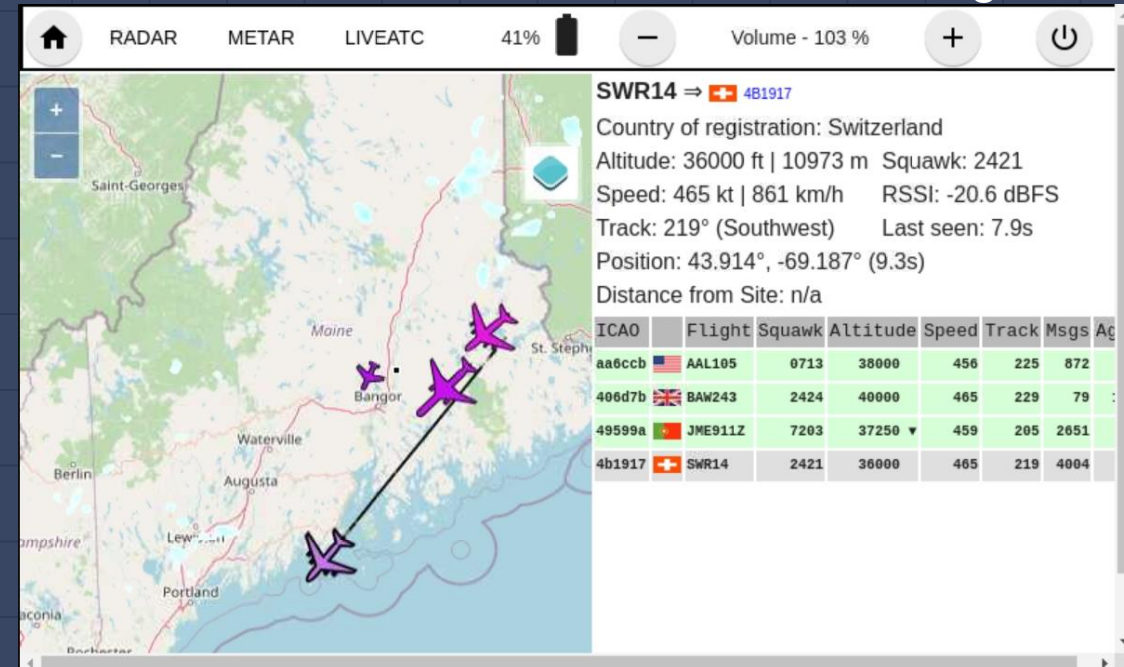
Device logs current GPS coordinates, speed, and heading and displays on map

