



# Quantum Sensing for Resilient Navigation

The navigation capabilities of the U.S. and its allies are being challenged as near-peer adversaries and nefarious actors deny the ability to accurately navigate the globe. In this era of great power competition, threats to navigation technology are more persistent than ever.

Now is the time to develop an overall Assured Positioning, Navigation, and Timing (APNT) solution to augment the Global Positioning System (GPS), ensure resiliency, and maintain operations — even in the most contested environments.

## The Quantum Advantage

Earth's magnetic field has been harnessed for analog, compass-based navigation for centuries — migratory birds even navigate in this way. Quantum sensors are highly sensitive which enables them to observe the slightest changes in electric and magnetic fields that are not detectable via traditional sensors.

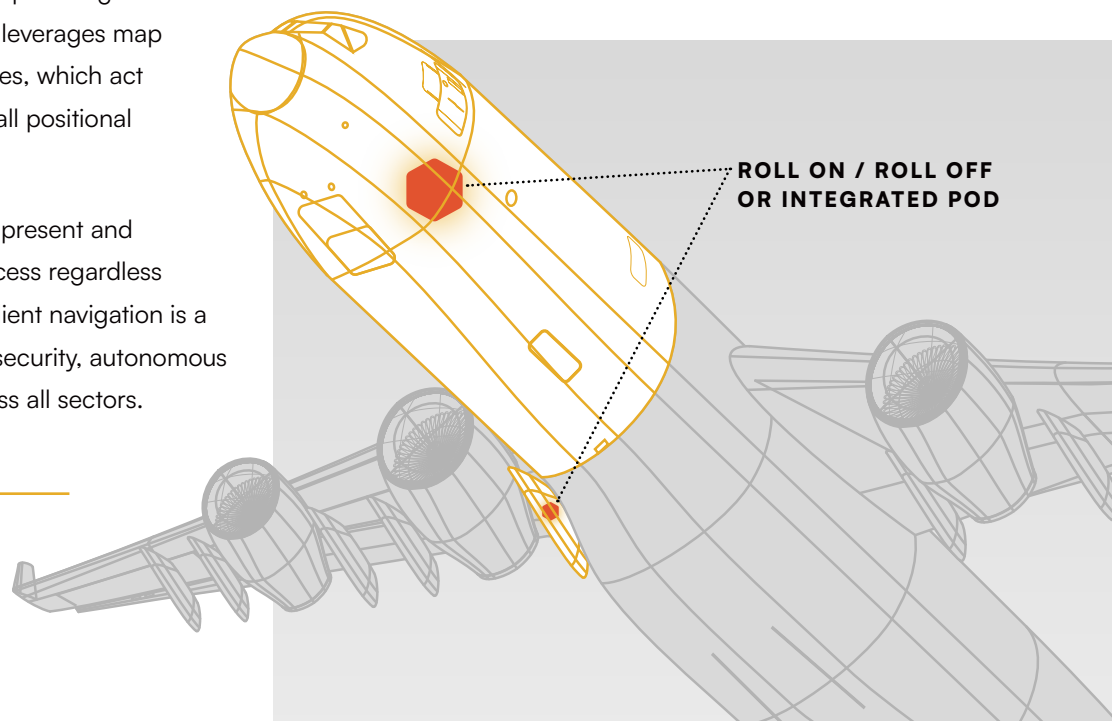
Using Earth's magnetic field as a signal, SandboxAQ is developing an advanced quantum navigation system using a combination of AI and Quantum technologies we call "AQ." AI algorithms filter out noise to improve signal processing. Our quantum sensor then leverages map data to identify magnetic field anomalies, which act as global fingerprints to enhance overall positional awareness.

Because Earth's magnetic field is omnipresent and unjammable, it provides unfettered access regardless of jamming or spoofing attempts. Resilient navigation is a mission-critical capability for national security, autonomous vehicles, and safer transportation across all sectors.

## Quantum Sensors for Adaptive Navigation

The goal of our AQ-based solution is to offer an alternative to GPS that provides uninterrupted navigation in situations where GPS is unavailable or intentionally spoofed. Our sensor is being designed to complement and extend current navigation capabilities to deliver confidence in even the most challenging scenarios. SandboxAQ's quantum sensor is modifiable and able to easily integrate with existing navigation systems.

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





## Key Features

AQ 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

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

### All-Domain

Quantum 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

Our technology 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-inspired AI unlocks novel applications using quantum sensors that were previously unavailable using sensors or AI alone. The multi-disciplinary 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 Quantum 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 government partners to deploy AQ navigation technology. Deployed sensors collect critical magnetic field data that informs more accurate maps. Better maps equals better mission outcomes for all. SandboxAQ will share performance data and benchmarks with the navigation community as our product matures. Join us today!

