

Summary

Motivated and experienced individual with strong skills in analysis, design, proposals, teamwork, and completing projects. Capable of working on and overseeing aeronautical, mechanical, controls, estimation, computer vision and software aspects of most any project. Practical experience and theoretical knowledge of aerodynamics, classical mechanics, optimal controls, tracking filters, and image processing allows efficient solutions and novel concepts to challenging problems. Software capability ensures rapid implementation and testing on real hardware.

Education

The University of Southern California

PhD, MS, BS - Aerospace Engineering June 2001 – Aug 2008 GPA: 3.75
Dissertation: *Aerodynamics at Low Reynolds Number - Boundary Layer Separation and Reattachment*

US Military Academy - West Point

June 1999 – May 2001 GPA: 3.9

Work Experience

Raytheon Company

Nov. 2018 – Present Los Angeles, CA

Principle Systems Engineer: Multi-disciplinary, Algorithms, Implementation, Test

- Developed **simulation framework** for **High Energy Laser** performance
- Designed and implemented **auto-regressive predictive controller** for LOS/beam steering
- Documented, calibrate and performed **testing/operation** of a **100 Gbps RF air/ground link**
- Identified **significant flaws** in software implementation, which caused system anomalies
- Implemented **image processing** techniques on **IR imager**, and helped with **control tuning**
- One of two presenters at **major customer review/demo** showing current progress/capability
- Worked with software team to develop **rapid post-processing analysis tools**
- Developed **dynamic model** of **Harmonic Drive** and integrated into larger simulation
- Integrated **predictive methods** for robotic arm in **simulation** and **auto-coded algorithm**

University of Southern California

Aug. 2017 – May 2018 Los Angeles, CA

Full-Time Lecturer: Teach, Advise, Mentor, Develop

- Teaching courses on the integration of **Mechanical, Optical, and Electrical Systems**
- Teaching courses on **Aircraft Dynamics and Controls**
- Advising student design teams ranging from **electric vehicles** to **vision-based systems**
- Overseeing students software development in **Windows, Linux, Simulink** and **LabView**

Primary Android Developer: UAV Control App

- Develop **user interface and experience** for a stand-alone **Android** application
- The application interfaces with a custom **ATAK** plug-in built by me as well
- **Developed** the overall plan and **prototyped** an early GUI concept
- **Implemented** the **user interface** and **back-end**

Senior Analyst and Developer: Research, Development, Implementation

- **Collaborated** with teams of engineers on simulation and control for **unique aircraft**
- **Primary developer** of **control architectures** for testing in **SIL, HIL bench, and field** testing
- Implemented **operator and machine interfaces** for **real-time training simulations**
- Developed **Monte Carlo techniques** to explore boundaries of acceptable operation
- **Demonstrated final products** to customers with over **100M\$ awards** to date

AeroVironment Inc.

Jan. 2015 – Aug. 2017 Simi Valley, CA

Aero/Controls Engineer: Modeling, Simulation, Optimization, Controls

- **Rapid development** of **new air vehicle** system based on previous tools and analysis
- Increased **autonomous capabilities** of aircraft using controls/software
- **Multi-disciplinary optimization** of aircraft based on **physics-based models**
- Developed **vision-based methods** in **Linux/OpenCV** to enable **GPS denied navigation**
- Designed and implemented **quantitative** and **repeatable** vision-based test system
- Defined and implemented **requirements** for various **ground control stations**
- Architected and implemented in **Android, C#, and Embedded** platforms

John McArthur, Ph.D.

Work Experience (cont.)

Rolls-Royce Corporation

Sep. 2012 – Jan. 2015 Indianapolis, IN

Engine Controls Engineer: Software, Hardware, Simulations

- Developed jet engine **simulations and control systems** in Matlab/Simulink environment
- Auto-coded models to run in a **real-time Linux OS** on server-class system with **HIL**
- Developed models of **decentralized engine control systems** to test effects on engine
- Proposed and developed **model-based estimation and control** of engines
- Developed and worked with **automated control design** methodologies
- Modeled **hydro/aero/thermal/electrical components** in support of full system simulations

AeroVironment Inc.

