

600 S. Clyde Morris Blvd
Daytona Beach, FL 32114

Borja Martos
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AREA OF EXPERTISE

Fifteen years of experience in flight controls system development, data processing algorithms for aerospace ground and flight test programs, and data acquisition systems. This includes full scale and sub-scale aircraft, rotorcraft, ground simulators, aviation engines, and aerospace actuators.

RELEVANT SOFTWARE/HARDWARE EXPERIENCE

MATHWORKS – MATLAB/SIMULINK REAL-TIME (2005-2020)

- Architect of full authority, hydraulic, fly-by-wire flight control system for a 3,000-pound full-scale research aircraft. This includes all flight computers, sensors, instrumentation racks, HMI, inceptors, and all software development and testing. Pictures available upon request. This includes 100's of parameters at 1000 Hz.
- Developer of low, mid, and high-level flight control, guidance, and navigation algorithms. Video demonstration available upon request. Extensive test subject demonstrations.
- Developer of high-fidelity non-linear pilot in the loop simulations for numerous aerospace vehicles.
- Develop of haptic inceptors with electro-mechanical actuators and high-speed hydraulic actuators. Pictures available upon request. This includes 10's of parameters at 5000 Hz.

National Instruments – LabVIEW (2005-2014)

- Instrumented 6 full scale experimental aircraft for various flight experiments. Developer of data acquisition systems, HMI, and data processing algorithms. This included 100's of parameters at 100 Hz.
- Maintained three full scale research aircraft with PXI based racks, C-RIO chassis, and USB data acquisition systems for six years. Responsible for all aspects of sensor integration including code development and data analysis. This included 100's of parameters at 100 Hz.
- Developed over 500 VI's and maintained over 1000 additional vi's for UTSI's flight tester software pack.

EDUCATION

- Ph.D. Aerospace Engineering, University of Tennessee Space Institute (UTSI), August 2013.
- M.S. Aerospace Engineering, Embry-Riddle Aeronautical University (ERAU), May 2006, with distinction.
- B.S. Aerospace Engineering, Embry-Riddle Aeronautical University, December 2004, Magna Cum Laude.

PROFESSIONAL CERTIFICATIONS and ENDORSEMENTS

- Fixed Wing Airline Transport Pilot Certificate
- Fixed Wing Certified Flight Instructor (Single, Multi-engine, and Instrument)
- Instrument, Glider, and Multi-engine ratings
- Endorsements include tail wheel, complex and high performance

SMALL BUSINESS OWNER / OPERATOR

- Owner of the only two piston powered 5-DOF and 6-DOF fly-by-wire / variable stability flight controls research aircraft in the United States.
- Owner / Manufacturer of Group 2 (55lb) Osprey UAV
- Owner / Manufacturer of mechatronic haptic devices

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PROFESSIONAL EXPERIENCE

- 2014-2020, Research Engineer, Eagle Flight Research Center, ERAU
Conducting digital flight controls, modeling and simulation, and system identification research with manned aircraft and UAVs. Human centered augmentation and autonomy using classical methods and modern methods for feedback control design, stability, and robustness. Research is focused on flight control laws, artificial feel systems, flight management systems, displays, and air traffic control for simplified vehicle operations in urban air mobility concepts.
- 2010-2014, Research Scientist, Head of Flight Research, UTSI
Technical lead over aircraft fly-by-wire hydraulic flight control system and explicit model following control law development. Responsible for software and hardware electrical design, analysis, and flight testing. Developed data acquisition hardware and software for multiple aircraft including force, position, inertial, temperature, etc. Lead ground and flight testing and supervised 3 staff and 2 faculty members.
- 2008-2010, Research Engineer, UTSI
Designed, built, and tested an engineering flight simulator in support of coursework and research. Designed, built, and tested an all-electric reconfigurable active feel system for an engineering simulator. Feel system included side stick, center stick, and rudder pedals.
- 2005-2008, Instrumentation Engineer, Eagle Flight Research Center, ERAU
Lead instrumentation, data analysis, and reporting engineer for several general aviation aircraft for FAA Level 6 flight simulator device qualifications. Developed data acquisition systems and calibration procedures in support of ground and flight test programs.

PROPOSAL EXPERIENCE

Authored more than 100 technical proposals on behalf of the University of Tennessee Space Institute and Embry-Riddle Aeronautical University as the principal or co-principal investigator. Sponsors include various government agencies and private industry. Winner of over \$5,000,000.00 in research awards over the last 10 years. Authored more than 30 technical proposals on behalf of Flight Level Engineering, LLC as Principal investigator. Sponsors include the FAA, NASA, and several aircraft manufacturers. Winner of over \$3,000,000.00 in the last 4 years.

JOURNAL PUBLICATIONS

Brooks, S.; Ren, X.; Cohen, M.; Luke, W.T.; Kelley, P.; Artz, R.; Hynes, A.; Landing, W.; Martos, B. "Airborne Vertical Profiling of Mercury Speciation near Tullahoma, TN, USA". *Atmosphere* 2014, 5, 557-574.

