Carlos Montalvo

University of South Alabama - Mobile, AL

Associate Professor, Mechanical Engineering

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Education

Ph.D. Aerospace Engineering, Georgia Institute of Technology, Atlanta, Georgia, May 2014

Area of Specialization: Flight Dynamics, Control and Design
Thesis Topic: Meta Aicraft Flight Dynamics and Controls
Advisor: Professor Mark Costello
GPA: 3.75/4.00

M.S., Aerospace Engineering, Georgia Institute of Technology, Atlanta, Georgia, August 2010

Area of Specialization: Flight Dynamics, Control and Design
Thesis Topic: E ect of Canard Stall on Projectile Angular Rate Damping
Advisor: Professor Mark Costello
GPA: 3.90/4.00

B.S., Aerospace Engineering, Georgia Institute of Technology, Atlanta, Georgia.DC /T1oJgo, Atlanta, B.S.,

Created a multi-body aircraft simulation software with magnetic, contact,

Honors, Awards

C. Montalvo

Aircraft.

Meta Aircraft is an aircraft of aircraft which combines many disciplines including multi-body dynamics, formation ight control, and non-linear aerodynamics. Montalvo has worked on numerous aerospaceTd (dynamics,)Tj /T

Research Activities

Research Statement

My research interests lies at the intersection of ight dynamics, control and design of unmanned aerial vehicles with a focus on multi-body systems. I am involved in all types of unmanned aerial vehicle research with a focus on controls of multi-body systems including aircraft, quadrotors, parafoils, projectiles, spacecraft and tethered systems. Research has been conducted at the Facility of Aerial Systems and Technology (FAST) at the University of South Alabama (USA). Platforms include conjoined xed wing aircraft called meta aircraft to electrically tethered cubesats called Electric Sails and everything in between. The basic research performed includes a combination of dynamic simulation coupled with applied estimation of custom made aircraft along with design of control systems and control mechanisms with the goal of experimental testing to improve the performance of autonomous aerospace vehicles. I have presented my research ndings in the classroom as well as published in JOA, JGCD, SIMULATION, JOAE: Part G, Wind Engineering, JSR and Acta Astronautica with major research funding from NASA Marshall Space Flight Center (MSFC). I believe that my papers contribute to the growing area of autonomous drone research utilizing them for automatic control and disaster relief as well as atmospheric sampling and control of tethered satellites.

Journals

[1] Lisa Schibelius, Marine Leabeater, and Carlos Montalvo. \Project-Based Engineering Instrumentation Lab at Home Kit With CircuitPython". In: Journal of Advances in Engineering Education (2022). Anticipated Submission in June.

[2] Maxwell Cobar and Carlos Montalvo. \Takeo and Landing of a Wingtip Connected Meta Aircraft with Feedback Control". In: for Connected Marine url T1_1 1 Tf ( )Tj /T1_0 TJ /T1Link Tf ( )Tj12/T1_

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[12] Brandon Troub et al. \Characterization of a Two-Dimensional Static Wind Field using Radial Basis Functions". In:

[28] Maxwell Cobar and Carlos Montalvo. \Developing Semi-Autonomous Flight Control Software For a Meta Aircraft of Two Fixed Wing

[46] Nghia Huynh, Alicia Ratcli e, and Carlos Montalvo. \Dynamics of Multi-Purpose LightWeight Towed Systems". In: AIAA AVIATION Denver, CO. doi:10.2514/6.2017-3551June 2017.

[47] BeecherFaust et al. \Experimental and Simulation Analysis of a High-Power Rocket". In: AIAA Region II Student Conference Starkville, MS. Apr. 2017.

[48] Nghia Huynh, Alicia Ratcli e, and Carlos Montalvo. \Multi-Objective DesignOptimization for a Light-Weight Towed System". In: AIAA Region II Student Conference Starkville, MS. Apr. 2017.

[49] Lisa Schibelius and . DesignMontalv 5 Td7921 Tf 3.02822 (StudentKimet)Tjball Schibelius Ratcli e,2017Hyp 1n.

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Online Segments

[68] Thomas Becnel. Design, Build, Fly. 2022. url: https://www.southalabama.edu/departments/publicrelations/pressreleases/031022dbf.html (visited on 05/08/2022).

[69] El Jaya. Dominicano doctor Carlos Montalvo Vasquez colaboro en proyecto de la NASA, Marte 2020. 2021. url: https://www.eljaya.com/115727/dominicano-doctor-carlos-montalvo-vasquez-colaboro-en-proyecto-de-la-nasa-marte-2020/ (visited on 03/10/2021).

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[74] Fox 10 News - WALA. NASA's Mars rover to land Thursday; Local professor skeptical, but hopeful. 2021. url: https://www.fox10tv.com/news/mobile_county/nasas-mars-rover-to-land-thursday-local-professor-skeptical-but-hopeful/article_1cf5afcc-719a-11eb-adcf-5f699283f5f4.html (visited on 02/22/2021).

[75] Collin Buckner - NOAA. Disaster Preparedness Program and University of South Alabama Partner to Develop Fixed Wing Unmanned Aerial Surveillance Aircraft. 2020. url: https://response.restoration.noaa.gov/disaster-preparedness-program-and-university-south-alabama-partner-develop-fixed-wing-unmanned (visited on 07/27/2020).

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[77] Bob Lowry. Fifty Years After 'One Small Step'. 2019. url: https://www.southalabama.edu/departments/publicrelations/pressreleases/071719space.html (visited on 07/17/2019).

