



**College of Engineering**  
**Department of**  
**Mechanical & Industrial Engineering**

## **The Robert W. Courter Seminar Series**

2:30-3:30pm, Friday, October 7<sup>th</sup>, 2022

1263 Patrick F Taylor Hall

# **Improved Wheeled Rover Localization via Autonomous Pseudo-Measurement Constraints**

by **Jason Gross\***

**Chair and Associate Professor**

**Dep. of Mechanical and Aerospace Engineering**

**West Virginia University**



A core capability to enable enhanced autonomy for robotics systems is reliable self-localization. Autonomous self-localization can be a challenge, especially in the absence of external aiding systems, such as GPS. Systems like GPS are unavailable or unreliable in many environments in which the use of robots could offer many benefits. This seminar will discuss some research conducted in the Navigation Lab at West Virginia University to address some of these challenges for applications including wheeled planetary exploration rovers and cooperative robots operating in GPS degraded environments. In particular, the seminar will review a method that uses a simple machine learning to learn and predict important environmental factors that impact the performance of wheel-inertial odometry based localization. These predictions are shown to be an effective manner for triggering motion constraints, such as zero velocity updates, when needed, to significantly reduce localization drift. This concept is then extended for the coordination of a multi-agent robotic systems and multiple heuristics are explored for triggering motion constraints in a decentralized manner. Finally, the seminar will overview a few other related projects including WVU's entry to the NASA Space Robotics Challenge and a robot/drone team developed for limestone mine inspections

\*Jason Gross is an associate professor and serves as the Chair of Mechanical and Aerospace Engineering at West Virginia University. He received his Ph.D. in Aerospace Engineering from WVU in 2011, received his undergraduate degrees in Mechanical Engineering and Aerospace Engineering from WVU in 2007. From 2011 to December 2013, he worked as Research Technologist in the Near Earth Tracking Applications Group at Caltech's NASA Jet Propulsion Laboratory. His research focuses on robotic systems and unmanned aerial system with an emphasis on perception and localization. He directs the WVU Navigation Lab, is a coordinator of WVU's growing robotics program, and was the lead for WVU's Space Robotics Challenge 2 team. He is past recipient of an NGA New Investigator Program grant, AFOSR Faculty Fellowship, WVU Big XII Faculty Fellowship, and WVU Statler College Outstanding Teaching and Excellence in Research awards. He is an associate editor for navigation systems in IEEE's transactions on aerospace electronic systems and IEEE's aerospace electronic systems magazine. He is a senior member of the AIAA, senior member of the IEEE, and a member of the Institute of Navigation.