

AES Seminar



**Jay
McMahon**

Assistant Professor, Smead Aerospace

Building Robots that Eat Asteroids for Science, Safety, and Profit

Friday, Oct. 5, 2018 | DLC | 12:00 P.M.

Abstract: There is great interest in asteroid exploration for three reasons: science, planetary defense, and asteroid mining. While many dream of getting rich off of mining rare minerals, the real treasure is water, which can be used for fuel and life support. Thus, in-situ resource utilization could dramatically influence how future missions throughout the solar system are designed and operated. There are still many challenges to getting at the resources in near-Earth asteroids (NEAs). This talk will discuss the current state of asteroid exploration (including the OSIRIS-REx mission) and resource utilization technologies, and will present a new way of acquiring material from asteroids. There are two key components to this new approach. First, an overall architecture, termed Lofted Regolith Sampling (LoRS) will be presented. Second, current work on Area-of-Effect Softbots (AoES) which are being designed to operate on NEA surfaces and “eat” the asteroids. Both approaches are designed to take advantage of the peculiarities of the asteroid environment, and to be robust to the uncertainties remaining in our knowledge of these fascinating objects. The talk will close with a discussion of future work and related technologies for advancing asteroid mining and other goals in solar system exploration.

Bio: Jay McMahon is an Assistant Professor in Smead Aerospace and heads the Orbital Research Cluster for Celestial Applications (ORCCA) lab, which focuses on: autonomous space vehicle guidance, navigation, and control; asteroid science and missions; resource utilization; and space situational awareness. He has been in Boulder for a while - earning his PhD in Aerospace in 2011, then serving as a Research Associate and Assistant Research Professor until 2016. Prior to Boulder he worked in Guidance Analysis at The Aerospace Corporation from 2004-2008. He holds an MS in Astronautical Engineering from USC and a BS in Aerospace Engineering from the University of Michigan. He is an Associate Editor of the AIAA Journal of Spacecraft and Rockets and an Associate Fellow in AIAA. He was named a NASA Institute for Advanced Concepts (NIAC) fellow in 2017, and a NASA Early Career Faculty fellow in 2018. Asteroid (46829) McMahon (a main-belt binary asteroid) is named in his honor.



Smead Aerospace
UNIVERSITY OF COLORADO **BOULDER**

Be Boulder.