Navigation With Differential Carrier Phase Measurements From Megaconstellation LEO Satellites

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BRIEF DESCRIPTION

A novel navigation framework utilizing low Earth orbit (LEO) satellite signals to provide accurate positioning where traditional Global Navigation Satellite System (GNSS) signals fail.

FULL DESCRIPTION

This technology leverages signals from low Earth orbit (LEO) satellites as an alternative or supplement to global navigation satellite systems (GNSS), especially in environments where GNSS signals are unreliable or unavailable. It introduces a carrier phase differential-LEO navigation framework with a proprietary method to extract navigation observables from LEO signals. The system characterizes and addresses unique error sources related to megaconstellation LEO satellites, enabling enhanced positioning accuracy. Experimental results demonstrate successful UAV localization using real LEO satellite signals.

SUGGESTED USES

- Navigation and positioning for unmanned aerial vehicles (UAVs) and drones.
- Indoor and urban canyon navigation solutions.
- Supplementary navigation systems for autonomous vehicles.
- Location-based services in GNSS-denied or degraded environments.
- Defense and security applications requiring anti-jamming and anti-spoofing capabilities.

ADVANTAGES

- Provides reliable navigation in GNSS-challenged environments.
- Utilizes abundant LEO satellite signals which cover a wide range of frequencies and directions.
- Employs a computationally efficient integer ambiguity resolution method for improved accuracy.
- Enables differential carrier phase measurements for precise position estimation.
- Characterizes unique error sources for megaconstellation LEO satellites to optimize system performance.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,953,607	04/09/2024	2020-685

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OTHER INFORMATION

KEYWORDS

Positioning, Autonomous Vehicles, Signals of Opportunity

CATEGORIZED AS

- **Communications**
  - Wireless
- **Security and Defense**
  - Other
- **Sensors & Instrumentation**
  - Position sensors
- **Transportation**
  - Aerospace
  - Automotive

RELATED MATERIALS

» Khalife, J., et al. Kassas, Z. M. (2020). Navigation with differential carrier phase measurements from megaconstellation LEO satellites. PLANS. - 04/20/2020

RELATED CASES

2020-685-0

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