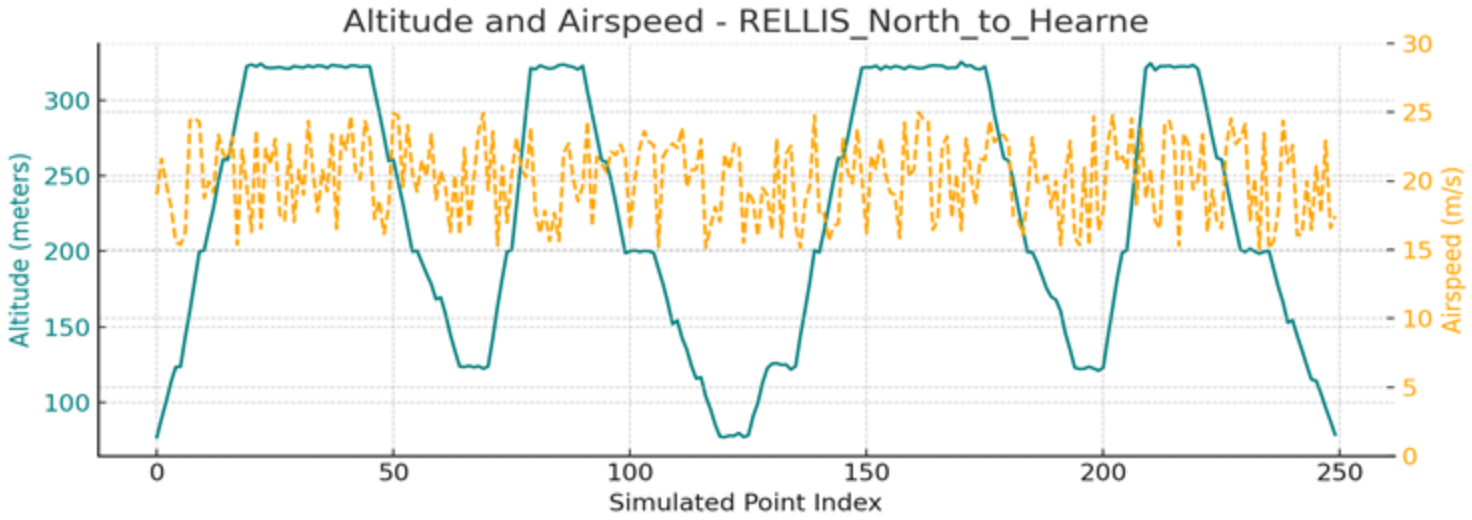
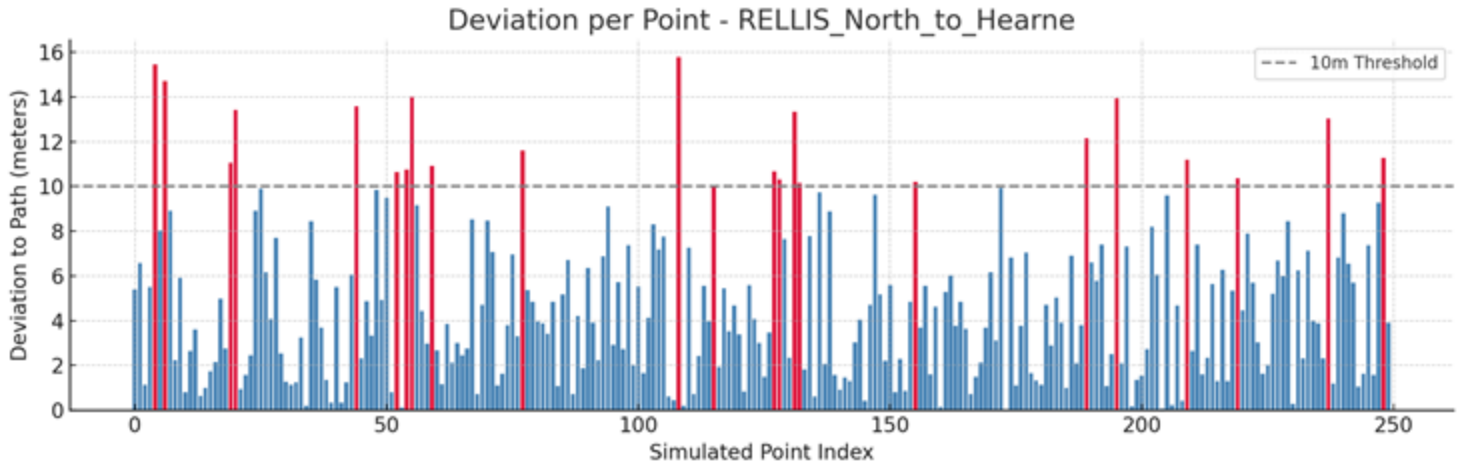
Previous Implementation

BUSH COMBAT DEVELOPMENT COMPLEX





BCDC Drone Tracker:

Goal: Develop real-time dashboard that collects and computes telemetry data from autonomous drones.