# 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

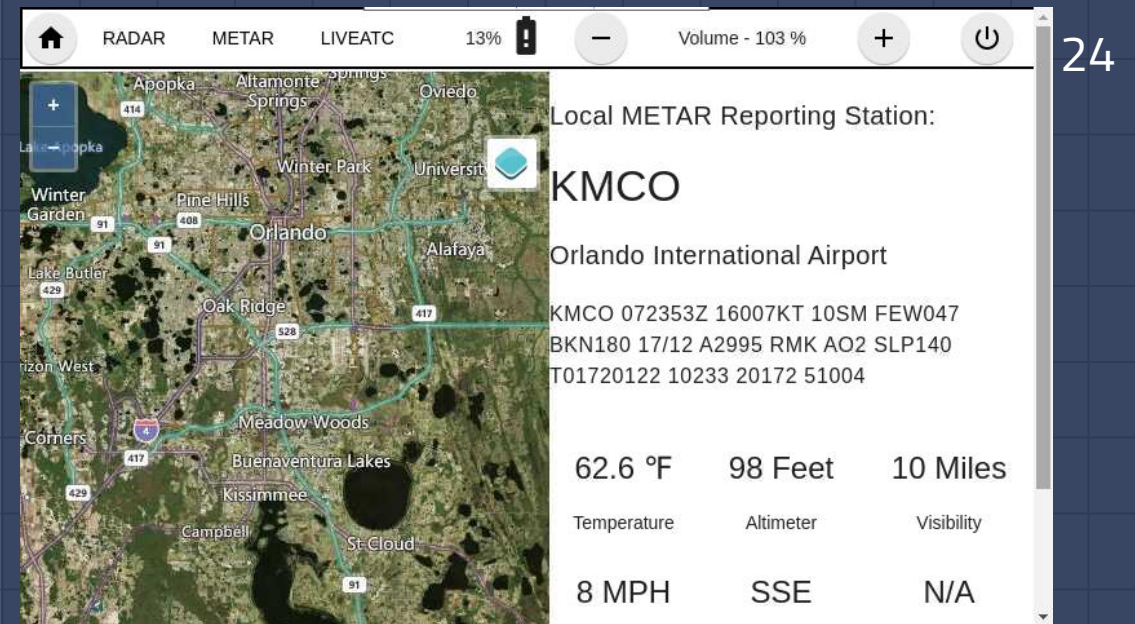


ADS-B Radar Screen with Aircraft in Range

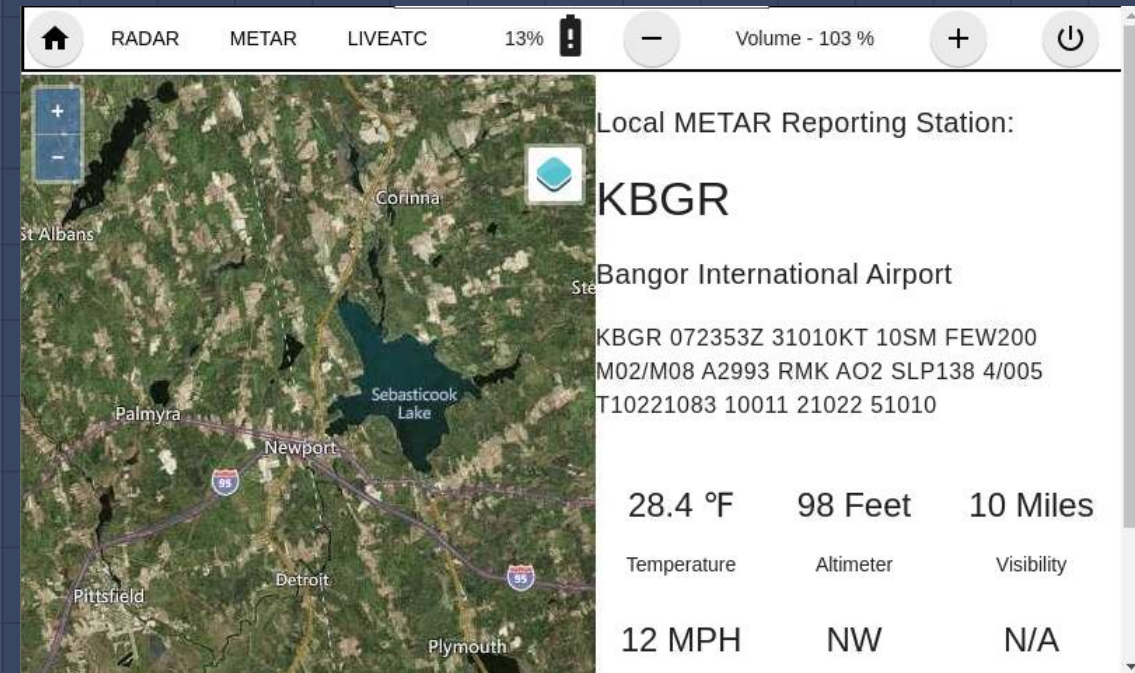


# METAR Weather Information

- 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



