

# DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING

## WILLIAM MAXWELL REED SEMINAR SERIES

### “Review Our Development of a Machine Learning Approach to Improve Orbit Prediction Accuracy.”

**Hao Peng, Ph.D.**  
Rutgers University

#### **Abstract:**

In this talk, Dr. Peng will present the machine learning approach to improve the accuracy of the satellite orbit prediction which they have been developing since 2016. The improvement is achieved without explicitly modeling space objects or space environments. The proposed ML approach integrates physics-based orbit prediction algorithms with a learning-based process that focuses on reducing the prediction errors. Details will be provided with focuses on how this particular problem is identified, analyzed, investigated, validated, and ultimately raises new questions. It will be shown that aerospace engineering always lies at the core of this research, but machine learning always determines how the problem should be modeled. Additionally, Dr. Peng would like to share some insights on identifying and solving other aerospace engineering problems following a similar path.

#### **Speaker Bio:**

Dr. Hao Peng is now a Research Associate at Rutgers University, before which he was a Postdoctoral Associate from 2016 to 2021 at Rutgers as well. In 2016, he obtained his Ph.D. degree in aerospace engineering from Beihang University in Beijing, China. His doctoral thesis focuses on using the elliptic restricted three-body problem (ER3BP) model for deep space trajectory design. Besides continuing that part of research, he is now actively working on machine learning applications in aerospace engineering problems. His exploration emphasizes the uniqueness and exclusiveness of the problems that are suitable and may only be solved by machine learning (ML) or artificial intelligence (AI) technology. For example, he has developed a machine learning approach to improve the orbit prediction accuracy; a Bayesian optimization observation planning method for a constellation; a machine learning calibration method for MEMS gyro; etc.

**Date:** Friday, February 10, 2023  
**Place:** Whitehall Classroom Building 110

**Time:** 3:00 PM EST  
**Contact:** Dr. Jesse Hoagg

Attendance open to all interested persons