

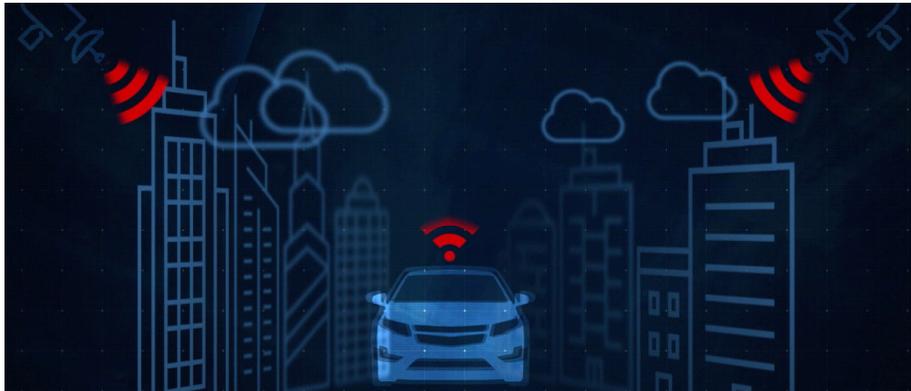
Design a Top-Notch Dead Reckoning GNSS Navigation System



INTRODUCTION

Five things will help you design a top-notch dead reckoning GNSS navigation system

Vehicular navigation system designers and integrators understand the importance of the technology known as Dead Reckoning or DR. DR is the algorithm that derives the likely current position of a moving vehicle from a known previous position fix and adjusting it based on displacement information not originating from the satellite signal. DR boosts position accuracy under poor satellite signal receiving conditions that may exist in urban canyons, tunnels, parking garages and severe overcast.



GNSS + Dead Reckoning
Improves performance in urban canyons

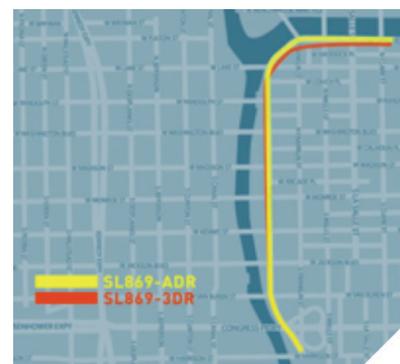
The latest weapon in the designer's arsenal is autonomous DR technology. These are module components integrating a high performance satellite receiver as well as an embedded array of micro-electromechanical systems (MEMS) sensors that allow them to derive DR position coordinates strictly from the sensor array when satellite signal is compromised. There are a number of these products in the market now but their performance and therefore the performance of the end-user navigation or tracking system they power can vary significantly. These are five points to drilldown in the component selection process:

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1. Embedded Sensors

The best performance is currently delivered by modules featuring 7 degrees of freedom (DoF) from a 3D Gyro, a 3D accelerometer and a barometer. A number of products feature only a 6-axis sensor system. The additional barometer (pressure sensor) improves performance with altitude detection allowing the system to deliver position in three dimensions while in dead reckoning navigation. That is necessary, for example, to determine where a vehicle is inside a multi-level garage structure.



2. Antenna Status

Overall performance of vehicular navigation depends heavily on a good connection to the external antenna. Make sure the module you select has the ability to inform your application whether or not its antenna is well connected or if an open or short circuit is detected. Antenna sensing has been a strong requirement from the auto industry for any device that requires an antenna. When selecting a module that includes this feature, you not only reap the direct benefits of the feature but also from the fact that the vendor implicitly understands the requirements of the vehicular environment. That translates into improved lifecycle reliability and customer satisfaction.

3. RF Sensitivity

Vehicular navigation applications are notoriously demanding on satellite signal reception. Commercial fleets and consumer vehicles must operate at their best when the signal environment is at its worst, for example in urban canyons, under heavy foliage or under an elevated roadway. DR Modules equipped with an additional Low Noise Amplifier (LNA) enjoy improved RF sensitivity. Make sure you compare the module specifications for acquisition, navigation and tracking sensitivity. These are expressed in negative dBm. The lower the number (bigger negative number) the higher the sensitivity.

4. Temperature Stability

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5. SAW Filter

Satellite signals arrive on the earth's surface very weak and battered by noise from other radio sources. Presence of radio noise is stronger in urban areas, where, of course tracking and navigation devices need to operate expertly. To mitigate the ill effects of radio noise in satellite receivers, vendors add special electronics to filter out the noise to enhance the module's ability to deliver an accurate fix. This is known as a SAW filter and it is a feature you should definitely look for in your selection process.



Telit has two module-level solutions for vehicular navigation with DR, the SL869-ADR and the SL869-3DR. Both modules are delivered in a compact 12.2x16mm LCC package. Find out more about the Telit DR modules.