Features:

- Live real-time map
- Fully automated
- Dynamic Charts
  - Airspeed vs Altitude
  - Deviation per point time
  - Cumulative critical deviation

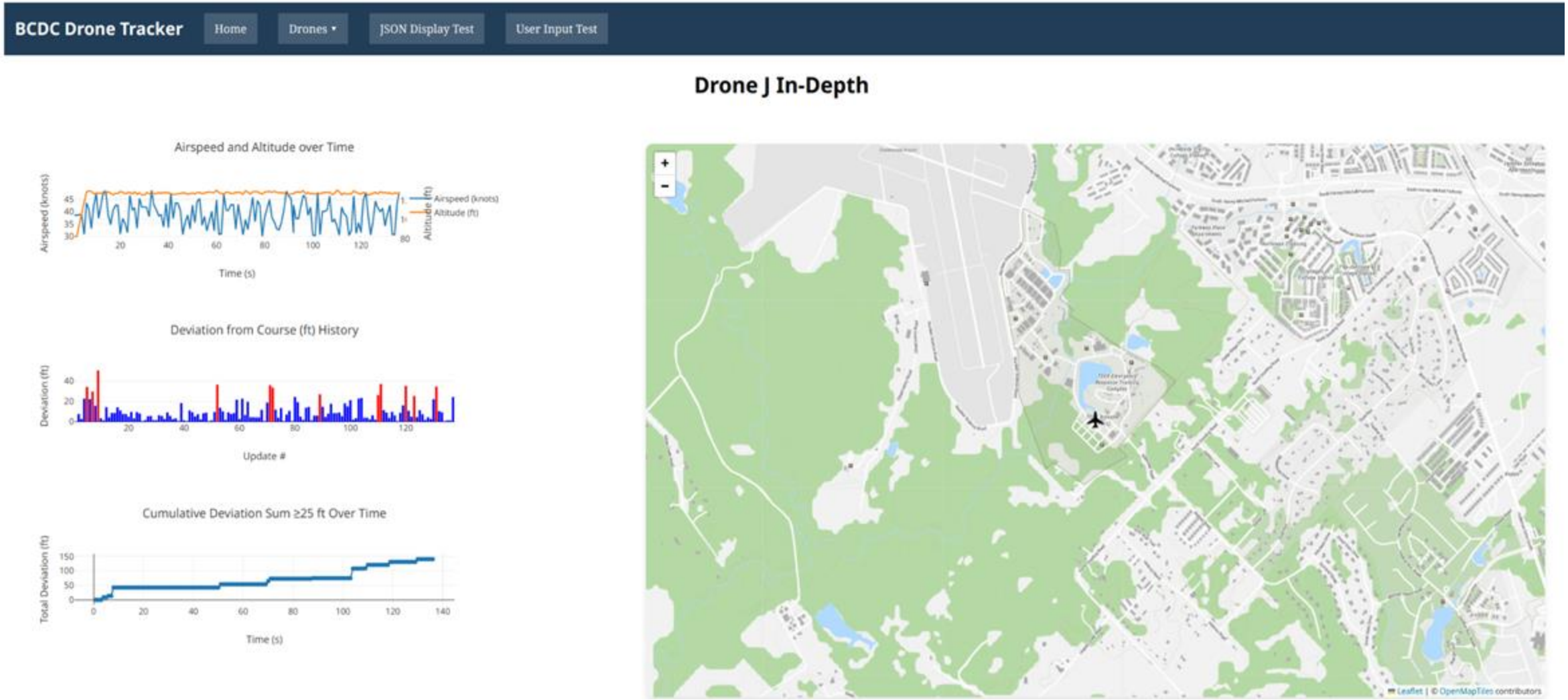
Designed and developed graphs using simulated data of drone flights.

Designed the website and made functionalities

Bridged the gap to have the website ingest data and output real-time graphs

Previous Implementation - Lacking

BUSH COMBAT DEVELOPMENT COMPLEX



Link to page: [Redacted]

What needed to be done?

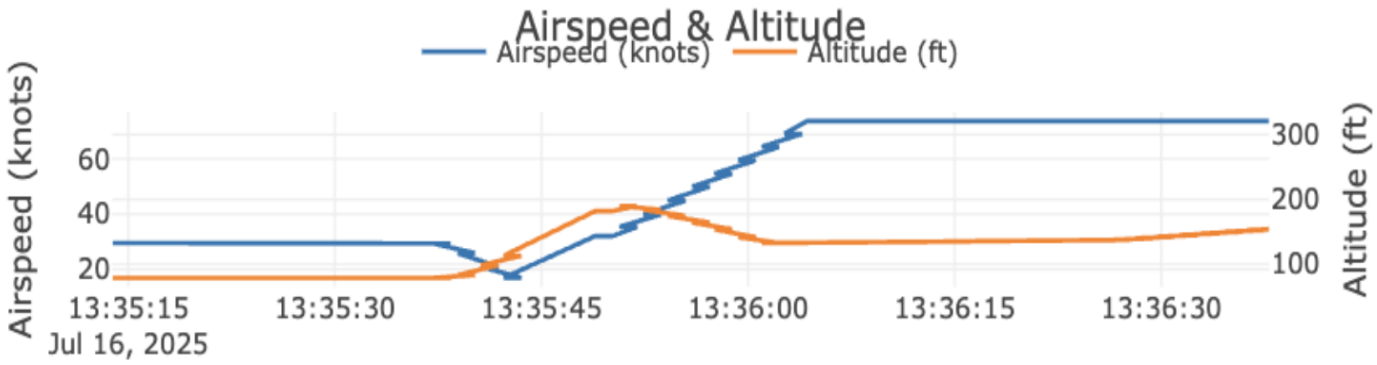
BUSH COMBAT DEVELOPMENT COMPLEX

- **Display all 4 drones at once**: responsive layout, labeled feeds, optimized performance
- **Flight trail**: colored paths, toggle visibility, optional time fade
- Timestamps: synced with JOSN packets
- JSON statistics: live telemetry panel, filter/highlight, export option
- **Data from [Redacted]**: reliable transfer of data, as well as reliable data
- API: document endpoints, define access scope, test performance
- **Security**: HTTPS, authentication tokens, login screen
- Backend database: store positions/stats, indexing, backups
- Extras: mobile-friendly UI, error logging, QA testing, deployment & performance tuning

