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Low Earth Orbit Satellite Signal Aided Inertial Navigation System

Tech ID: 34527 / UC Case 2019-676-0

BRIEF DESCRIPTION

An innovative technology that greatly enhances navigational system performance by reducing dependence on unreliable signals for a wide range of navigation-reliant products.

FULL DESCRIPTION

This innovation greatly enhances the navigational performance of positioning systems by reducing inertial navigation system (INS) error accrued when traditional global navigation satellite system (GNSS) signals are unavailable or degraded. The technology integrates Doppler measurements from low Earth orbit (LEO) satellite vehicles with inertial measurement unit (IMU) data, along with the traditional GNSS inputs. This innovation employs the extended Kalman filter (EKF), and aids in overcoming the single-point dependency on unreliable GNSS signals inherent in all navigation-dependent applications, such as mobile devices.

SUGGESTED USES

- » Mobile device manufacturers and cellular network providers.
- » Applications in the aerospace and automotive industries.
- » Defense applications, such as unmanned aerial vehicle (UAV) manufacturers.
- » Providing enhanced products to GNSS device manufacturers.

ADVANTAGES

- » Improves INS accuracy during GNSS outages or signal blockages.
- » Utilizes low-cost LEO satellite signals transmitted over diverse frequencies and directions.
- » Simultaneously estimates satellite states and vehicle positioning in real-time.
- » Reduces dependency on traditional GNSS satellites.
- » Employs extended Kalman filter for precise data fusion and navigation.
- » Compatible with a priori imperfect satellite position and velocity data.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,808,867	11/07/2023	2019-676
Patent Cooperation Treaty	Published Application	2020/226862	11/12/2020	2019-676

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OTHER INFORMATION

CATEGORIZED AS

- » **Communications**
 - » Other
 - » Wireless
- » **Sensors & Instrumentation**
 - » Position sensors
- » **Transportation**
 - » Aerospace
 - » Automotive

RELATED CASES

2019-676-0

Additional Patent Pending

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