



**PSIONIC™**

**Psionic SurePath™ Advanced Navigation Technical Note**

# Improving IMU performance with Psionic SurePath

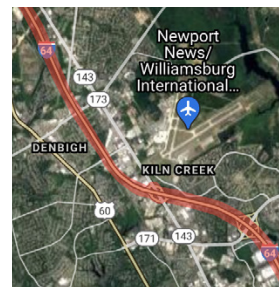
Inertial Measurement Units (IMUs) have accumulated errors that, if not corrected through an external signal—usually GPS—will not provide accurate information for navigation. By incorporating Psionic SurePath technology, IMU drift can be corrected even when GPS or other external signals are not available or cannot be trusted.

A typical IMU uses a combination of the roll, pitch, and azimuth gyroscope along with the x, y, and z accelerometer to solve a large set of differential equations that calculates distanced traveled and direction from the measured acceleration data. Usually these IMUs are used as a supplement to other navigation systems, such as GPS, providing a higher degree of accuracy than is possible with the use of any single navigation method systems.

IMUs come in a variety of designs, with performance, size, and cost trade-offs. They can be marine navigation-grade highly accurate inertial systems that are used on ships and submarines and can cost up to \$1,000,000, to the automotive and consumer-grade sensors used in suspension systems, airbags, and anti-lock braking systems. In the middle are tactical and industrial-grade sensors that are used in robots and drones. All IMUs have integration drift, as small errors in measurement are integrated and become progressively larger errors in velocity and position. Because the device is always measuring changes relative to itself, the IMU constantly rounds off small fractions that accumulate.

## Solution: Self-contained navigation

Psionic’s SurePath™ technology is a self-contained system that provides precision navigation without GPS or any other incoming signal. As such, it operates independently allowing a vehicle to navigate without GPS. It cannot be spoofed and is extremely difficult to jam.



Source: August 2020 test report

Starting from a known point and used in combination with an existing IMU or other navigation system, Psionic SurePath™ technology corrects for the accumulated error that results from IMU-based navigation systems when they aren’t able to get an external update to their current position via GPS or other GNSS.

**Psionic SurePath technology ensures precise navigation over long distances even when GPS or other external signals are not available or can not be trusted.**



5.0" L  
(12.70 cm)

2.5" W  
(6.35 cm)

4.0" H  
(10.16 cm)

Psionic SurePath Processor, Development Unit, Gen. 5 (Aug. 2020)  
5.0" L (12.70 cm) x 2.5" W (6.35 cm) x 4.0" H (10.16 cm)

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