

NRL Power and Energy Research for Group 1/2 UAS

24 August 2018 – ME Auditorium – 1300

With Guest Lecturer Dr. Dan Edwards

Chief Scientist, Vehicle Research Section, Tactical Electronic Warfare Division, U.S. Naval Research Laboratory



Dr. Dan Edwards

Abstract

Missions for unmanned aircraft systems (UAS) in the Department of Defense may vary, but a common thread is an ever-increasing desire for more endurance. The US Naval Research Laboratory's Vehicle Research Section has conducted several UAS power and energy projects over the last decade. Solar-Soaring is a powered sailplane with integrated solar photovoltaics and autonomous soaring guidance algorithms, which has demonstrated dawn-to-dusk endurance. Ion Tiger is a fuel cell testbed, demonstrating +24hr endurance on gaseous hydrogen and +48hr on liquid hydrogen fuel. Hybrid Tiger is a multi-day endurance Group 2 UAS, enabled by the combination of solar photovoltaic arrays, a hydrogen fuel cell, and energy-aware guidance. This talk will give a background on these programs, describe their results, and suggest areas where future research may find even more endurance.

Biography

Dr. Dan Edwards of the U.S. Naval Research Laboratory is the Chief Scientist for the Vehicle Research Section within Tactical Electronic Warfare Division. Dr. Edwards earned his PhD in 2008 from North Carolina State University developing autonomous soaring algorithms on a UAV sailplane, extending the endurance of the sailplane to over 5.2hr and 100km using just the power from atmospheric thermals. He has +15 years of experience designing and operating unmanned systems, including the flying circuit-board CICADA micro UAV, Solar-Soaring UAV with +11hr endurance, Ion Tiger Group-2 UAS with 48hr endurance, and multi-modal Flying Sea Glider UAV/UUV. Dr. Edwards is currently developing hybrid soaring / solar / fuel-cell energy systems in the Hybrid Tiger program, funded by OSD (Operational Energy), with a goal of Trans-Pacific range and multi-day endurance.

