



Profound-DR

Upgrade to More Accurate Continuous Navigation for Less

Continuous, Accurate and Reliable Navigation with Dollar-Level Sensors

PPI's Profound-DR is a cutting-edge sensor fusion navigation firmware for land vehicle and mobile robot 3D navigation applications in degraded or denied GNSS signals environments such as tunnels, indoor parking, urban centers, and multilevel highway junctions.



Sustained Robustness wherever you drive

Backed by Profound Fusion+ technology, Profound-DR navigation library is able to keep high positioning accuracy with errors **less than 1% of the travelled distance for several minutes of GNSS signal loss** with integrated dollar-level inertial sensor measurements with speed measurements from vehicles speedometer.



Initialize and Start from Anywhere

The Profound-DR navigation library initializes automatically within few minutes in open sky with no need to specific vehicle dynamics. After initialization, **the library can start from covered or underground parking.**



Unique Navigation Algorithm

The Profound-DR navigation library feature a special inertial sensor mechanization, and advanced dynamic error models that minimize sensor errors and prevent them to propagate through the navigation algorithm, resulting in a more reliable 3D navigation performance.



Smartly Fuse GNSS, Vehicle Speed information and Inertial sensor Measurements

The Profound-DR navigation library recognizes the GNSS environment and automatically weights the GNSS updates accordingly. The smart combination of GNSS updates, vehicle speed and sensor measurements result in continuous, accurate and reliable positioning in all environment.



Unique Integration Filter Extending Standalone Operation

The Profound-DR navigation library utilizes unique multi-sensor fusion filter with online sensor error calibration to extend the operation of the system where many of the standard filters will fail.

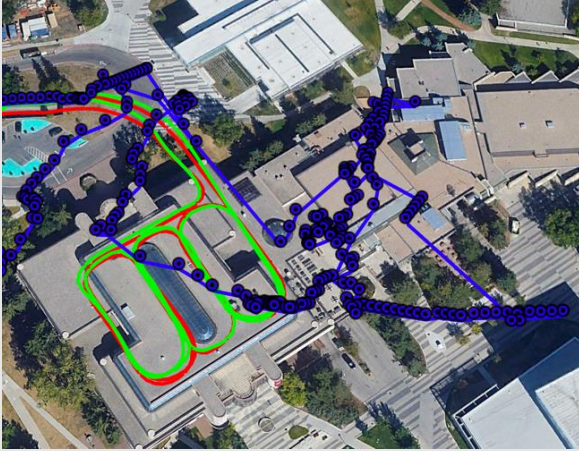


Customization

Profound-DR library can be customized to target any grade of IMU and GNSS receivers. Profound-DR has been optimized to run in real-time for a variety of mainstream processors including ARM Cortex-M4F based processors to provide the most accurate and reliable 3D navigation at a low-cost



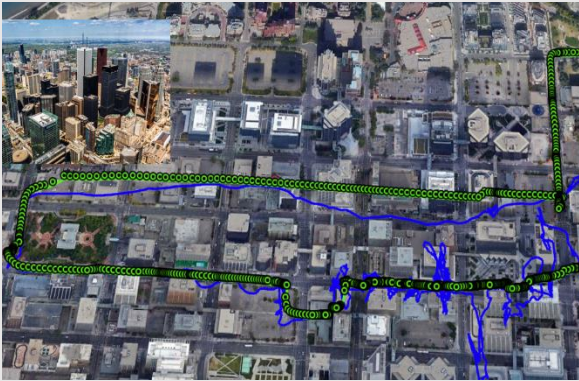
Underground Parking



Tunnels



Multipath – Downtown



Blue – GNSS, Red: Reference Solution using High End INS/GNSS System (cost > \$50,000), Green: Profound-DR 3D Navigation Solution

Key Features

- Integrated GNSS, speed measurements from vehicle speedometer with either 6 DoF or 10 DoF sensors.
- Plug-and-play capability with no need to any special vehicle dynamics during system initialization.
- Continuous and robust 3D navigation in urban and denied GNSS areas using dollar-level consumer grade MEMS inertial sensors.
- Positioning accuracy of less than 1% of the distance travelled even during long GNSS signal outages.
- Real-time sustained performance for up to 10 Hz.
- Ability to start in denied GNSS environment such as underground parking where no GNSS updates are available.
- Open to work with GPS, GLONASS, BeiDou, and Galileo
- Can integrate with other sources of update such as HD maps, vision, LiDAR, and radar.
- Fast acquisition of GNSS satellite signals at the end of long GNSS outages.

Targeted Applications

Profound-DR provide continuous and accurate 3D navigation for:

- In-dash Car Navigation,
- Wheel-based unmanned ground vehicles.
- Safety critical platforms such as future self-driving cars.
- Vehicle to Everything

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