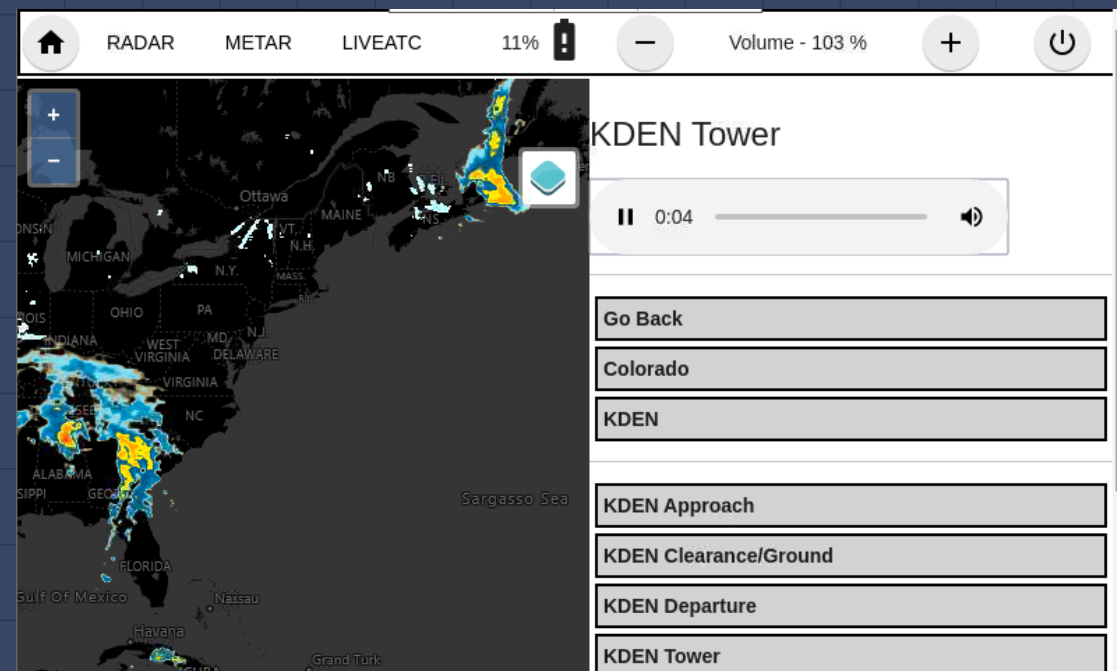
METAR Information Screen





# Live Aircraft Audio by LiveATC

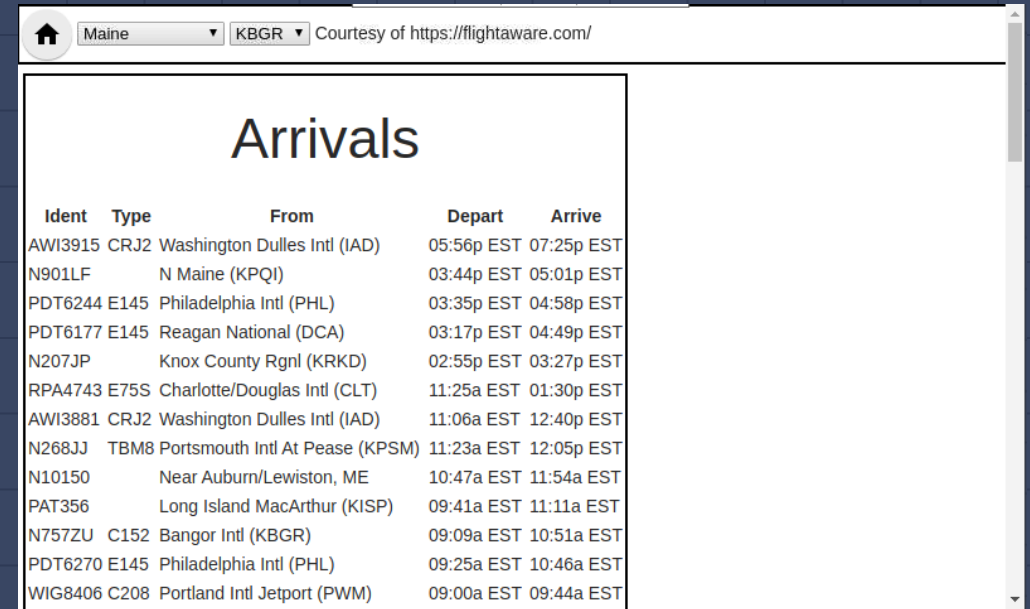
- Draws information from custom generated file
- Fetches audio streams from liveatc.net
- Wrote the file generation script, the web crawler, and the interface all myself