Krishnan, P., J. Kochendorfer, E. J. Dumas, P. C. Guillevic, B. B. Baker, T. P. Meyers, and B. Martos. "Comparison of in-situ, aircraft, and satellite Land Surface Temperature measurements over a NOAA Climate Reference Network Site", *Remote Sensing of Environment* 165 (2015) 249–264, doi:10.1016/j.rse.2015.05.011

B. Martos and D.F. Rogers, "Low Cost Accurate Angle of Attack System", *Journal of Aircraft*, 2017.

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CONFERENCE PUBLICATIONS

D. R. Gingras, B. Barnhart, R. Ranaudo, B. Martos, T. Ratvasky and E. Morelli, "Development and Implementation of a Model-Driven Envelope Protection System for In-Flight Ice Contamination," AIAA-2010-8141, 2010.

R. Ranaudo, B. Martos, B. Norton, D. Gingras, B. Barnhart, T. Ratvasky and E. Morelli, "Piloted Simulation to Evaluate the Utility of a Real Time Envelope System for Mitigating In-Flight Icing Hazards," AIAA-2010-7987, 2010.

B. Martos, P. Kiszely, J. Foster, "Flight Test Results of a GPS-Based Pitot-Static Calibration Method Using Output-Error Optimization for a Light Twin-Engine Airplane, "AIAA-2011-6669, 2011.

G. Milen and B. Martos, "Flight Test Results of Efficient Manuever Development for a GPS-Based Pitot-Static Calibration Method Using Output-Error Optimization, " AIAA-2012-2855, 2012.

B. Martos and E. A. Morelli, "Using Indirect Turbulence Measurements for Real-Time Parameter Estimation in Turbulent Air," AIAA-2012-4651, 2012.

T. Sorensen and B. Martos, "A comparison between Global and Local Aerodynamic Modeling from Flight Data, " AIAA-2013-0472, 2013.

B. Martos, R. Ranaudo, B. Norton, D. Gingras, B. Barnhart, T. Ratvasky and E. Morelli, "Final Report NASA Grant NNH06ZEA001N: Development, Implementation and Pilot Evaluation of a Model-Driven Envelope Protection System to Mitigate the Hazard of In-Flight Ice Contamination," NASA CR-2014-218320.

M. Siu and B. Martos, "Flight Test Results of an Angle of Attack and Angle of Sideslip Calibration Method Using Output-Error Optimization, "AIAA-2013-5086, 2013.

J. Grauer and B. Martos, "Evaluation of Piloted Inputs for Onboard Frequency Response Estimation," AIAA-2013-4921, 2013.

B. Martos and D.F. Rogers, "Low cost Accurate Angle of Attack System," AIAA-2017-1215, 2017.

M. Marwa, B. Martos, S. Martin, R. Anderson, "Analytical Forms of the Range Performance of Hybrid and Electric Turboprop Aircraft, for Design Optimization Studies," AIAA-2017-0211, 2017.

P. Chinta and B. Martos. "Low Cost Wearable Head-Up Display for Light General Aviation", AIAA Atmospheric Flight Mechanics Conference, AIAA AVIATION Forum, (AIAA 2017-4060).

A. Noriega, M.J. Balas, B. Martos. "Direct Adaptive Augmentation of a Linear Controller for a Plant with Unmatched Uncertainties with an Application to Aircraft Fly-by-Wire Control", AIAA Atmospheric Flight Mechanics Conference, AIAA AVIATION Forum, (AIAA 2017-4063).

B. Martos, M. Snyder, R. Anderson, Z. Kern, "Multisine Inputs for Simultaneous Identification of Multiple Control Loops," AIAA SCITECH Conference, AIAA-2018-0770, 2018.

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REPORTS

B. Martos, R. Ranaudo, R. Oltman, N. Myhre, "Final Report NASA Grant NNX13AH29: Simulation Evaluation of Pilot Inputs for Real Time Modelling During Commercial Flight Operations," NASA CR-2017-219600.

CONTINUING EDUCATION TEACHING EXPERIENCE

Professional Short Courses Taught

- In Flight Icing and Its Effects on Aircraft Handling Characteristics – Course Director / Instructor 2010, 2013, and 2015
- Fundamentals of Flight Test Engineering – Course Director / Instructor 2014-2017
- Fundamentals of Test Engineering – Course Director / Instructor 2014, 2015
- Introduction to MATLAB and SIMULINK – Course Director / Instructor 2014
- Introduction to LabVIEW – Course Director / Instructor 2014
- Aerospace Modeling and Simulation – Course Director / Instructor 2015
- Advanced Flight Control Systems Parts 1-3 – Course Director / Instructor 2014-2020

UNIVERSITY TEACHING EXPERIENCE

Courses Taught (Graduate and Undergraduate)

- AS510 (UTSI) Special Topics: Aerospace Vehicle Modeling and Simulation
- AS521 (UTSI) Experimental Flight Mechanics: Fixed Wing Performance
- AS522 (UTSI) Experimental Flight Mechanics: Fixed Wing Stability and Control
- AS508 (UTSI) Flight Test Instrumentation
- AS510 (UTSI) Flight Test Data Processing
- AE413 (ERAU) Aircraft Stability and Control
- AE415 (ERAU) Inflight laboratory
- AE506 (ERAU) Aircraft & Rotorcraft Dynamic Stability

PROFESSIONAL ACTIVITIES

Society Memberships

- American Institute of Aeronautics and Astronautics (AIAA)
- Society of Flight Test Engineers (SFTE)
- Aircraft Owners and Pilots Association (AOPA)
- Soaring Society of America (SSA)