Trials, Errors, and Everything in Between: Time Travel

BUSH COMBAT DEVELOPMENT COMPLEX

- Majority tests = [Redacted] would send telemetry, plus some *creative* numbers
- Time values would often skip ahead or behind, not following ~ 4 JSON/second
- Built a Python script to scan all JSON files for anomalies:
  - Impossible values/time data
  - Script now flags bad data before it reaches the map
  - Script output all bad data into an anomolies.json file

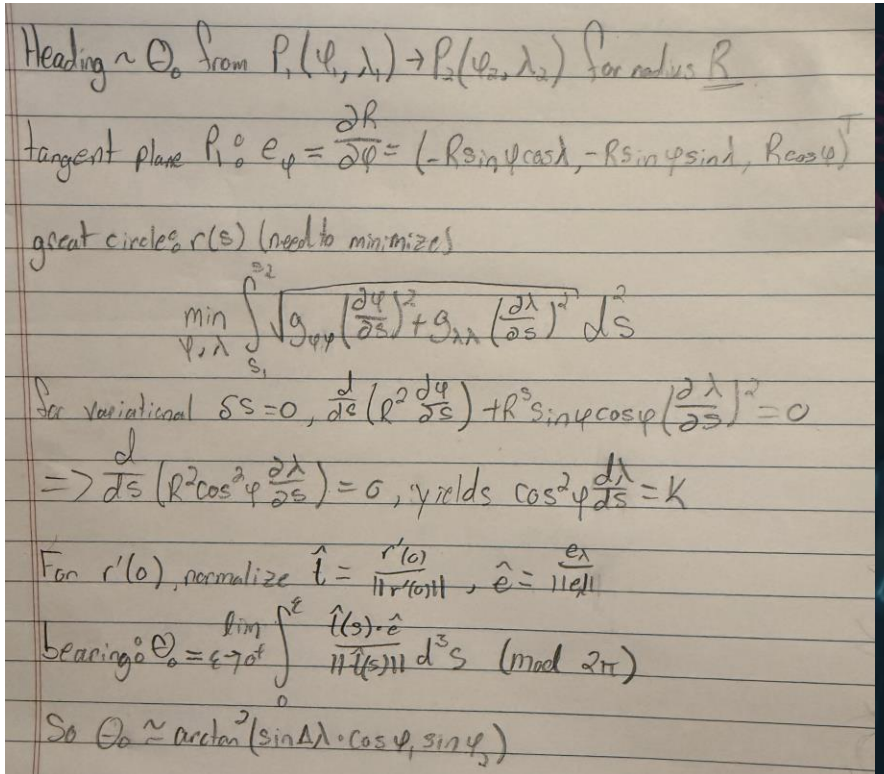


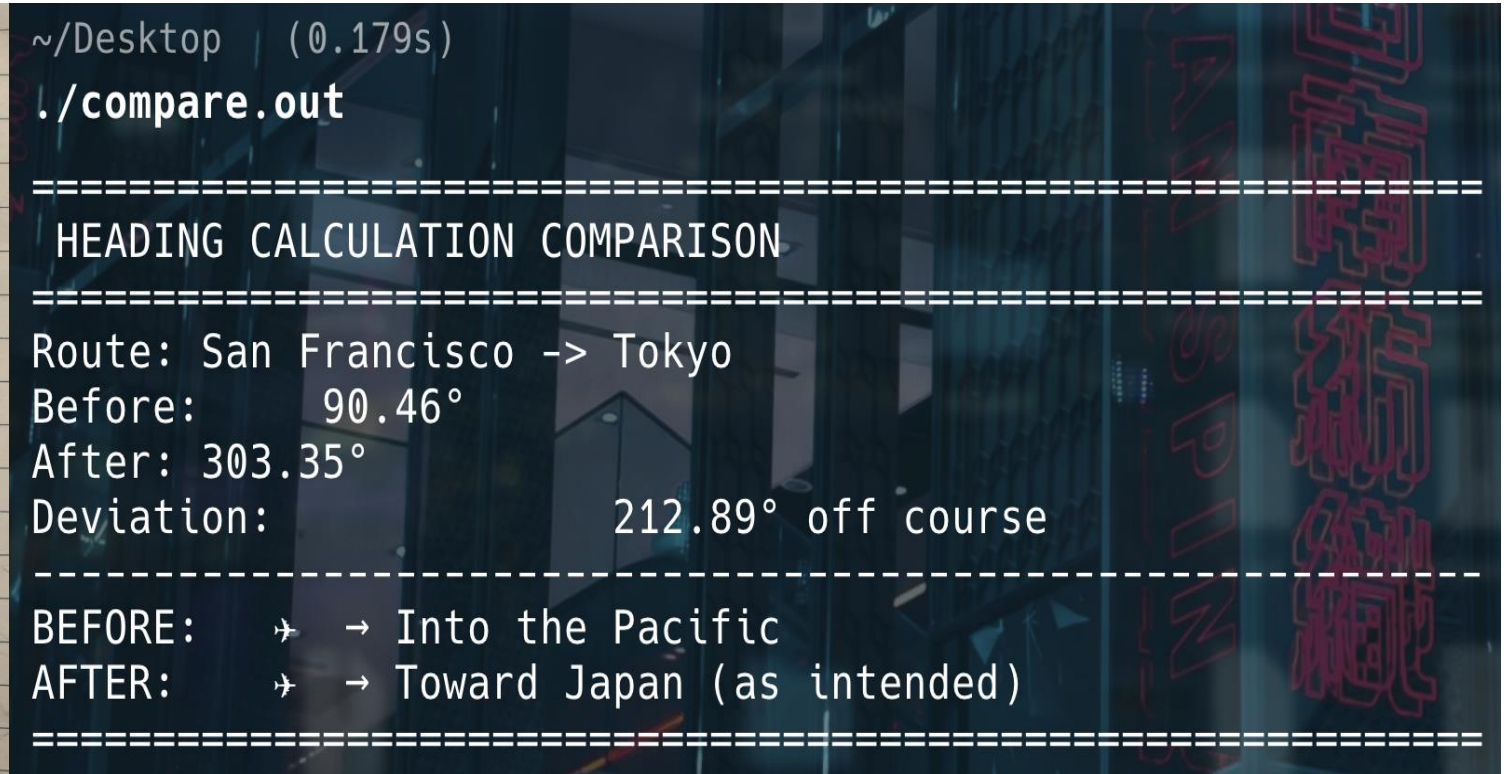

```
.venv ~/Desktop   (0.119s)
python3 pythonScript.py DroneData2/DUSKY*.txt --future-tol 1 -m 3 --json-out anomalies.
json

========== ANOMALY SUMMARY ==========

TOTAL anomalies: 314

By kind:
  backward      300  avg|Δt|=   1.33s  med|Δt|=   1.26s
  gap            14  avg|Δt|=   8.49s  med|Δt|=   8.08s

By file:
  DroneData2/DUSKY18.txt: 75
  DroneData2/DUSKY21.txt: 78
  DroneData2/DUSKY24.txt: 85
  DroneData2/DUSKY27.txt: 76

By call_sign:
  DUSKY18: 75
  DUSKY21: 78
  DUSKY24: 85
  DUSKY27: 76

Detailed anomalies written to anomalies.json
```

Trials, Errors, and Everything in Between: KISS

BUSH COMBAT DEVELOPMENT COMPLEX

- Goal: Have a plane path traced out & point plane in direction of travel
- Started with "less complicated" calculation for plane orientation: (x/y)
- Error built up; guesses? Solution: Earth is not flat
- Switched to rough estimation with error correction: results finally correct, lesson -> "keep it simple, stupid"



