



# AQNav - AI-based Quantum Sensing for Resilient Navigation

The over-reliance on GPS for accurate navigation has become a critical vulnerability as nefarious actors increasingly disrupt and deny access to these signals at an alarming rate. What was once a reliable and accurate navigation source is now frequently targeted, exposing industries and governments to significant operational risks.



The time has come for both sectors to commit to adopting Assured Positioning, Navigation, and Timing (APNT) solutions to enhance GPS and close this growing vulnerability gap. By addressing this challenge, we can ensure seamless operations, even in the most contested and challenging environments.

AQNav is a breakthrough navigation technology that leverages proprietary Large Quantitative Models (LQMs),

powerful quantum sensors, and the Earth's crustal magnetic field, which acts as a global fingerprint to enhance positional awareness, delivering an unjammable, un-spoofable, all-weather, real-time navigation solution for both military and commercial applications. With the omnipresent and unjammable nature of Earth's magnetic field, AQNav provides reliable access, even in the face of jamming or spoofing attempts.



## The AI and LQM Advantage

Large Quantitative Models (LQMs) are a type of AI model specifically trained on quantitative data. Similar to how Large Language Models (LLMs) are trained on language data, LQMs are designed to handle complex numerical datasets and make sense of structured, quantitative inputs. AQNav leverages LQMs to extract useful signals from the Earth's magnetic field by filtering out noise and comparing the refined data to known magnetic maps. This allows the system to pinpoint its exact location with high accuracy.

In our system, highly sensitive classical and quantum sensors gather vast amounts of data, and LQMs drive the real-time analysis and interpretation, allowing AQNav to navigate reliably in any environment, regardless of jamming, spoofing, or weather conditions. Essentially, just as LLMs have transformed natural language understanding, LQMs are revolutionizing how we interpret physics-based quantitative data for navigation.

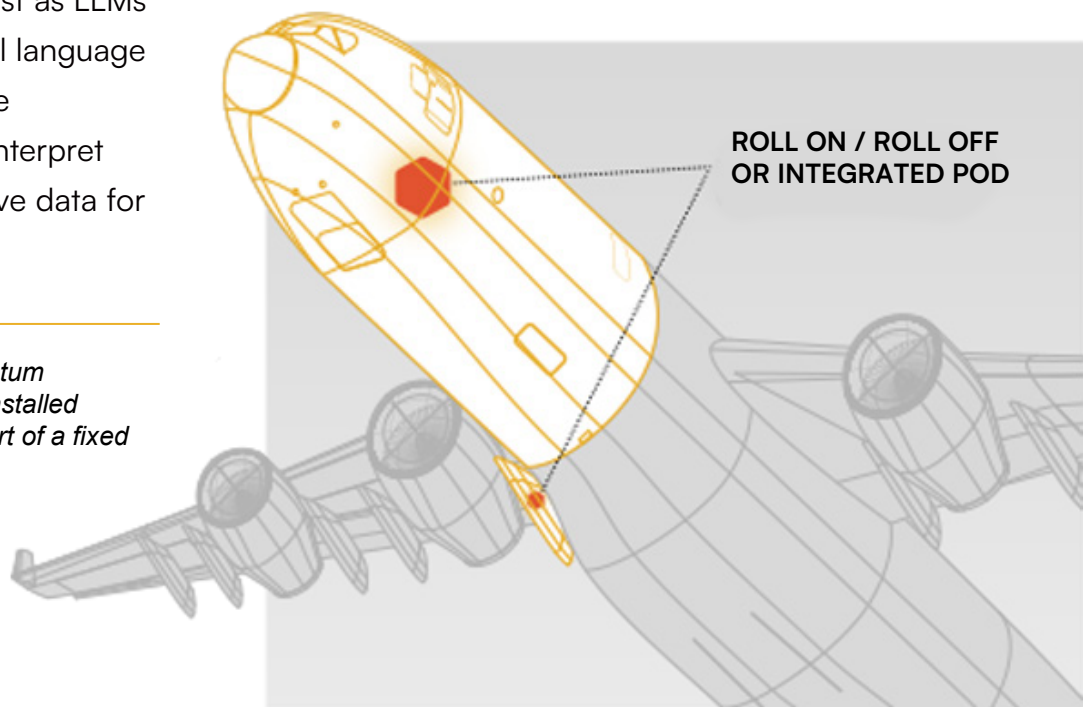
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*SandboxAQ's adaptable quantum navigation prototype can be installed directly on an aircraft or as part of a fixed wing sensor pod.*

In AQNav, these AI-driven LQMs are the backbone of the system, ensuring robust, resilient, and precise navigation across air, land, and sea domains. Resilient navigation is a mission-critical capability for worldwide air traffic, national security, autonomous vehicles, and safer transportation around the globe.

## Quantum Sensors for Adaptive Navigation

The goal of AQNav is to supplement GPS in a system-of-systems approach, ensuring uninterrupted navigation when GPS is unavailable or intentionally spoofed. Designed to complement and extend current navigation capabilities, AQNav delivers confidence even in the most challenging scenarios. It is also modifiable and can easily integrate with existing navigation systems.





## Key Features

AQNav technology can provide operators with trusted positioning solutions regardless of the operating environment.

### Unjammable Worldwide Signal

Adversaries cannot degrade Earth's magnetic field, ensuring a persistent and trusted signal.

### All-Weather

AQNav is not influenced by clouds or lighting conditions, making it an effective complement to other techniques.

### All-Domain

Magnetic navigation does not require visual ground features, making it a valuable tool for navigation at sea, over open water, on remote terrain, or even underwater or underground.

### Passive Technology

AQNav is passive, only sensing Earth's magnetic signals to ensure users remain undetected.

### Improved Global Magnetic Mapping

Data generated from quantum sensors has the potential to enhance global magnetic maps for a variety of stakeholders and use cases.

## Why SandboxAQ?

SandboxAQ's physics-based quantitative AI unlocks novel applications using quantum sensors that were previously unavailable using sensors or AI alone. The multidisciplinary SandboxAQ team includes scientists specializing in geomagnetism, physics, and AI as well as hardware engineers with expertise in prototyping and small form factor sensors.

## Building the Magnetic Navigation Ecosystem

Earth's magnetic field has been studied for centuries, but its application in navigation now goes far beyond a compass and map. SandboxAQ is seeking partner organizations to deploy AQNav. Deployed sensors collect critical magnetic field data that informs more accurate maps. Better maps equals better and safer navigation for all. SandboxAQ will share performance data and benchmarks with the navigation community as our product matures. Join us today!