Receiver Design For Doppler Positioning With LEO Satellites

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BRIEF DESCRIPTION

A novel receiver architecture and navigation framework leveraging Doppler measurements from low Earth orbit (LEO) satellites to provide accurate positioning where Global Navigation Satellite System (GNSS) signals are unreliable or unavailable.

FULL DESCRIPTION

This technology introduces a receiver architecture designed to extract Doppler frequency measurements from LEO satellites for navigation. Experimental and simulation results demonstrate positioning accuracy down to 11 meters with multiple satellites and 360 meters accuracy over one minute with just two satellites, making it a robust alternative or supplement to traditional GNSS in challenging environments.

SUGGESTED USES

- Mobile device manufacturers for enhanced location services.
- Cell phone providers to improve network-based positioning.
- Unmanned aerial vehicle (UAV) manufacturers for precise navigation in GNSS-challenged areas.
- Automotive industry for advanced driver assistance and autonomous driving.
- Aerospace companies for reliable navigation solutions.
- GNSS equipment manufacturers to supplement existing systems.
- Defense contractors for secure and resilient positioning capabilities.

ADVANTAGES

- Enables navigation in environments where GNSS signals are unreliable or unavailable.
- Utilizes abundant LEO satellite signals available at multiple frequencies and directions.
- Reduces reliance on costly aiding sensors by leveraging existing satellite infrastructure.
- Achieves high positioning accuracy through advanced Doppler measurement extraction.
- Compatible with existing satellite position data, simplifying integration.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,960,018	04/16/2024	2019-677

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OTHER INFORMATION

KEYWORDS

Low Earth Orbit (LEO) Satellites, Positioning System, Receivers, Doppler Effect

CATEGORIZED AS

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

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