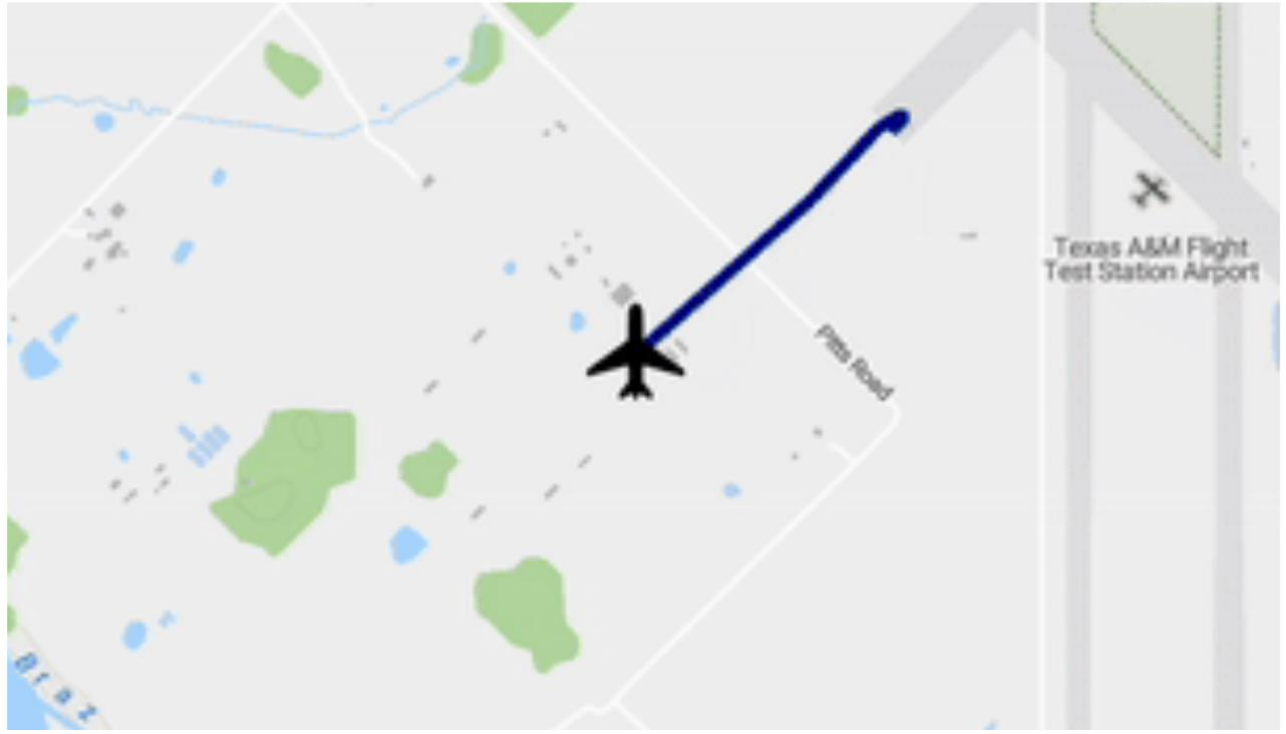


Trials, Errors, and Everything in Between: Rotation

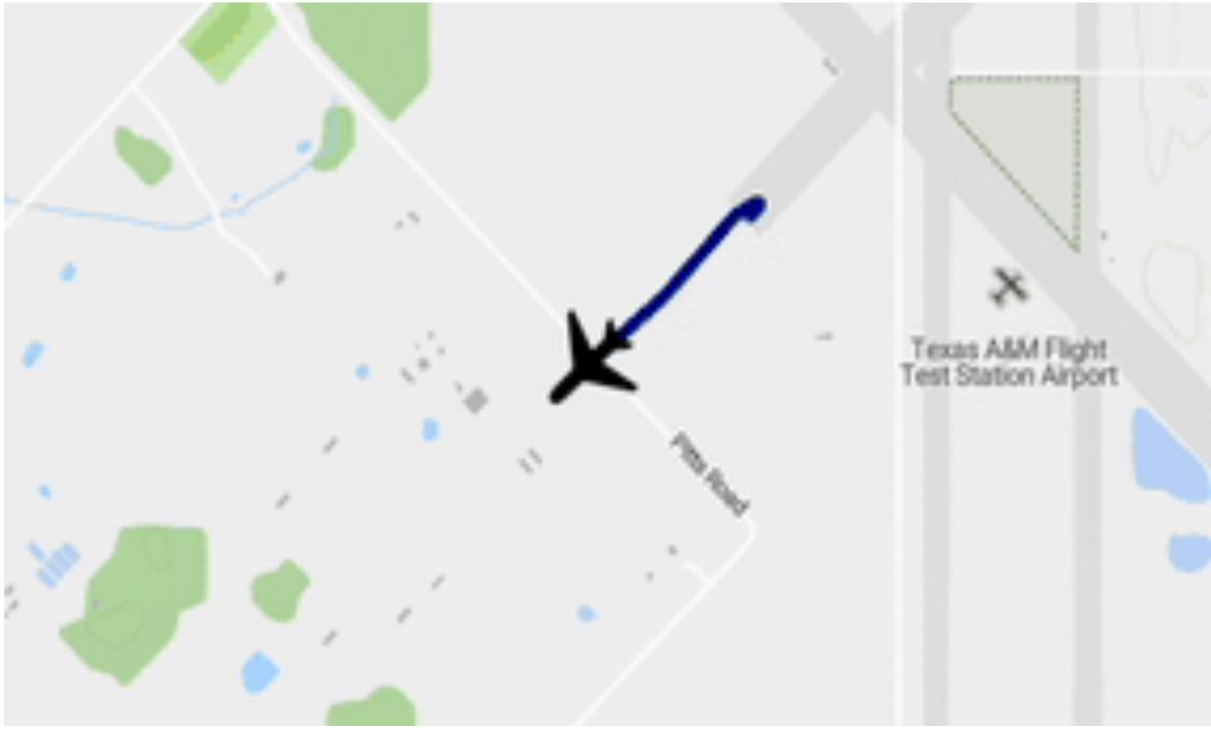
BUSH COMBAT DEVELOPMENT COMPLEX

- Planes could randomly change direction and orient to North on refresh
- Simple fix for main drone page, irrecoverable error on individual drone pages
- Ended up mirroring main page to individual drone page – fixed

