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, Auburn, AL, USA

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*A Generalized Flight Control Architecture for Transitioning Flight Vehicles with Flight Test Validation*
Advisor: Dr. Imon Chakraborty

(01/01/25 – current)
Mechanical, Aerospace, and Biomedical Engineering Department, University of South Alabama

Performing research in the areas of: flight dynamics, flight mechanics and control, flight simulation, flight testing, rotorcraft dynamics and control, unmanned aerial systems (UAS), and electric vertical takeoff and landing (eVTOL) flight mechanics.

(08/26/24 – current)
NASA Ames Research Center (ARC), Mountain View, CA

Integrating flight dynamics, stability, and control considerations into a machine learning-based optimization platform for aerial vehicles aimed at martian flight. Major responsibilities include:

- Design and analysis of flight control systems for proposed martian flight vehicles
- Integration of MATLAB-based optimization processes into a Python environment

- Piloted simulation testing with representative flight scenarios to ensure operational requirements
- Hardware model development and integration to deploy the controller to a Pixhawk flight controller
- Flight testing the developed control system on SEARCH and IMPACT vehicles on site (CERTAIN range)

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(01/13/19 – 12/14/24)

Department of Aerospace Engineering, Auburn University

(01/13/23 – 12/14/24)

Managing a team of graduate students through ongoing lab projects along with managing all lab purchases, including management of lab finances. Major responsibilities include:

- Coordinating graduate students for lab activities and tasks
- Progress check-ups and meetings with graduate students to ensure and relay work progress
- Communication with the lab director as required to maintain progress on specific activities
- Detailed cost accounting and cost projections for lab purchases

(02/01/22 – 12/14/24)

Leading research and development aimed at extending VSDDL capabilities beyond simulation and into subscale modeling and hardware validation. Responsibilities include:

- Integration of flight control systems with Pixhawk flight controllers using the PX4 architecture
- PX4 firmware modification for flight control system monitoring and tuning with MATLAB/Simulink
- Design and manufacturing of various subscale models with extensive use of additive manufacturing
- Simulation, flight testing, and piloting of subscale vehicle models during flight test campaigns

(01/13/19 – 12/14/24)

Leading a team of graduate and undergraduate students in the design, construction, and improvements of flight simulators for research at VSDDL. Major responsibilities include:

- CAD design of simulator screen frame, projector gantry, instrument panel, and cockpit (SolidWorks)
- Construction and assembly lead for simulator screen, gantry, panel, and cockpit framework
- Finalizing computer specs, building computers, and interfacing with Auburn IT for final configuration
- Warp and blend calibration of simulator projectors, imparting training to other students
- Detailed cost accounting and cost projections for simulator construction, setup, and upgrades
- Modeling, simulation, and deployment of nonlinear vehicle models with varying inceptor layouts
- Training other lab members on simulator deployment and operations

(09/01/21 – 12/14/24)

Researching the

- Development of novel control inceptor schemes using microcontrollers for piloted simulations
- Learning and implementing Arduino IDE software on physical systems, interfacing with simulations
- Design and testing of force feedback controllers for simulator inceptors used during simulation

(07/19/19 – 10/01/22)

In collaboration with Auburn's Aviation Department, conduct research aimed at modeling performance characteristics of General Aviation (GA) aircraft for safety research. Responsibilities to date include:

- Preparation of flight testing cards for data logging in a Cessna 172SP Skyhawk
- Post-processing of de-identified flight data records for statistical analysis of flight operations
- Developing a feasible and cost-effective solution for measuring flight control positions

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(01/13/25 – current)

Teaching a 3 credit-hour undergraduate course on engineering graphics and communication, including computer-aided design and dimensioned drawing techniques using SolidEdge CAD software.

(08/21/23 – 05/02/24)

Teaching a 1 credit-hour undergraduate course on MATLAB/Simulink with a focus on aerospace engineering applications, including dynamic system modeling and controller design techniques.

Chakraborty, I., Mishra, A.A., Comer, A., and Leonard, C., AIAA SCITECH 2021 Forum (virtual event), Jan 11-15 and 19-21, 2021, AIAA-2021-1899

Chakraborty, I., Comer, A., Mishra, A.A., Dewey, J., and Leonard, C. AIAA AVIATION 2020 Forum, Reno, NV, June 15-19, 2020, AIAA-2020-3190

Comer, A. and Chakraborty, I., AIAA AVIATION 2020 Forum, Reno, NV, June 15-19, 2020, AIAA-2020-3097

Chakraborty, I. and Comer, A., AIAA SCITECH 2020 Forum, Orlando, FL, January 6-10, 2020, AIAA-2020-1401

Chakraborty, I., Ahuja, V., Comer, A., and Mulekar, O., AIAA AVIATION 2019 Forum, Dallas, TX, June 17-21, 2019, AIAA-2019-3112