

## Attempting Dead Reckoning with a G-Link<sup>®</sup>

### G-Link<sup>®</sup>

#### Overview

MicroStrain's G-Link<sup>®</sup> is a wireless accelerometer node, utilizing MEMS sensor technology. It combines a triaxial accelerometer, temperature sensor, 12-bit A/D converter, on-board microprocessor, 2MB on-board flash memory, internal rechargeable battery, and a 2.4 GHz radio. It is designed to capture acceleration measurements in 3 axes (X, Y and Z) and transmit them wirelessly to a host computer.



#### Dead Reckoning, Position Finding, Heave, Displacement

If one was to attempt dead reckoning, position finding, heave and/or displacement measurement with the G-Link<sup>®</sup>, one would follow this path:

1. The G-Link<sup>®</sup> provides acceleration with respect to its body-fixed coordinate system. This must be transformed into a coordinate system fixed to the earth. In order to accomplish this, it is necessary to know the orientation of the G-Link<sup>®</sup> relative to the earth-fixed coordinate system.
2. Subtract the gravity vector.
3. Double integrate (WRT time) the acceleration.

We generally do not recommend the G-Link<sup>®</sup> for applications involving position measurement due to the exceptional difficulty of such computations. Even the best systems, costing hundreds of thousands of dollars, are subject to error accumulation on the order of 1 kilometer per hour. The bias errors of the **automotive** grade (not **navigational** grade) accelerometers used in the G-Link<sup>®</sup> will produce errors of many kilometers within seconds. This assumes that the orientation is known perfectly. Uncertainty in the orientation measurement will make the errors even larger. The G-Link<sup>®</sup> does not have the precision required to calculate accurate speed or velocity.

#### Support

MicroStrain support engineers are always available to expand on this subject and support you in any way we can.