Before



After



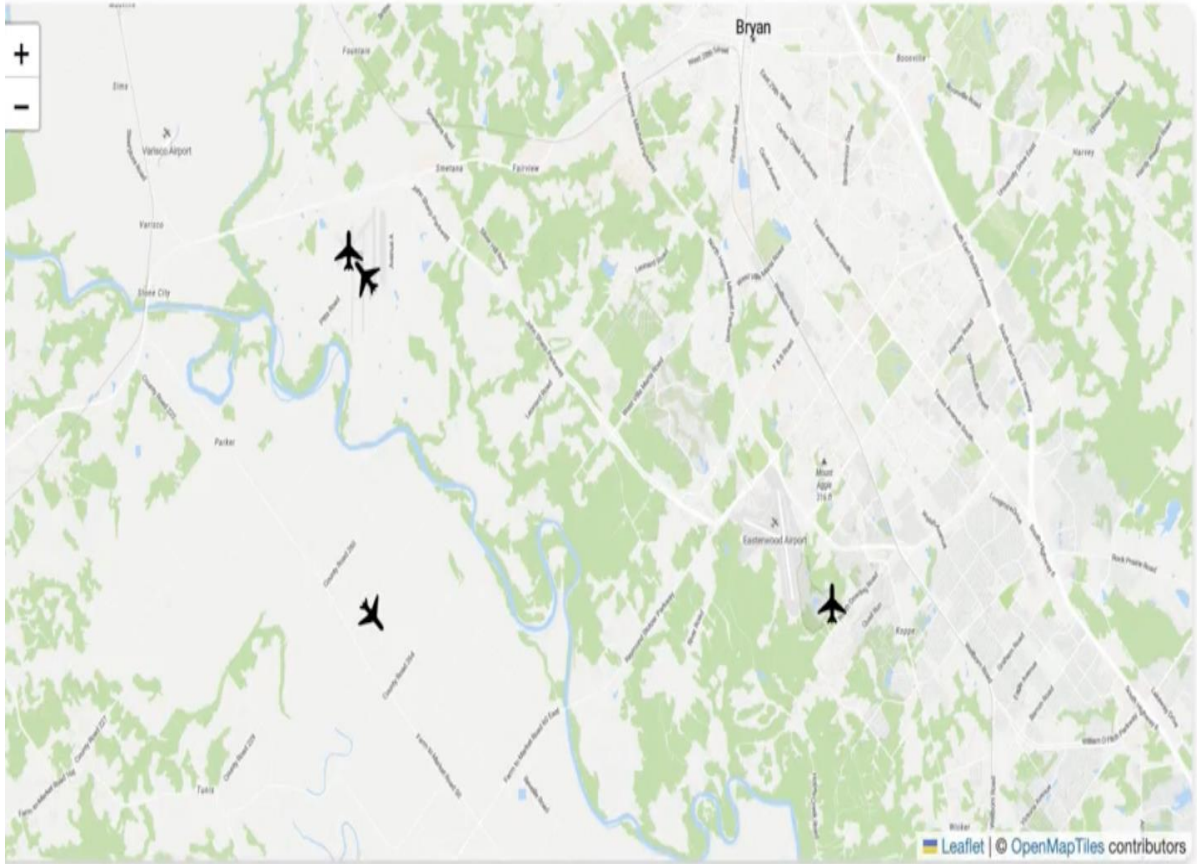
Current Website Layout – Main page maps

BUSH COMBAT DEVELOPMENT COMPLEX

BUSH COMBAT DEVELOPMENT COMPLEX

Home | Drones ▾ | Delete History

BCDC Drone Tracker



All Drones

Zoomed drone: DUSKY18

DUSKY18	DUSKY21	DUSKY24	DUSKY27
30.6336, -96.4812	30.6379, -96.4860	30.5751, -96.4790	30.5770, -96.3474

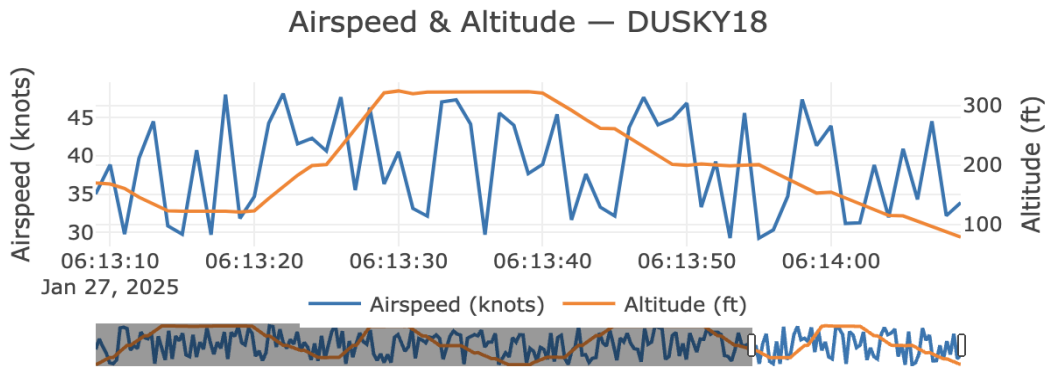
Current Website Layout – Main page graphs