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

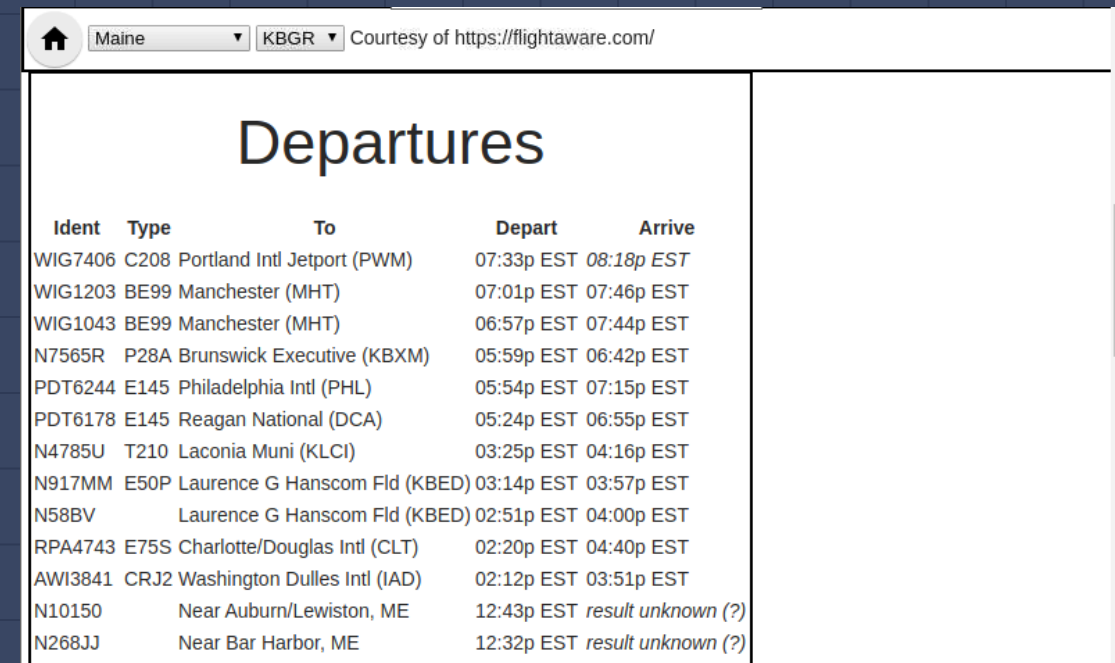
# Airport Arrivals and Departures

- Pulls airport arrivals and departures from selected airport
- Created the api and generated the lookup file
- Data fetched from flightaware.com

