THE ADVANTAGES AND DISADVANTAGES OF AN INERTIAL NAVIGATION SYSTEM VS. AN INERTIAL MEASUREMENT UNIT

We surveyed our HGuide inertial navigation engineers with more than 100 years of experience combined between them to help you better understand the advantages and disadvantages of using an inertial navigation system as compared to an inertial measurement unit.

LEGEND:

GNSS: Global Navigation Satellite System
IMU: Inertial Measurement Unit
INS: Inertial Navigation System

ADVANTAGES

When compared to an inertial measurement unit

DISADVANTAGES

When compared to an inertial measurement unit

ABSOLUTE POSITION

An integrated INS/GNSS provides absolute position and attitude information to a platform. This information can be used to navigate vehicles autonomously, perform highly precise inspections, generate high definition maps for location applications and many other purposes.

1 cm

During a recent test run, HGuide engineers found that the n580 INS/GNSS could determine position accuracy within 1 cm.

In some cases, absolute position and attitude information isn't required. In these cases, an IMU that provides changes in orientation and acceleration over short durations should meet the user's requirements.

For control applications that require platform stabilization, like antennas, an IMU may be a better fit such as the HG4930.

LEVEL OF INTEGRATION

An integrated INS/GNSS contains an IMU, a GNSS receiver and sensor fusion software to provide georeferenced information to the user. If the user isn't experienced in integrating an IMU with GNSS and skilled in writing sensor fusion software, an integrated INS/GNSS could offer more value than an IMU.

Our HGuide Engineers find that an INS/GNSS tends to provide the most economical solution for autonomous vehicles, sensor payloads such as LiDAR, mobile mapping applications and other applications operating in GNSS-denied areas.

While an IMU doesn't contain a GNSS receiver, the user may want to use a GNSS receiver that is already being used on the platform. In this case, the user can integrate an IMU to enhance the position and attitude accuracy of the platform in areas where GNSS is unavailable.

In this case, an IMU may be procured separately from the GNSS receiver and implemented in a federated architecture.

SENSOR FUSION SOFTWARE

An integrated INS/GNSS contains software that fuses together inertial data along with other independent aiding sources (information from GNSS receiver, odometry, pressure, etc.) to generate accurate position and attitude information.

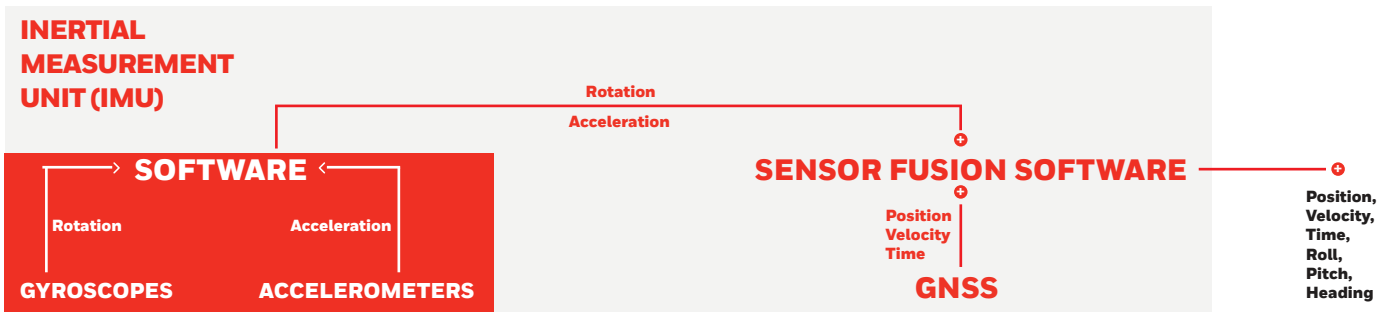
On a recent test run, Honeywell's HGuide n580 inertial navigation system delivered the following performance.

.05 Degrees Heading Accuracy

An IMU does not contain sensor fusion software; if aiding sources aren't present, then the user must rely on inertial data only and an IMU may be preferred to an integrated INS/GNSS.

For example, the user may consider inertial navigation a core competency and can add value through implementation of specialized fusion software for unique applications.

THE ANATOMY OF AN INERTIAL NAVIGATION SYSTEM



Fun facts

1. Inertial navigation systems were first developed in the 1920s by Sperry Flight Instruments (now Honeywell).

2. Honeywell's HGuide n580 inertial navigation system has survived several performance tests like being fried in cast-iron skillet and scorched with a flame thrower at temperatures well exceeding its advertised operating range to demonstrate its reliability in any operating environment.

THE FUTURE IS WHAT WE MAKE IT

Honeywell