FUSION FLIGHT: REAL-TIME MULTIPATH DETECTION AND MITIGATION WITH ML-AUGMENTED INTERFEROMETRY

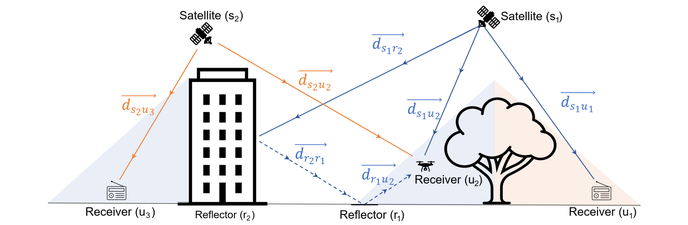
STUDENTS: GOKUL NATHAN[1], ERNST ANDERSON[1], SHAWN CHAN[1]

1. ARC LAB, DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING, UNIVERSITY OF WASHINGTON, SEATTLE, WA, USA

AUTONOMY, ROBOTICS, & CONNECTIVITY

PROBLEM

Autonomous systems depend on continuous, trustworthy GPS. In reflective and cluttered environments, multipath and interference distort GNSS measurements, producing unpredictable localization performance.



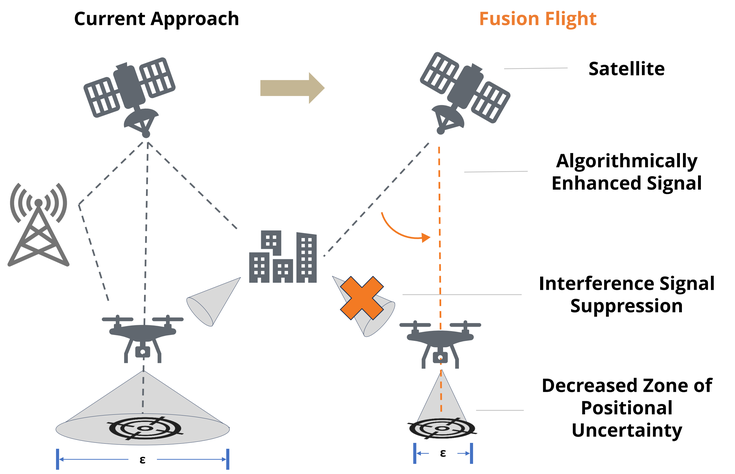
Nathan, G. (2024). *Examination of Drone Localization Performance with Commercially Available Embedded GPS Sensors*. Master's Thesis, University of Washington

When localization is unreliable, autonomy must slow down, add safeguards, or revert to a human operator, limiting adoption in these industries:

Last-Mile Delivery | **Infrastructure and Inspection** | **Maritime and Port Operations** | **High Precision Agriculture**

TAM: **$3.8B** high-precision airborne GNSS market by 2032 (12.7% CAGR), within a $20+B GNSS augmentation services market by 2030

OUR SOLUTION



Competing high-accuracy GPS needs RTK/PPK corrections and fixed reference networks.

- Requires reliable communications
- Adds cost, setup, and operational burden
- Limited scalability
- Performance degrades in complex environments

Fusion Flight enhances GNSS reliability through algorithmic **multipath mitigation** and **interference suppression**.

- Reduces positioning uncertainty
- Improves signal confidence and continuity
- Enables scalable, low-SWaP integration
- Compatible with existing GNSS/IMU stacks

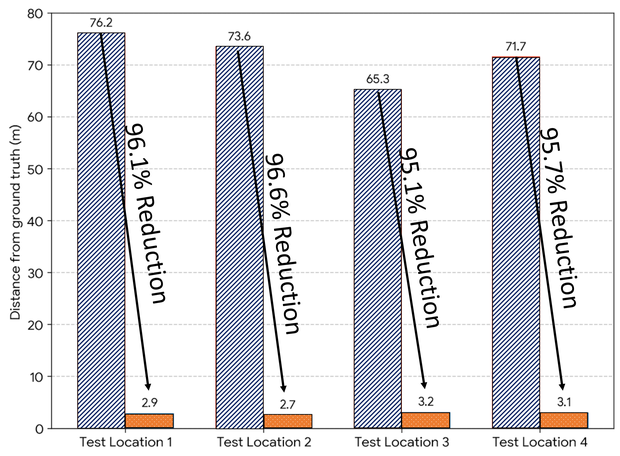
Fusion Flight: $600 solution replaces $5,000–$8,000 in RTK base station hardware — **90%** cost reduction, **no setup** overhead, runs on **existing** GNSS/IMU stacks

EXPERIMENTATION

Field experiments were conducted to evaluate GNSS performance in a controlled urban corridor environment over repeated evening trials.

- **Two-week campaign**, 7–10 PM data collection window
- Test corridor between Guggenheim Hall and the Aerospace Building
- Custom DAQ enclosure built to securely house synchronized GPS receivers
- Antennas mounted above enclosure to maintain clear sky exposure
- Overhead sky imagery captured for post-processing satellite geometry analysis
- Completely **new, unseen environment with heavy atmospheric disturbances**

Residual Magnitude Error of GPS Fix

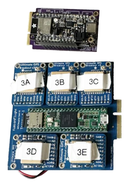


Post-processing analysis demonstrates substantial reduction in residual position error compared to raw GPS measurements

- **24× improvement** in residual positioning accuracy after Fusion Flight processing
- Consistent performance improvement across **4 independent, unseen sites**
- Reduced variance and **improved fix stability** in multipath-rich conditions

TECHNICAL STACK

PATH FINDER



Aircraft prototype (Boeing) to validate core algorithms & data

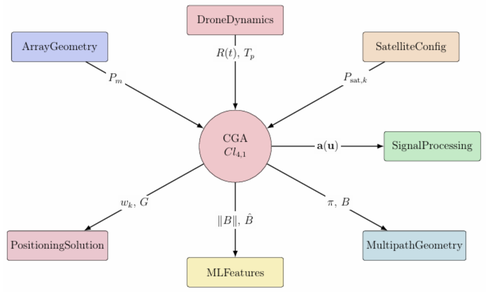
SCOUT

UAV-sized prototype for real-time drone field testing

EVK

Evaluation kit to compare GNSS + auxiliary sensors across config.

FUTURE WORKS & PRODUCT ROADMAP



We have developed **a unified real-time estimation framework** that jointly models:

- platform dynamics
- satellite geometry
- array configuration
- signal behavior

We reduce GNSS instability and provide accurate navigation solutions for aerospace applications in real-time on low compute hardware.

THE TEAM & COMMERCIALIZATION ROADMAP

Sep - CFO

Shawn - Chief Engineer | Gokul - CEO | Ernst - CPO

Tom – National Security Advisor

Eric – Commercial Advisor

RBPC 2026

Invited to compete in the 2026 Rice Business Plan Competition (**1 of 42** companies selected worldwide)

Planned Pilot program with the US Coast Guard in Puget Sound (Due Diligence on Letter of Support and Access)

Expanding technical efforts towards dynamic testing in adjacent markets

Applying to NSF Translation to Practice - Translate

GUIDEAIR LABS

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