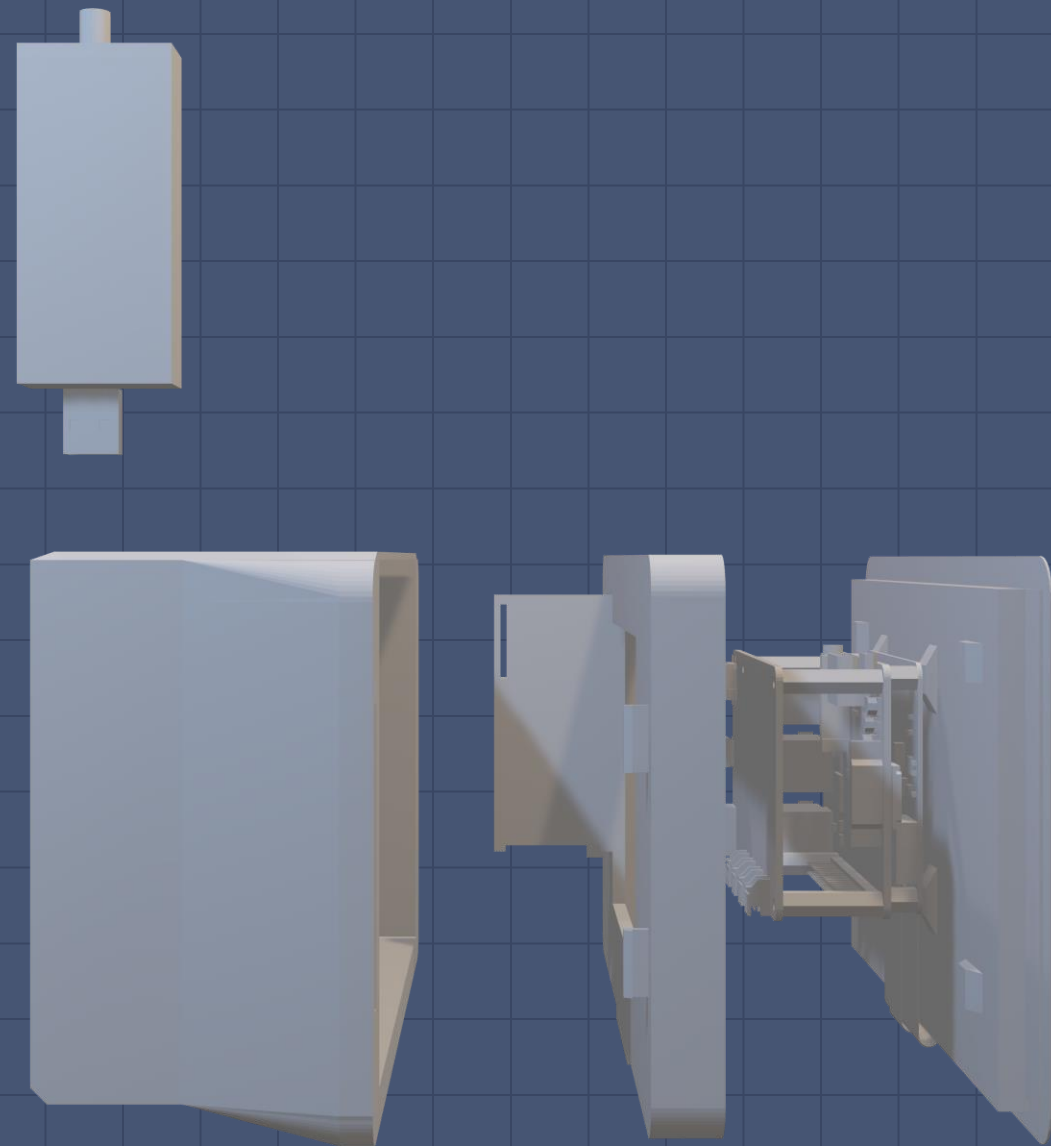
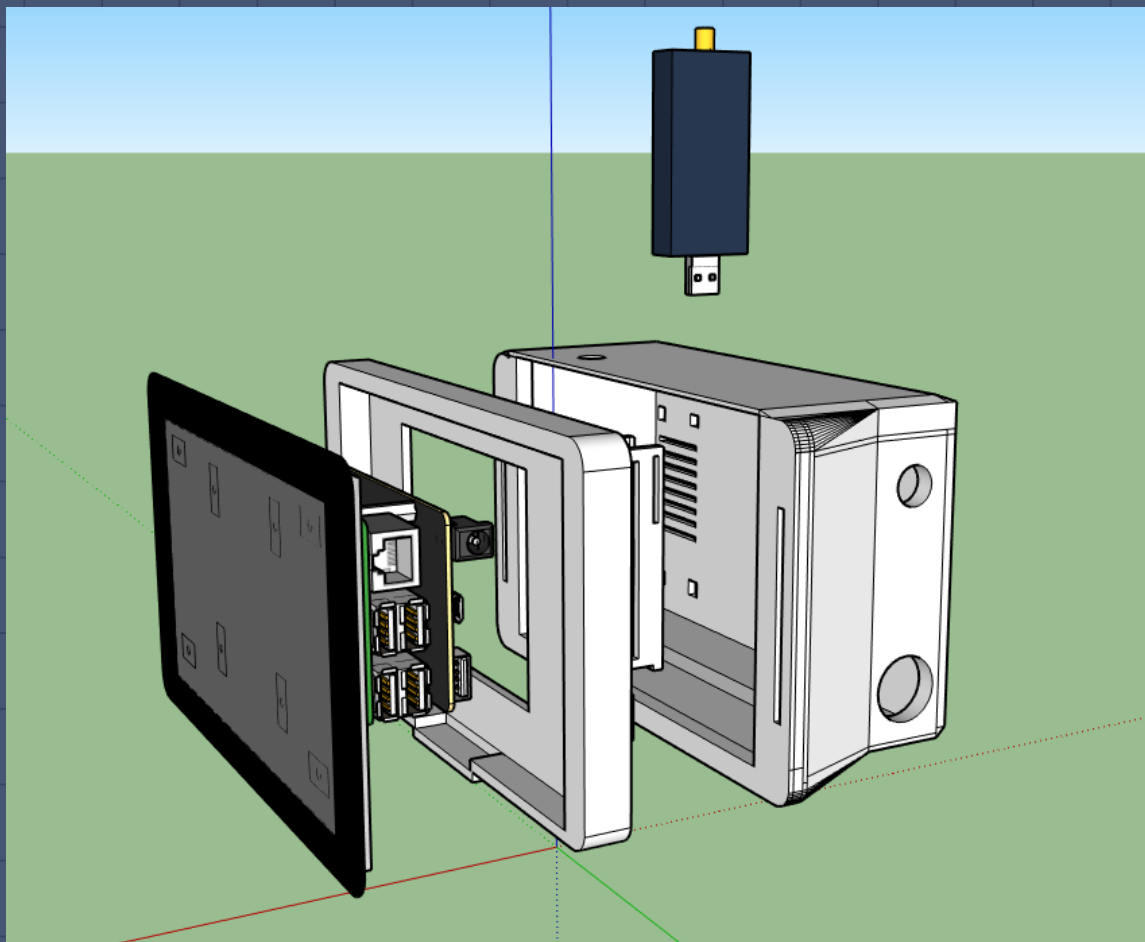


