UK HUB FOR
QUANTUM ENABLED POSITION,
NAVIGATION & TIMING

Low-drift quantum enhanced sensors for navigation

Developing new quantum accelerometers and gyroscopes for accurate navigation systems that don't need any external signals

QEPNT.ORG

Low-drift quantum enhanced sensors for navigation

Inertial sensors measure an object's motion and orientation by detecting acceleration and rotational rate. These signals can be used to calculate a vehicle's change in position, without ever needing to send or receive a signal externally. Further position accuracy can be achieved through sensor fusion, for example by augmentation with magnetic field sensors.

Currently, the UK relies on GNSS (satellite-based navigation) for determining position and navigation, and it underpins vital areas of the UK's economy, infrastructure and national security. However, GNSS is vulnerable to interference and attacks, and the signals can be affected by bad weather, tall buildings and poor coverage underground or underwater.

QEPNT research led by Imperial College London is developing quantum-enhanced inertial sensors that will deliver significant performance advantages over existing classical sensors, through reduced drift. These sensors can be deployed in rail and maritime environments, with a view to developing future long-range quantum navigation systems that can operate in satellite denied environments.

Accelerometers and gyroscopes devices created by the team will accurately pinpoint their locations no matter where they are placed, paving the way for the creation of a new generation of underground and underwater sensors.

KEY BENEFITS

- New device doesn't rely on receiving external signals – removes the possibility of signals being lost or blocked by buildings.
- Cold atom devices allow more accurate measurements over longer periods of time.
- Optimising size, weigh, power and cost of the devices for more advanced field trials.

APPLICATIONS

Our next generation inertial sensors have applications in:

- Navigation – aircraft, underwater vehicles, spacecraft, and connected and autonomous vehicles (CAVs)
- Telecommunications
- Energy

MEET OUR INVESTIGATORS

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FOR MORE INFORMATION, PLEASE CONTACT

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Dr Joe Cotter's team collaborates with the Royal Navy to test the Imperial technology in the real-world environment.
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