

# ATC DEMO 2

Kaldi Research Team:

Adam G., Milan H., Tabitha O., David S., Tahmina T.

NeMo Team:

Adam F., Darian H., Maegan L., Max M., Taylor S.

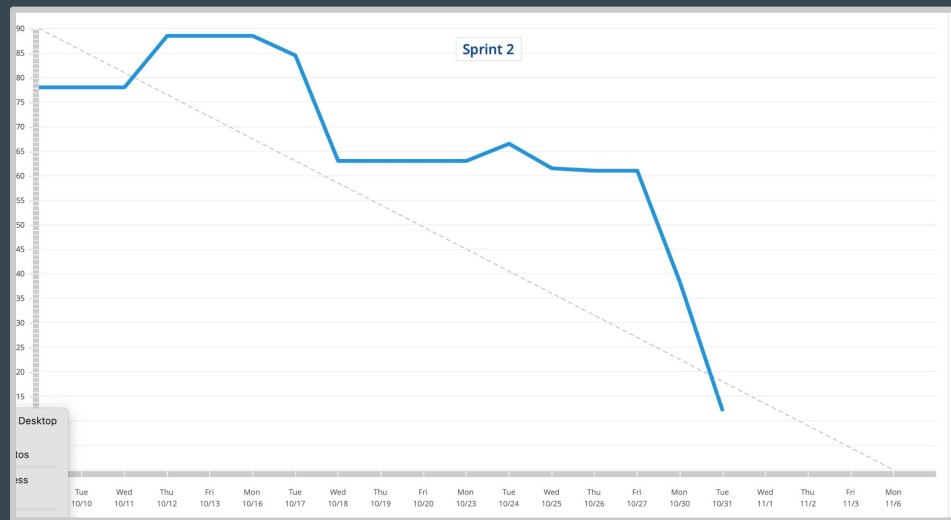
Kaldi Research Team

# Team Roles

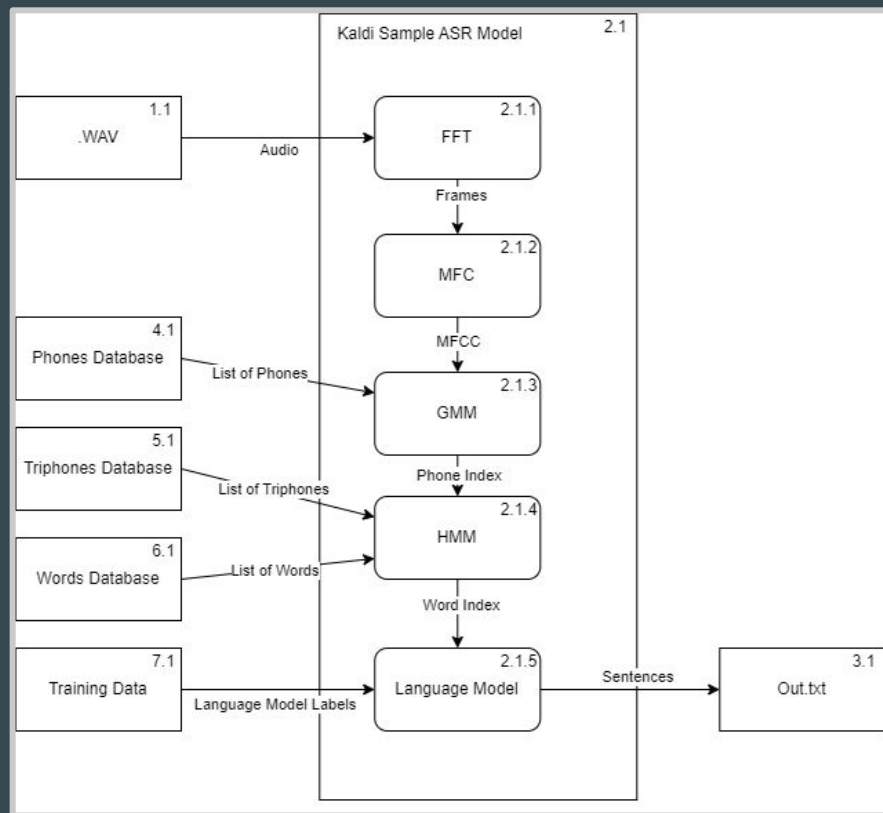
- Tabitha: Team leader, research, documentation
- David: Research, documentation
- Milan: Research, documentation, editor
- Tisha: Documentation
- Adam G.: Documentation