Ident	Type	From	Depart	Arrive
AWI3915	CRJ2	Washington Dulles Intl (IAD)	05:56p EST	07:25p EST
N901LF		N Maine (KPQI)	03:44p EST	05:01p EST
PDT6244	E145	Philadelphia Intl (PHL)	03:35p EST	04:58p EST
PDT6177	E145	Reagan National (DCA)	03:17p EST	04:49p EST
N207JP		Knox County Rgnl (KPKD)	02:55p EST	03:27p EST
RPA4743	E75S	Charlotte/Douglas Intl (CLT)	11:25a EST	01:30p EST
AWI3881	CRJ2	Washington Dulles Intl (IAD)	11:06a EST	12:40p EST
N268JJ	TBM8	Portsmouth Intl At Pease (KPSM)	11:23a EST	12:05p EST
N10150		Near Auburn/Lewiston, ME	10:47a EST	11:54a EST
PAT356		Long Island MacArthur (KISP)	09:41a EST	11:11a EST
N757ZU	C152	Bangor Intl (KBGR)	09:09a EST	10:51a EST
PDT6270	E145	Philadelphia Intl (PHL)	09:25a EST	10:46a EST
WIG8406	C208	Portland Intl Jetport (PWM)	09:00a EST	09:44a EST

Example Arrivals and Departures Screens

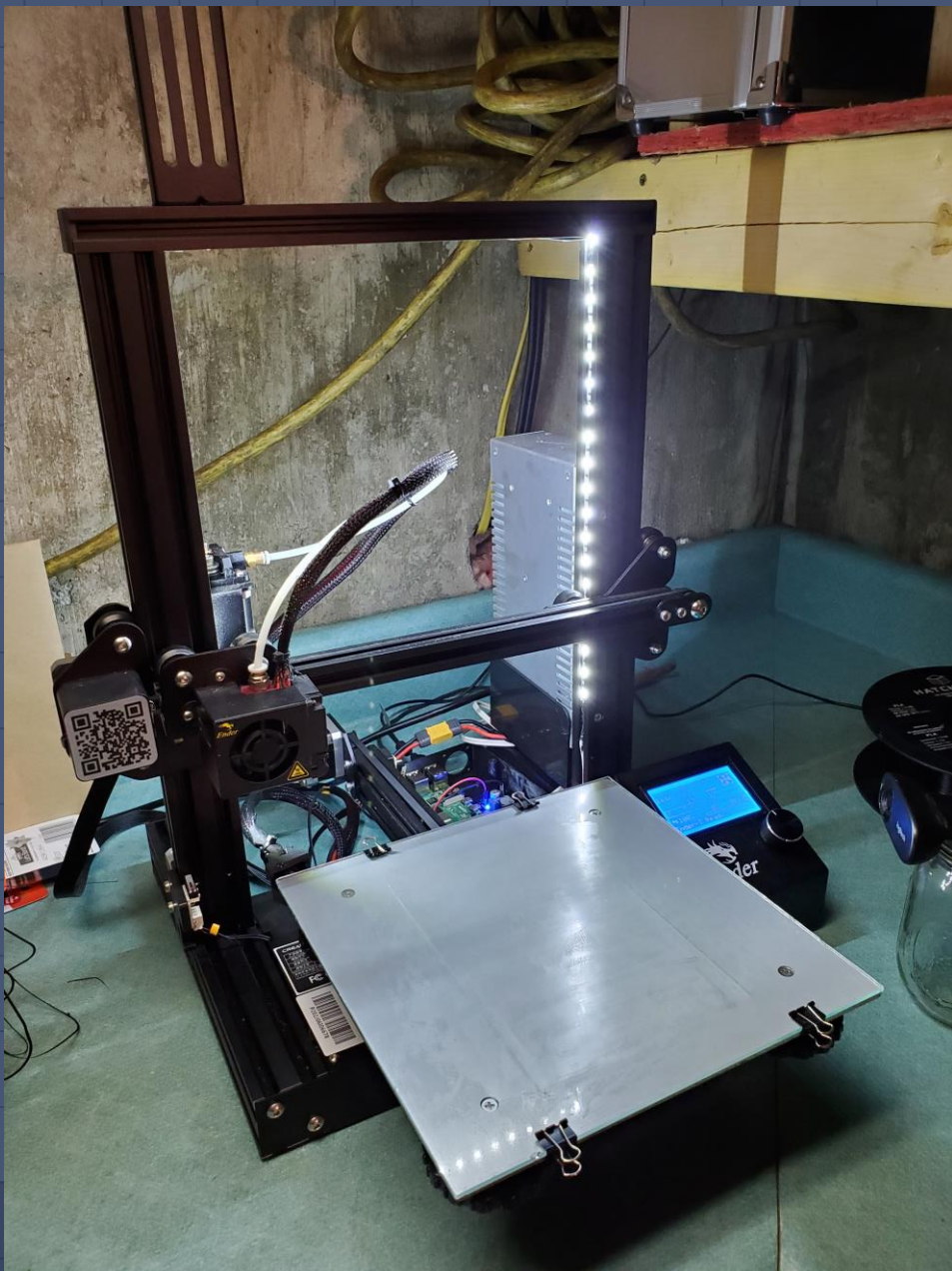


Ident	Type	To	Depart	Arrive
WIG7406	C208	Portland Intl Jetport (PWM)	07:33p EST	08:18p EST
WIG1203	BE99	Manchester (MHT)	07:01p EST	07:46p EST
WIG1043	BE99	Manchester (MHT)	06:57p EST	07:44p EST
N7565R	P28A	Brunswick Executive (KBXM)	05:59p EST	06:42p EST
PDT6244	E145	Philadelphia Intl (PHL)	05:54p EST	07:15p EST
PDT6178	E145	Reagan National (DCA)	05:24p EST	06:55p EST
N4785U	T210	Laconia Muni (KLCI)	03:25p EST	04:16p EST
N917MM	E50P	Laurence G Hanscom Fld (KBED)	03:14p EST	03:57p EST
N58BV		Laurence G Hanscom Fld (KBED)	02:51p EST	04:00p EST
RPA4743	E75S	Charlotte/Douglas Intl (CLT)	02:20p EST	04:40p EST
AWI3841	CRJ2	Washington Dulles Intl (IAD)	02:12p EST	03:51p EST
N10150		Near Auburn/Lewiston, ME	12:43p EST	result unknown (?)
N268JJ		Near Bar Harbor, ME	12:32p EST	result unknown (?)