BUSH COMBAT DEVELOPMENT COMPLEX

Airspeed & Altitude

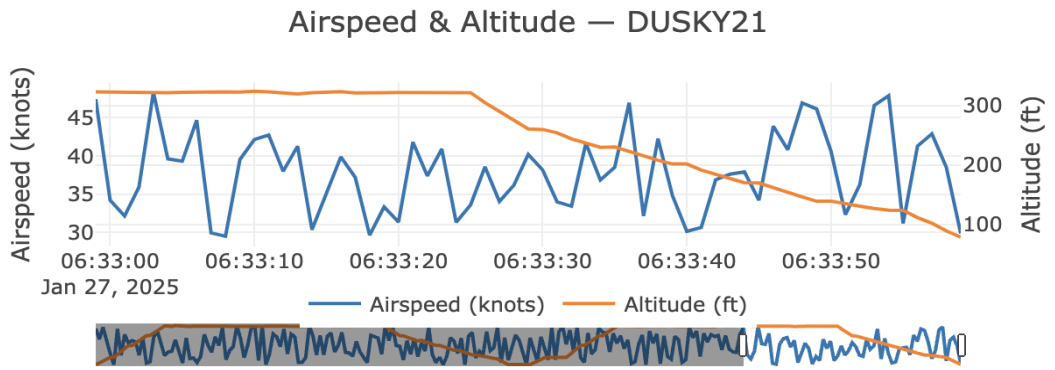
Drone DUSKY18

Airspeed: 33.90 kt
Altitude: 79 ft



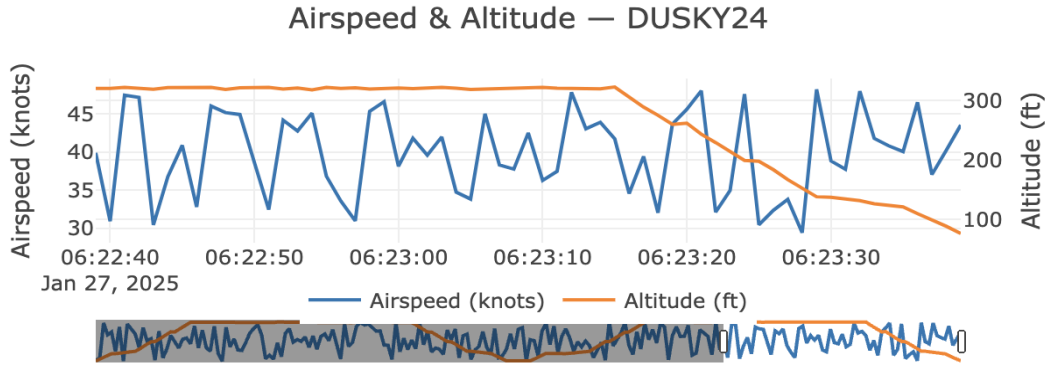
Drone DUSKY21

Airspeed: 29.88 kt
Altitude: 79 ft



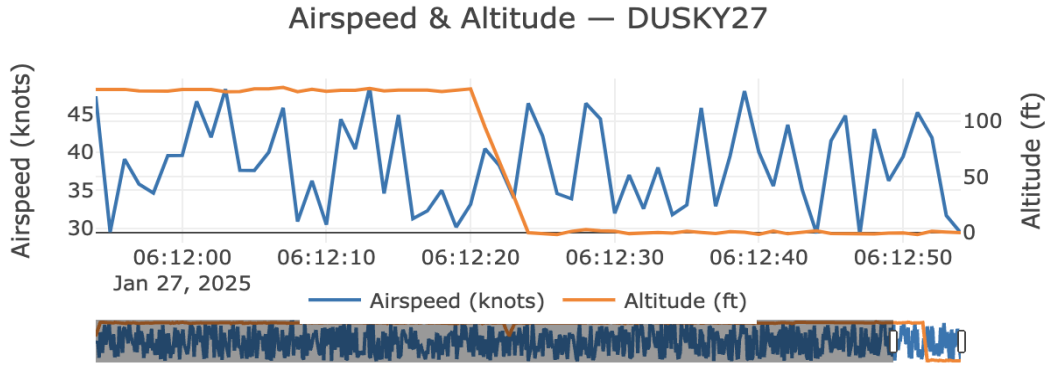
Drone DUSKY24

Airspeed: 43.54 kt
Altitude: 77 ft



Drone DUSKY27

Airspeed: 29.39 kt
Altitude: -0 ft



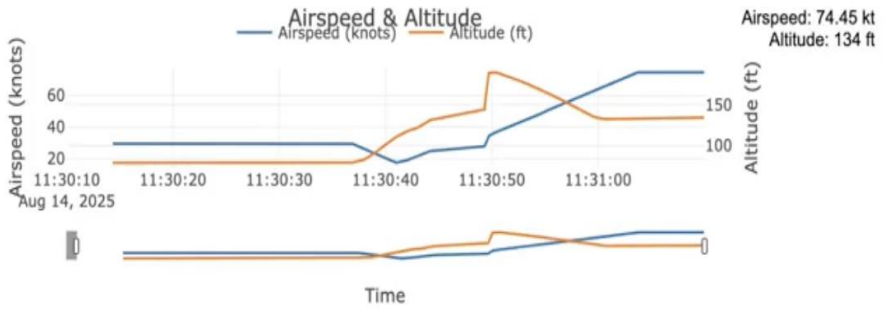
Current Website Layout – Individual Drone pages

