Stable Three-axis Nuclear Spin Gyroscope in Diamond
Technology #15617

Applications

This invention is used in navigation, inertial sensing, rotation sensors, mobile and geodetic applications.

Problem Addressed

The most widely used commercial gyroscopes are built using micro-electromechanical systems (MEMS) technology. Despite its several advantages over other systems, they suffer sensitivity drifts after a few minutes of operation. Therefore, there is a need for a commercial gyroscope that offers the advantages of MEMS-based systems with little or no sensitivity drift.

Technology

The invention overcomes the drawbacks of current gyroscopes by introducing a quantum sensor that provides a sensitive and stable three-axis gyroscope in the solid state. The Nitrogen-Vacancy (NV) based gyroscope includes a diamond structure implanted with multiple NV centers, whose nuclear spins form a spin gyroscope. A number of radio-frequency coils and microwave coplanar waveguides are fabricated on the diamond structure to provide a sensitive and stable three-axis gyroscope in the solid state.

Advantages

- Better stability and higher sensitivity than conventional MEMS-based gyroscopes

Categories For This Invention:

Photonics
Sensors (Photonics)

Intellectual Property:

Stable three-axis nuclear spin gyroscope
Issued US Patent
9,417,068
Stable three-axis nuclear spin gyroscope
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**Publications:**

*Stable Three-Axis Nuclear Spin Gyroscope in Diamond*  
American Physical Society  
Physical Review A. 11 December 2012, Vol. 86, Iss. 6

**External Links:**

Quantum Group  
http://qeg.mit.edu/Cappellaro.php

**Image Gallery:**

![Image of a three-axis nuclear spin gyroscope in diamond.](attachment:image.jpg)