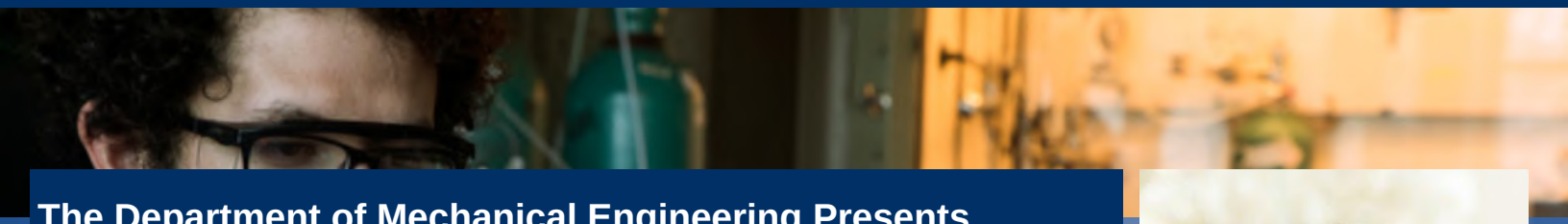
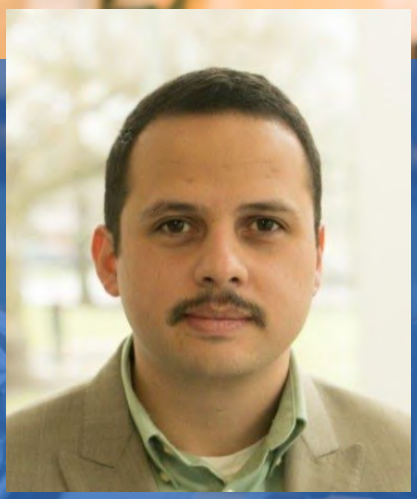
UC RIVERSIDE UNIVERSITY OF CALIFORNIA | Mechanical Engineering



The Department of Mechanical Engineering Presents

Javier González-Rocha, Ph.D.



Postdoctoral Fellow
Mechanical Engineering
University of California, Riverside

Title: Developing aerial robotic systems capabilities for targeted observations of atmospheric wind flows

Abstract: Measuring wind velocity near the Earth's surface is critical to understanding the surface-atmosphere interactions driving the dynamic state of the atmospheric boundary layer (ABL). How the ABL evolves with respect to space and time influences both natural and human-driven processes that impact the public's health and safety. Some examples include transport of air pollutants, forecast of weather, and spread of wildfires. However, wind observation from conventional in-situ and remote sensors are cost prohibited and are limited over water and complex terrain. This talk will describe a model-based wind sensing approach for targeted observations inside of the ABL with off-the-shelf aerial robotic systems. The first part of the talk will discuss the development of a model-based wind sensing framework for aerial robotic systems using flight dynamic modeling, system identification techniques, and state estimation. This part will include discussion of an accuracy and bandwidth analysis for wind estimates from three vehicle motion models, which consist of a kinematic particle model, a point mass model, and a rigid body model. The second part of the talk will focus on the application of model-based wind sensing to detect, localize, and quantify methane emissions from dairy farms. Lastly, an overview of preliminary results from field studies incorporating model-based wind sensing with aerial robotic systems will be highlighted along with remarks addressing future work.

About the Speaker: Javier González-Rocha is a UCR Chancellor's Postdoctoral Fellow in the Department of Mechanical Engineering. His research consists of developing algorithms to sense wind, turbulence, and air composition within the atmospheric boundary layer using aerial robotic systems. The theoretical aspects of his research involve theory from system identification, flight dynamic modeling, and state estimation. The experimental aspect of his work consists of field experiments using off-the-shelf multirotor airframes that are integrated with open-source flight controllers to validate wind sensing algorithms.

WINSTON CHUNG HALL 205/206

THURSDAY, MARCH, 31, 2022
11:00AM-11:50AM