# Sprint 2 Overview

- Deliverables
- Use case diagram
- Data-flow diagram
- Class models
- Learned what is happening in the ASR model's “black box”
- Learned about mel-frequency cepstra (MFCs)
  - Mel-frequency cepstral coefficients (MFCCs)



# How does the Kaldi sample ASR model work?



# Sprint 2 Challenges

- Magnitude of Kaldi ASR Toolkit
  - Research is a continuous task
  - Delay in project understanding creates delay in work completed
- Installation issues
  - Only Milan could get the toolkit running for most of Sprint 2
    - Installation errors, missing dependencies, etc.

# Sprint 1 vs Sprint 2

- Better understanding of ASR model
- Better documentation
- More people with access to Kaldi ASR Toolkit
- Learned our roles as the Kaldi Research Team

# Plans for the future

- More in-depth research on each of the classes within the ASR model
- Expand on the current requirements
- Modifying the use cases
- Optimization of the ASR model

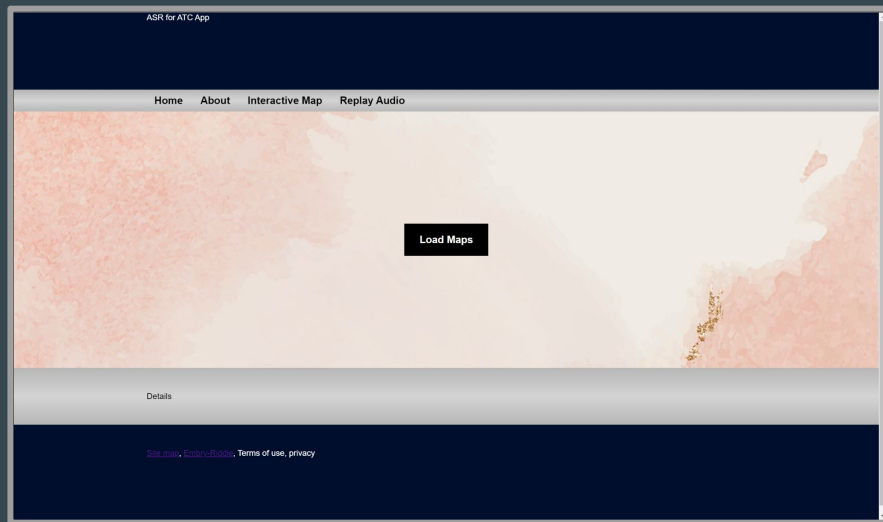
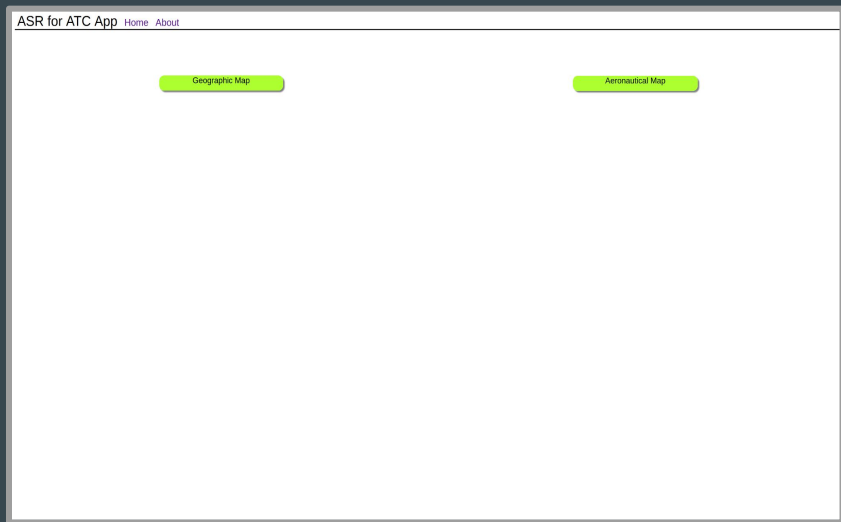


NeMo Team

# What We Completed - Sprint 2

- Sprint 2 deliverables (SDD, SRS, Demo)
- Adding different plane icons
- Adding different maps & toggle switch
- Started setup of database
- Started understanding NVIDIA NeMo
- Polishing the website
- Worked with Aaron (Research Assistant) on clarification of tasks & expectations