# 3D Modeling

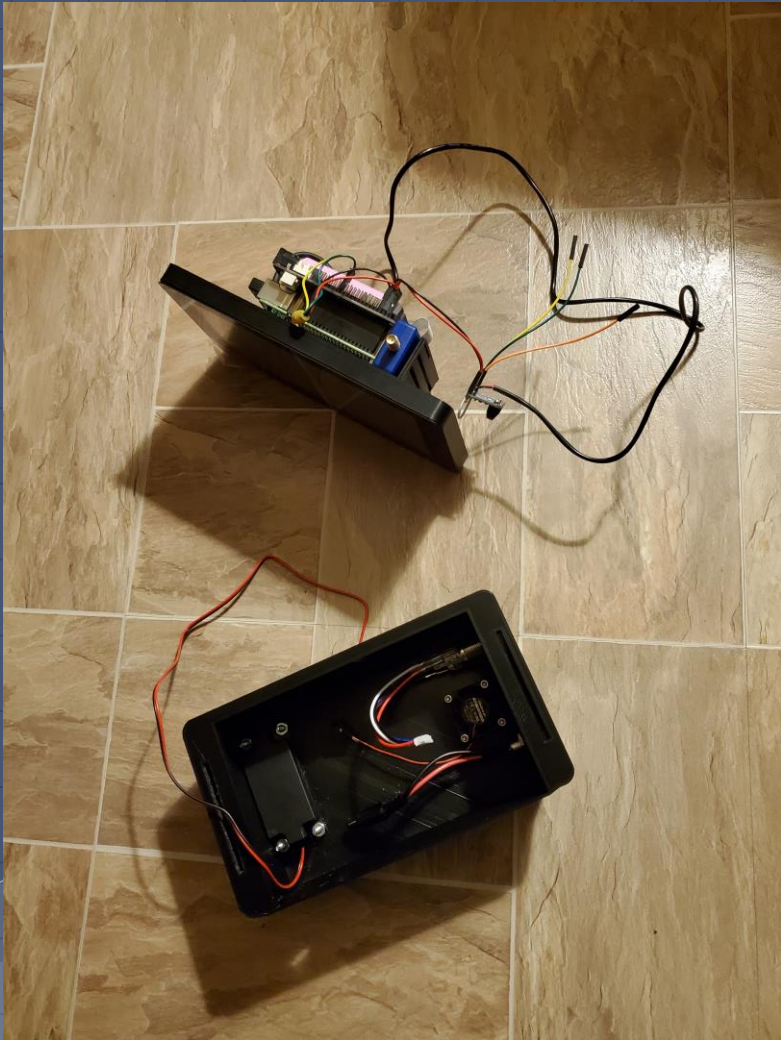




3D Printing

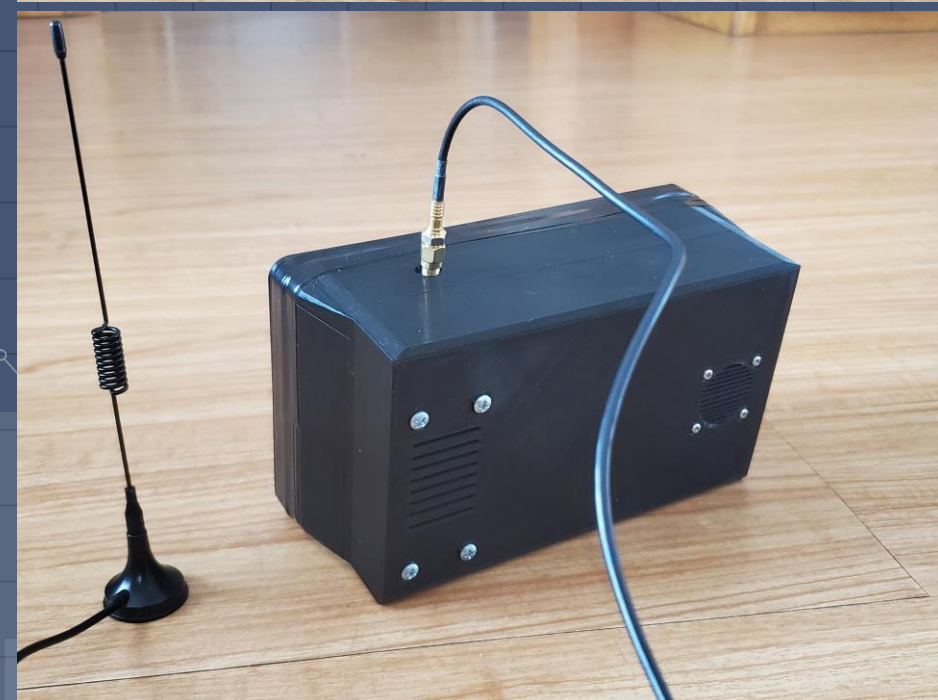


# Assembly

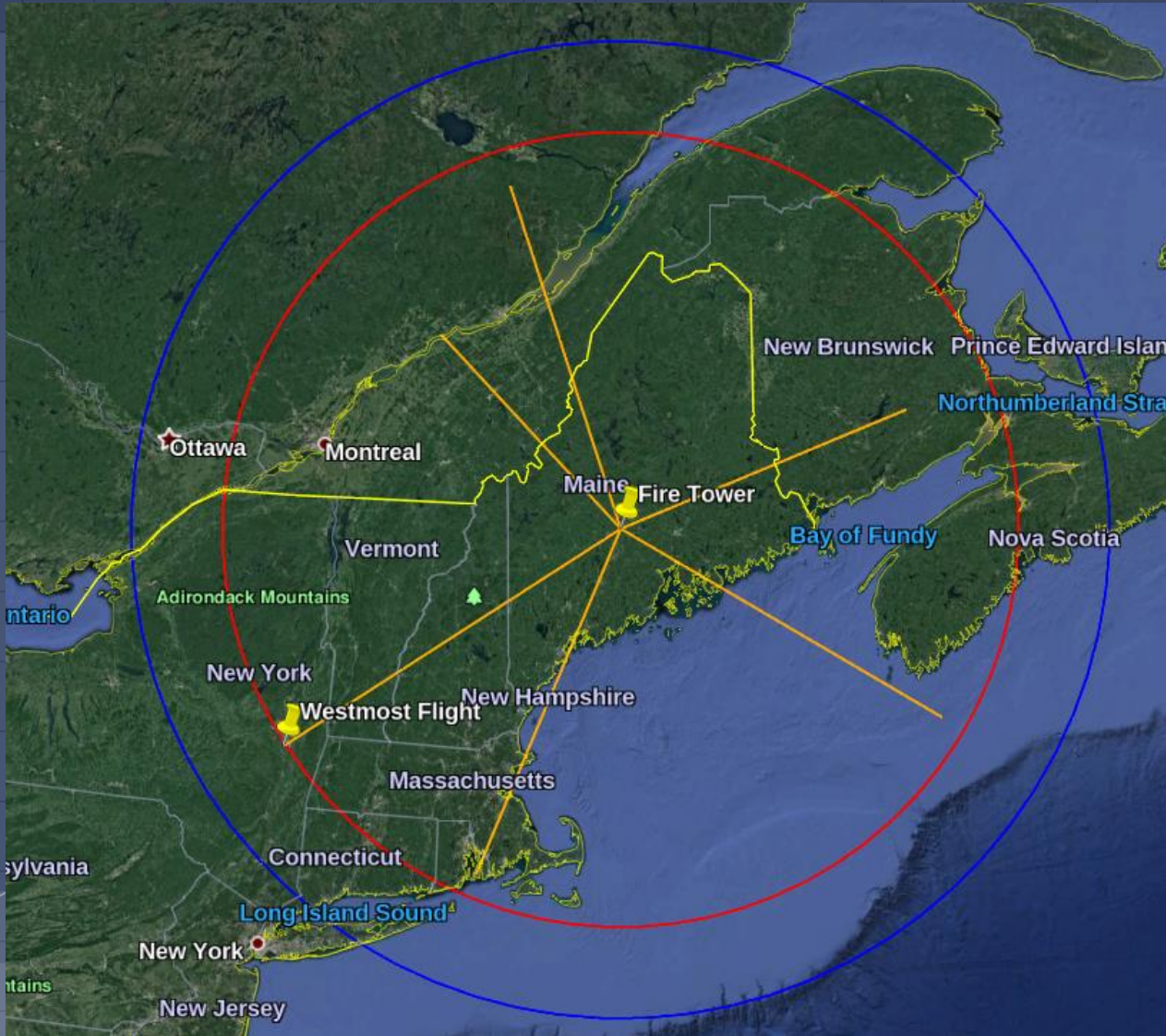




# Final Result



# Field Test – 1/15/2021



**Total Concurrently Tracked Aircraft:**

31

**Maximum Tracked Aircraft Range:**

261 Miles

**Total Surface Area Received:**

214,095 Square Miles

**Total Line Of Sight (L.O.S) Range:**

322 Miles

**Average Signal to Noise Ratio (S.N.R)**

15:1 dB

**Peak Signal to Noise Ratio (S.N.R)**

29:1 dB

Key:

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