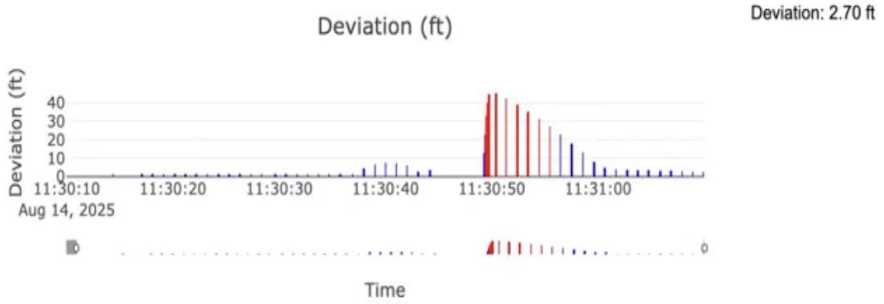
BUSH COMBAT DEVELOPMENT COMPLEX

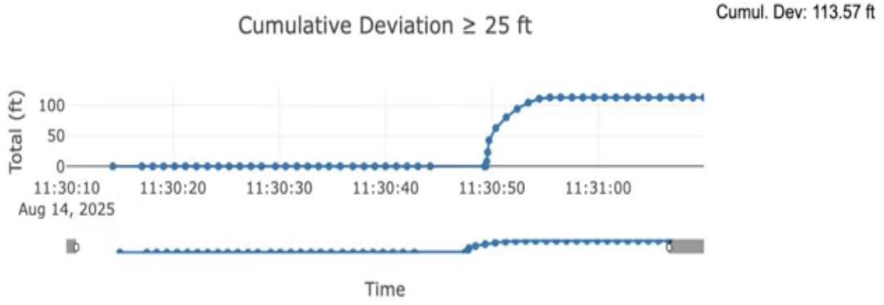
BUSH COMBAT DEVELOPMENT COMPLEX

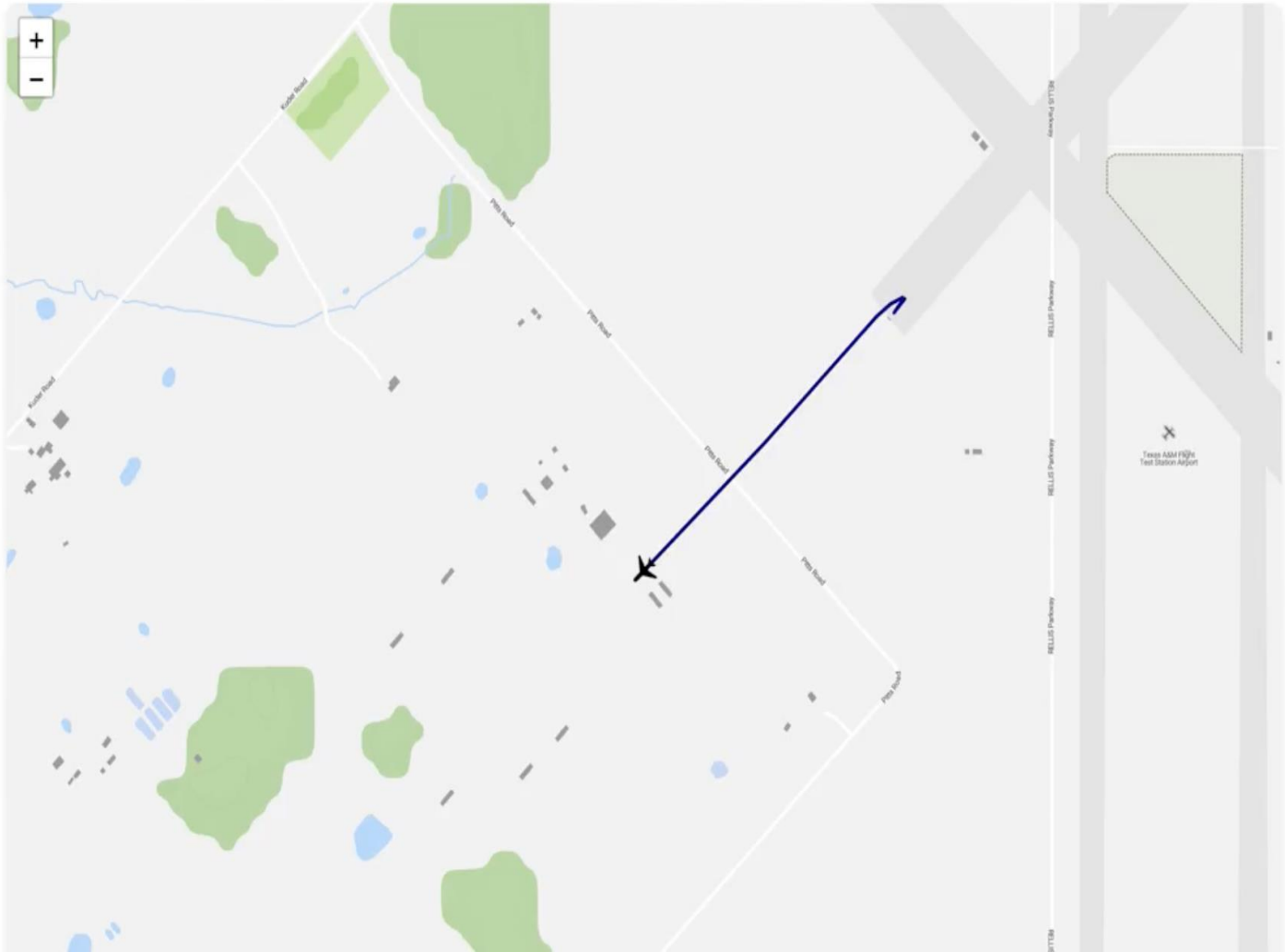
Home | Drones ▾ | Delete History

Drone DUSKY24 In-Depth









Future Developments – What's next?

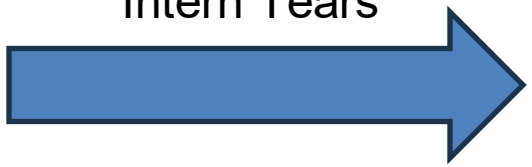
BUSH COMBAT DEVELOPMENT COMPLEX

BCDC Drone Tracker Current:

Features:

- Live real-time map
- Tracks up to 4 drones at once
- Fully automated
- Dynamic Statistical Graphs
  - Airspeed vs Altitude
  - Deviation per point time
  - Cumulative critical deviation

Software Magic + Intern Tears



BCDC Drone Tracker Future:

Features:

- Same as current
- Database implementation
  - Can be done in PythonAnywhere
- Optimization upgrades
  - May require premium accounts
- Migrate to BCDC server?
- Mobile UI?
- Use for future BCDC projects?

Summary – Current Website Standing & Info

BUSH COMBAT DEVELOPMENT COMPLEX

BCDC Drone Tracker:

Goal: Develop real-time dashboard that collects and computes telemetry data from autonomous drones.

Features:

- Live real-time map
- Fully automated
- Dynamic Charts
  - Airspeed vs Altitude
  - Deviation per point time
  - Cumulative critical deviation

Technical Info:

Website(pythonanywhere):

- Development: [Redacted]
- Production: [Redacted]

Limitations:

- Storage: 512Mb
- CPU: 100s (not hard capped)
- Consoles: At most 2
- Capacity: < 100k hits/day