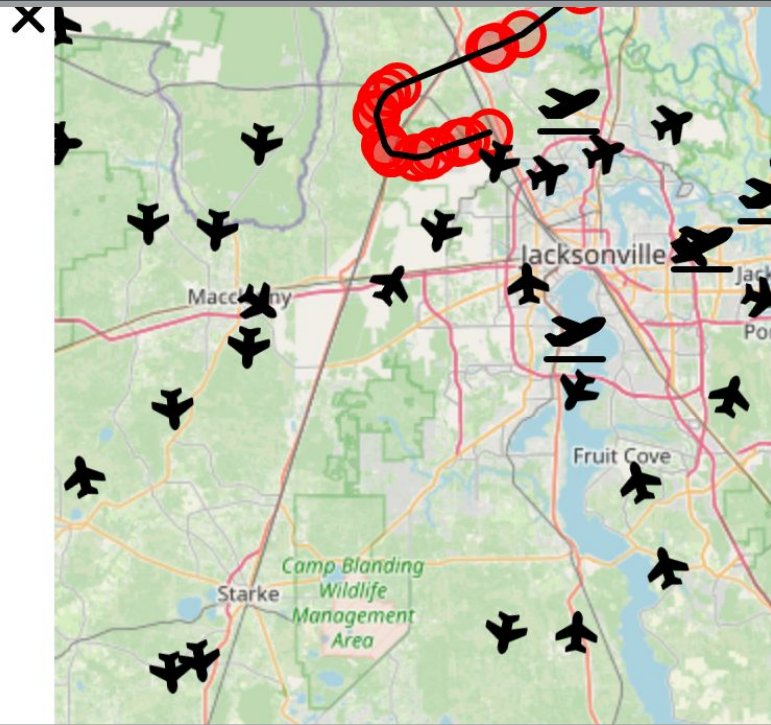
# Started Polishing The Website - Sprint 2