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[84] Carlos Montalvo. YouTube Channel Monte Carlo. 2014-Present. url: https://www.youtube.com/channel/UCbVk9lC3ACpR-OmUBCkXbqQ (visited on 09/08/2019).

Books

[85] Carlos Montalvo. Aerospace Mechanics and Controls. Github https://github.com/cmontalvo251/LaTeX/blob/master/Aerospace_Mechanics/aerospace_mechanics.pdf, 2022.

[86] Carlos Montalvo. Space ight Mechanics. Github https://github.com/cmontalvo251/LaTeX/blob/master/SpaceFlight_Mechanics_Montalvo/space_flight_mechanics.pdf, 2020.

[87] Carlos Montalvo. Aircraft Flight Mechanics. Github https://github.com/cmontalvo251/LaTeX/blob/master/Aircraft_Flight_Mechanics/Aircraft_Flight_Mechanics.pdf, 2020.

[88] Carlos Montalvo. Numerical Methods. Github https://github.com/cmontalvo251/LaTeX/blob/master/Numerical_Methods_Montalvo/Numerical_Methods.pdf, 2020.

[89] Carlos Montalvo. Project Based Engineering Instrumentation with CircuitPython. 2020.

Contracts/Proposals/Budgets/Grants

Current Support

1. Reichert M., Montalvo C., Cloutier R., Kimball S., Terwey W., Lanicci J., NavSea Typhoon), Submitted to Department of Defense- June 23rd, 2020 - $3,600,000- Accepted Jan 11, 2021
2. Alabama Space Grant Consortium $10,000 Grant for Alabama Burst Energtics Exploration Satellite Year 2 - Awarded 3/31/2021 - Start Date 8/14/2021
3. Montalvo C., Richardson J., Kendall B., Patterson V., Box T., Davis C., Franklin C., Godfrey A., Patrick T., Alabama Space Grant for Accelerometer based Rocket Development (ASGARD) Alabama SpaceGrant Consortium Outreach Programs, $5,000, Submitted 10/25/2021, Accepted 11/9/2021 - Project Period: 12/1/2021-12/1/2022

Pending Support

1. Latif S., Montalvo C., Subcontract from UAH - Alabama Burst Energetics eXplorer (ABEX) Mission AstroPhysics Research and Analysis (APRA) - Submitted to NASA Proposal#: NNH21ZDA001N-APRA - 12/17/2021

Funded and Closed

1. Alabama Space Grant Consortium $10,000 Grant for Alabama Burst Energtics Exploration Satellite - Awarded 9/12/2020 - Concluded 8/6/2021
2. Montalvo, C., ASGC CubeSat Subsystem Teams and Faculty Mentors Alabama SpaceGrant Consortium August 22nd, 2018 - $3,000- Program concluded - 5/5/2020
3. Montalvo, Carlos; Design of Tether Deployer for Spacecraft Applications - Senior Design Project - $2,000- NASA Marshall SpaceFlight Center - Submitted 8/27/2018 - Awarded 10/2/2018 - Program Concluded 5/5/2020
4. Powers, Joey; Wiegmann, Bruce; Montalvo, Carlos; Electric Sail Simulation Analysis Tool - NASA TIP QUAD Charts Proposal Submitted 7/18/2017, Full Proposal submitted 7/26/2017, Re-Submitted as NASA TE and Awarded 10/4/2017, $35,000, Costed 3/13/2019, Award Documents Sent 6/20/2019 - Program concluded 6/25/2020
5. Cobar M., Montalvo C., Meta Aircraft Flight Testing - Summer SURF Proposal - $2,000(student) - Submitted 3/1/2019 - Awarded April 12th, 2019
6. Sherman W., Montalvo C., Fault Tolerant Control of an Urban Air Taxi - Summer SURF Proposal - $2,000(student) - Submitted 3/1/2019 - Awarded April 12th, 2019

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28. M. Costello, C. Montalvo, Smart

Patents and Invention Disclosures

Device and Method for Tracking and Enhancing the Performance of a Subject Operating a Wheel-Based Longboard - Invention Filed with Intellectual Property Department at the University of South Alabama - Spring 2016 - US Patent Filed April 7th, 2018 - Docket Number - 2017-030-ENG

Teaching Activities

Teaching Statement

My teaching philosophy at its core is to captivate students so that they not only grasp difficult concepts but they also enjoy coming to class. Studies have shown that students learn better if they enjoy and respect the professor that is teaching. I try and participate in light-hearted conversation with the students while breaking down fundamental concepts into pattern recognition rather than \which equation do I use". Using these patterns I then have students use the tools design new systems and new problems which will help them in their future career. Every problem I engage in an academic setting is geared a towards their future career. Theory is the foundation of engineering but engineers also design and build everything from buildings to unmanned aerial vehicles. It is important to apply the theory and the fundamentals to real world problems.

In addition to real world problems, I am a strong supporter of kinesthetic learning. I think if an engineer is to truly be prepared

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Aircraft Design (AE 468) - Spring 2021 - 27 Students, Spring 2022 - 24 students
Spacecraft Design (ME490) - Fall 2020 - 35 students, Fall 2021

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drones on campus. I am also the Vice Chair of the AIAA Professional chapter here in Mobile and oversee all professional chapter events including outreach

Meta Aircraft Flight Dynamics and Controls - University of Tuscaloosa, Tuscaloosa, AL - Fall 2015
AIAA Atmospheric Flight Mechanics - June 2015, Dallas, TX
Meta Aircraft Flight Dynamics and Controls - UC Merced, Merced, CA - Spring 2015
AIAA Atmospheric Flight Mechanics{ Aug 2013 [illegible]