



VILLANOVA UNIVERSITY

**MECHANICAL ENGINEERING
DEPARTMENT**
Fall 2019 SEMINAR SERIES

Seminar Date: November 15th, 2019

Lecture: Rapid, Complex, Aerial Maneuvers in Insects and Hummingbirds

Speaker: Dr. Bo Cheng, Associate Professor, Department of Mechanical Engineering, Penn State

Abstract: Animal locomotion exhibit high stability, agility and robustness, which are the results of complex interactions among sensory & motor processes, neural computation, body movement dynamics and physics of the environments. Researchers are often amazed and sometimes puzzled by how animals master the complex physics of flying & swimming and produce highly complex maneuvers in a blink of an eye. In this talk, I will discuss how animals produce rapid and complex aerial maneuvers, for example, the inverted landing in flies and escape maneuvers in hummingbirds. I will also discuss how to derive the general sensing-control principles from animal flight using the tools of dynamics and control theories, and their potential applications to robotic systems.

Biography:



Dr. Cheng is an Assistant Professor of Mechanical Engineering at Penn State. Prior to this, he was a Postdoctoral Research Associate in the School of Mechanical Engineering at Purdue University, where he received his Ph.D. in 2012. He also received his M.S. in Mechanical Engineering from University of Delaware and B.S. from Control Science & Engineering at Zhejiang University, China. His research interests lie in the broad science & engineering of efficient, robust & agile locomotion in fluids, including animal flight, fish swimming, robot locomotion and learning and biologically inspired fluid dynamics. Working in a highly interdisciplinary field, Dr.

Cheng's work has been published in journals from many disciplines, such as Science, Science Advances, IEEE Trans on Robotics, Journal of Experimental Biology, Physics of Fluids and Journal of the Royal Society Interface. His research has been funded by various programs of National Science Foundation (NSF), Army Research Office (ARO) and Office of Naval Research (ONR). Dr. Cheng received NSF CAREER Award in 2016.

Host: Prof. Chengyu Li