# Creating Plane Categories - Sprint 2

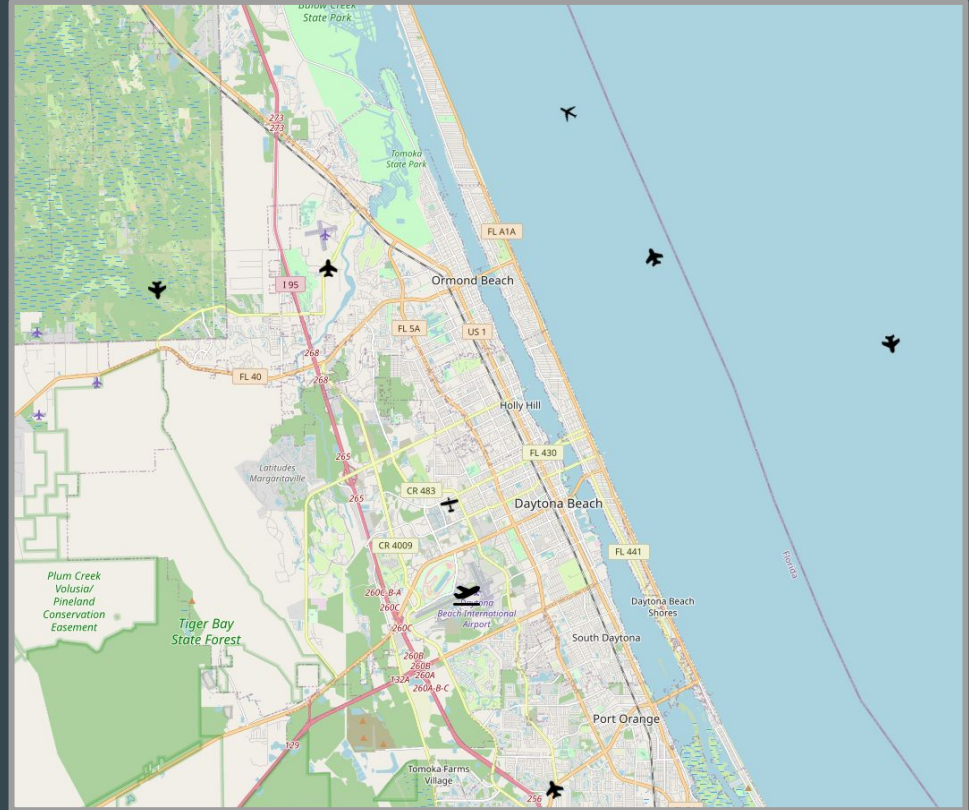
## Plane Properties

ICAO 24-bit Address	AA56D5
Callsign	UAL1343
Country Origin	United States
Time of Last Position Report	Fri Oct 06 2023 13:26:50 GMT-0400 (Eastern Daylight Time)
Last Contact (time)	Fri Oct 06 2023 13:26:50 GMT-0400 (Eastern Daylight Time)
Position	30.4662°N -81.7981°W
Geometric Altitude	525.78 meters
On Ground?	No
Velocity	92.26 meters per second
Heading	70.45°
Vertical Rate	-4.88 meters per second
Squawk	3045
Position Source	ADS-B
Plane Category	Large

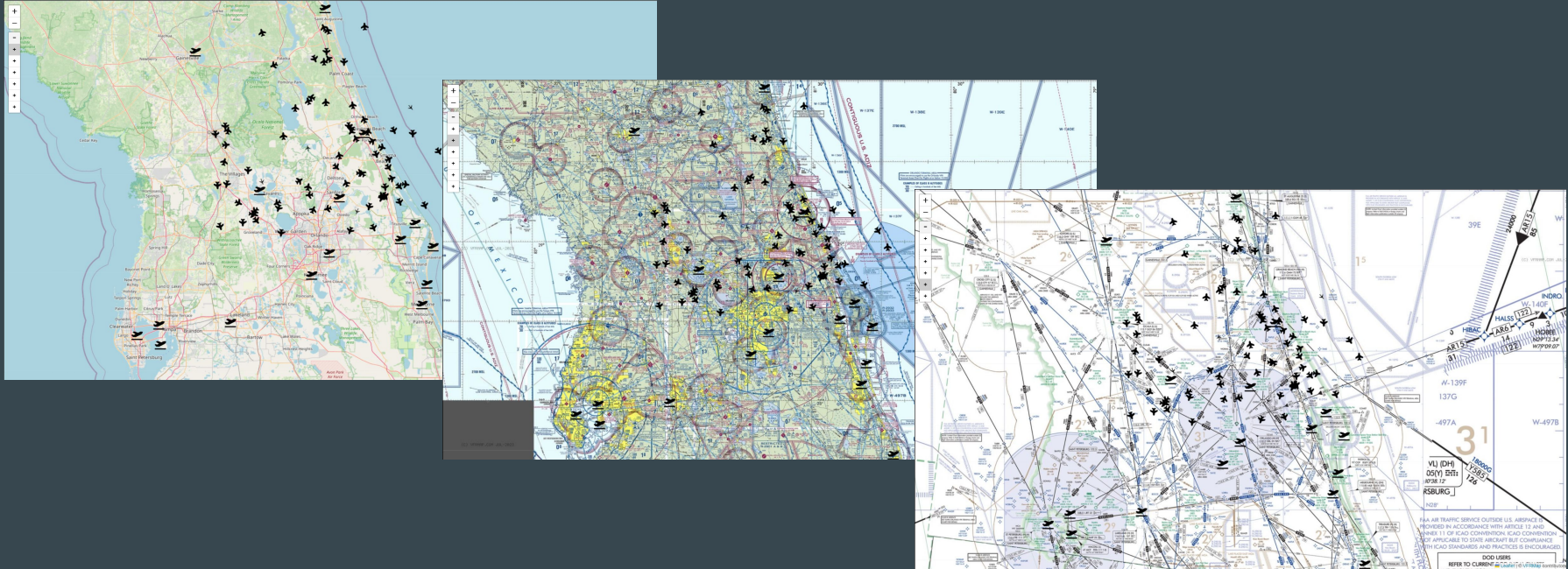


# Different Plane Icons - Sprint 2

- Icons based off aircraft type provided by OpenSky
- Many aircraft listed as an “No Information” aircraft type



