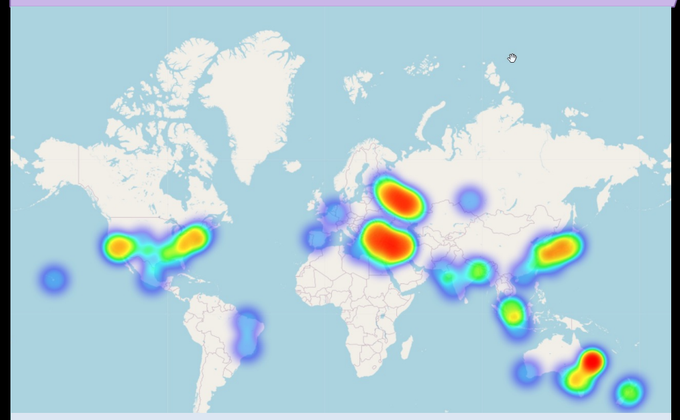
NavSentinel: A Resilient and Unspoofable GNSS Receiver

Problem & Objectives

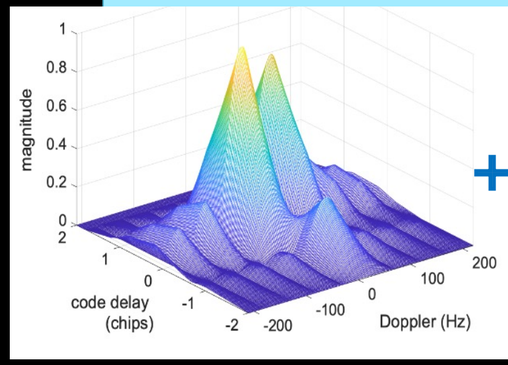
- **GNSS** is the **nervous system** of modern **transportation**.
- **Spoofers** can inject counterfeit signals → false position/time → **risks** to **safety, logistics,** and **security**.
- **Goal:** a **GNSS receiver** that **never yields corrupted PNT**, even through **covert** capture-phase **attacks**.

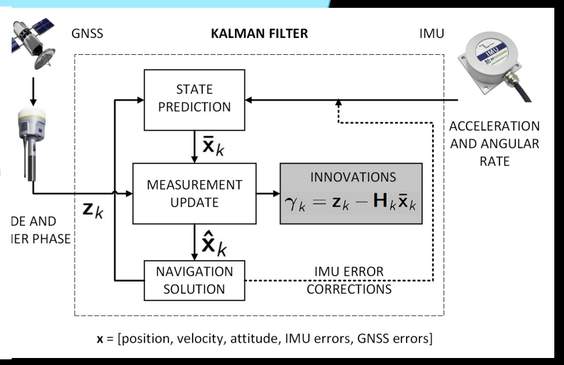


Interference Detection & Localization from Aircraft ADS-B GPS Position Reports

Solution & Performance

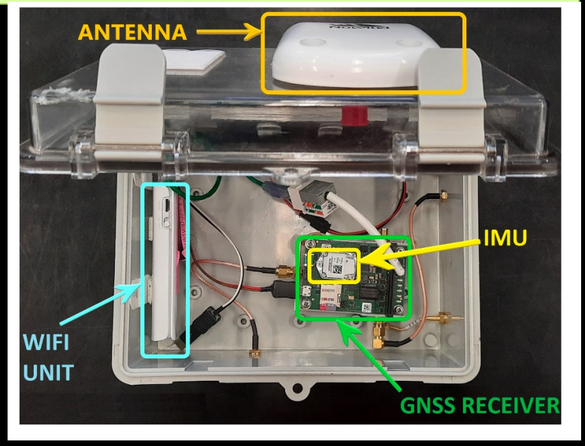
- **NavSentinel** – a real-time detect, separate, and track control loop.
  1. INS/GNSS monitor **detects sub-decimeter spoofing**.
  2. CCAF/iRAIM **separates authentic & spoofed** components and **tracks the true signal**.
- Key metrics (target):
  - **Detection** within seconds.
  - **False-alarm** probability < 10^{-5}
  - **Position error** < 0.2 m
  - **Continuous operation** > 99.9 % uptime under attack





Path to Market

- **Phase 1: Fuse** and optimize algorithms.
- **Phase 2: Prototype** on FPGA + Lab tests.
- **Phase 3: Field trials** (NavFest/PNTAX), **pilot integration** with OEM partners.
- **Commercial** hook: **OEM licensing** + safety-critical add-on → **$3B anti-spoof market** by 2028.



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