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Outdoor localisation system based on magnetic landmarks – magnetic anomalies that distort the expected geomagnetic field due to strong local magnetic fields, oftentimes originated by fixed man-made structures. This technology proposes to leverage those landmarks as signatures for localisation purposes.

Tech offer | Improving outdoor positioning in mobile devices using anomalies in the Earth magnetic field

The most common systems for outdoor positioning use GNSS (e.g. GPS) and/or inertial data. Satellite-based solutions have strong limitations (e.g. large positioning errors or outages) in multipath environments and non-line-of-sight conditions to the satellites, such as urban canyons, tunnels and underground parking. They are often combined with other sources of information to complement them, such as inertial sensors. Nonetheless, inertial data systems apply dead reckoning and present cumulative errors. The quality of the sensors has a high impact on the accuracy of the estimation, however, it strongly influences their price as well.

Magnetic information is frequently used in combination with other inertial data for orientation purposes in navigation systems and vehicle localisation. The present technology uses magnetic landmarks created by magnetic anomalies that distort the expected magnetic field, often man-made structures. This technology results in a localisation system that works in locations where satellite-based solutions are not available or not not accurate enough. This new method can be integrated as a module to improve the robustness, availability and accuracy of a localisation system, improving its resilience to disturbances in GPS or cumulative errors.

The main outcomes of this new technology are: 1) a method for detecting magnetic anomalies; 2) a system for collecting and saving classified instances for reference; 3) an algorithm that matches input magnetic anomalies to the known stored references, both for complete and partial time series.

APPLICATIONS

GEOLOCALISATION SYSTEMS DEMANDING HIGH PERFORMANCES:

- Traffic navigation in intricate scenarios (e.g. city centers, tunnels, multiple layer paths and intersections)
- Emergency assistance
- Civil protection

BENEFITS

PORTABILITY: the invention uses a mobile device equipped with inertial sensors and magnetometer to detect and match magnetic anomalies to references, providing location data.

GREAT IMPROVEMENT TO CURRENT LOCALISATION SYSTEMS: the technology can be modularly combined with existing localisation solutions:

- ↑ ROBUSTNESS
- ↑ ACCURACY
- ↑ AVAILABILITY

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TECHNOLOGY ID

PI-1017

INTELLECTUAL PROPERTY

International patent application (PCT/IB2021/051316) (priority date: 18-02-2020) - SOLD

INVENTORS

Researchers from:
- Instituto de Telecomunicações
- University of Porto

DEVELOPMENT STAGE

TRL 2
The concept has been established.

COMMERCIAL OFFERING

- Joint research and development
- Research on demand

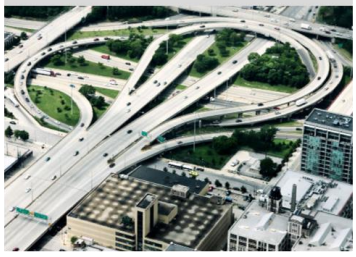
KEYWORDS

VEHICLE LOCALISATION
MAGNETIC ANOMALY DETECTION
INERTIAL NAVIGATION
MOBILE APPLICATIONS

TARGET MARKET

Instituto de Telecomunicações seeks partners within geolocalisation/georeferencing markets, as well as navigation systems providers.

Highway Crossing



Tunnel

Road Above Subway

Railway Crossing

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