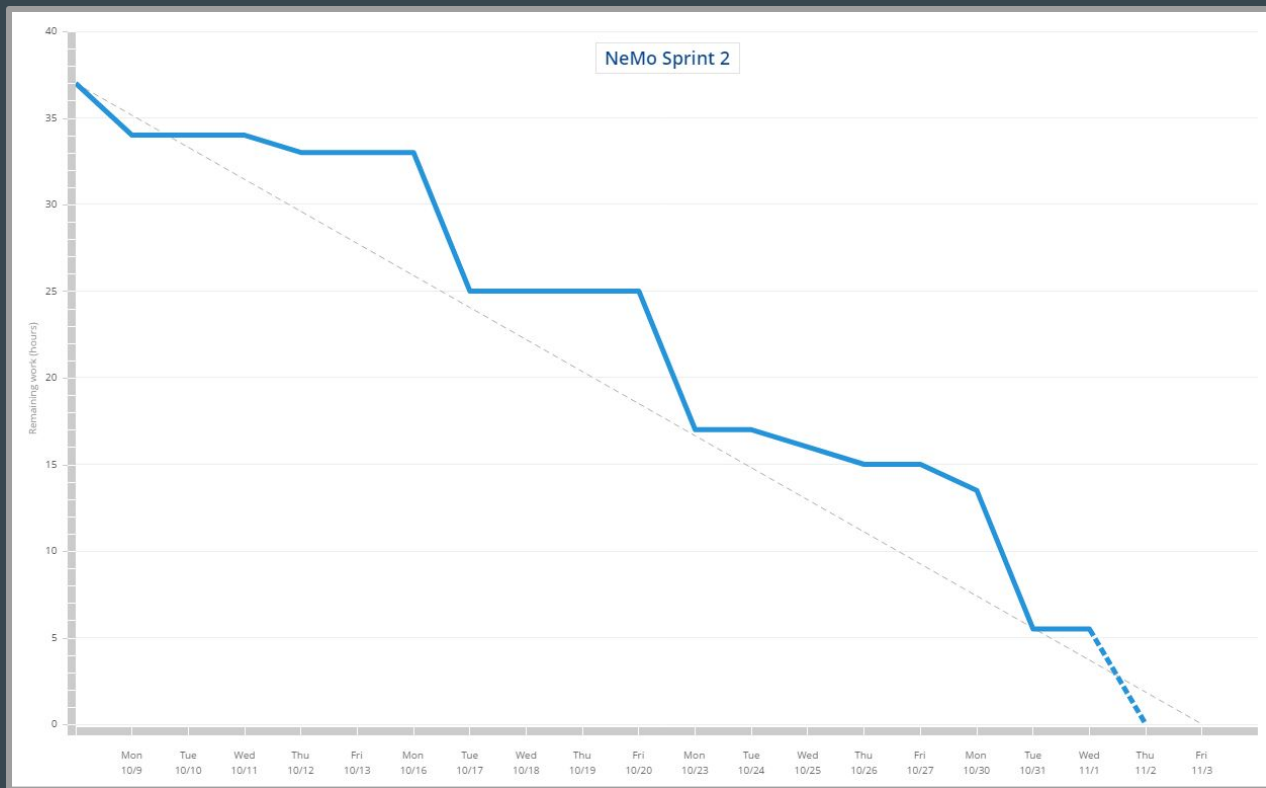
# Different Maps - Sprint 2



# Struggles - Sprint 2

- Communication within the team and with other stakeholders
- Changing requirements
- Familiarizing ourselves with NVIDIA NeMo
- Lack of familiarization with Git and Github + Recreation of github Repo
- Planes disappearing/Opensky API

# Burndown - Sprint 2





# Current Limitations - Sprint 2

- OpenSky API has call limit
- Source for Aeronautical Maps (VFR Maps) only allows to zoom in so far resulting maps with limited detail
- Current ASR Models have a relatively high Word Error Rate (WER)
  - Out of the box tutorial model (untrained) WER of ~0.89
  - Last senior design team (best model) WER of ~0.3
  - Aaron (Research Assistant) model WER ~0.15
  - Microsoft states that a WER of 0.05 - 0.10 is “good quality”

# Future Tasks - Sprint 3

- Continue development of database
  - Using the database to save and replay audio clips
  - Using the database to increase speed and save memory loading airport data
- Get transcriptions using NVIDIA NeMo working
- Live stream & output audio using NVIDIA NeMo
- Continue polishing the website
- Better organize and document within the code
- Fix or Minimize plane disappearance/Usage of Opensky API
- Creating a zoom limit on certain maps

# Future Tasks - Next Semester

- Align Communication & Breadcrumbs
- Icon color change for active speaker
- Integration of Kaldi & Better NeMo models into the webapp

Q&A