Localization of Unmanned Ground Systems Using the Zero Velocity Update Technique and a 3-D LiDAR in the Absence of GNSS

**Problem Statement**

- To investigate and exploit the complementary nature of the inertial navigation system (INS) and 3-D light detection and ranging (LiDAR) for localization of unmanned ground systems
- To mitigate the INS error growth resulting from double integration using the zero velocity update (ZUPT) technique
- To combat the IMU orientation error growth using 3-D LiDAR scan matching

**Impact**

- GPS is widely deployed for accurate tracking of equipment asset as well as personnel. However, GPS signals are susceptible to attack by adversaries via jamming or spoofing
- The proposed approach has the potential to significantly reduce the INS error growth and enable unmanned ground systems to accurately navigate over extended periods of time without GPS

**Transition**

- The proposed localization method is aimed to meet the Navy’s unmanned system (UxS) goals of developing technically superior unmanned systems that are able to navigate accurately in every domain under any environmental conditions
- The feasibility of the approach is to be validated in this proposed effort
- External sources of support for further development are actively pursued

PI: Xiaoping Yun, ECE
CoPI: James Calusdian, ECE