Oct. 2008 – Sep. 2012 Simi Valley, CA

Software/Controls Engineer: Multi-platform and Control Algorithms

- Developed unique control algorithms including an **adaptive controller**
- Developed new control/estimation feature with demonstrated **20-30% endurance increase**
- Architected and implemented code to run on **RTOS embedded systems**
- Helped create a **port of the RTOS** in windows, and developed software for **user interface**

Aero/Mechanical Engineer: Aerodynamic Analysis and Aircraft Improvement

- **Aerodynamic forces/moments** computed/measured and implemented in **6 DOF simulator**
- **Developed CFD analysis** capabilities using Fluent

Project Engineer: Proposals and Management

- Helped bring in **~25M\$ in development funding** based on proposal writing
- **Managed 250K\$ budget** while **working with employees, vendors, and clients**

Systems Engineer: Multi-disciplinary and Big Picture

- Developed **regression test methods and criteria**

Innovative Brands Inc. (*The Instyler*)

Jun. 2006 – Oct. 2008 Los Angeles, CA

Consultant: Engineering, Design and Invention

- Designed **novel hair styling devices** and oversaw prototype development
- Designed/built hair dryer with **performance equal to market best**, but at **30% less weight**
- Worked with **Chinese factory engineers and managers** to productionize the prototype
- Created 3D CAD models and performed **CFD analysis using Fluent**

University of Southern California

Aug. 2004 – Aug. 2008 Los Angeles, CA

Ph.D. Candidate: Research, Study, and Teaching

- Wind tunnel and water channel experiments on **fluid dynamics of small-scale wings**
- Computerized (**CNC**) and manual machining of test apparatus

The Aerospace Corporation

May. 2005 – Aug. 2007 El Segundo, CA

Summer Intern and Coop: Modeling and Simulation of Fluid Dynamics

- Improvement of existing **Fortran** tank thermodynamics code during a 3 month full-time period
- Learned and implemented **new theory of mass transfer calculation** at liquid-gas interface

Skills

Business

- Proposal writing, budget forecasts, project management
- Dealing with clients, vendors, and employees

Engineering

- **CAD Modeling** with AutoCAD, CATIA, SolidWorks, SolidEdge, IDEAS, MasterCAM
- **Analysis** using Cosmos, Nastran, Fluent, Xfoil, XFLR5
- **Coding** in C++, C#, Java, Excel VB, ForTran, LabView, MatLab, Simulink, HTML
- **Micro-Controller** development based on PIC or ARM architectures

Experimentation

- Particle Image Velocimetry, Hot Wire Anemometry
- Designing complex apparatus for advanced testing programs
- Experience with low-volume CNC manufacturing

John McArthur, Ph.D.

Leadership Experience

Senator and Vice President

USC, Los Angeles, CA

Engineering Graduate Student Association

Aug. 2006 – May 2007

- Voted in by fellow students and senators to hold elected positions
- Managed an annual budget of more than 60,000\$ and helped organize several events
- Met monthly with Dean of Engineering and developed method for students to request courses

Soccer Coach

USC, Los Angeles, CA

USC Men's Club Soccer Team

Dec. 2005 – Dec. 2007

- Managed an annual budget of more than 20,000\$
- Enrolled team in LA semi-pro league during collegiate off-season

Teaching Experience

Lecturer

Los Angeles, CA

Univ. of Southern California

Aug. 2016 – Present

Courses: Aircraft Stability and Control, Mechoptronics, Senior Projects Laboratory

- Surveyed student using internet to get feedback on course
- Excellent student reviews on teaching methods and subject proficiency

Industry Mentor

Indianapolis, IN

FIRST Robotics – Avon High School

Jun. 2013 – Dec. 2014

- Volunteered to help 14-18 year old kids learn software and hardware aspects of robotics
- Taught basic pneumatic circuits, C++ software development, and machining

Part-time Lecturer

Indianapolis, IN

Univ. of Indiana / Purdue Univ. @ Indianapolis

Jan. 2013 – Dec. 2014

Courses: Linear Controls, Aircraft Dynamics

- Provided foundation in theory and practice

Adjunct Faculty

Los Angeles, CA

California State Univ. – Northridge

Aug. 2009 – Dec. 2011

Courses: Advanced Fluid Dynamics, How Things Work

- Surveyed classes using internet to get feedback on course
- Excellent student reviews on teaching methods and subject proficiency

Teaching Assistant

Los Angeles, CA

Univ. of Southern California

Jan. 2001 – May 2008

Courses: Advanced Math, Fluid Dynamics, Senior Project Lab, Mechatronics Lab

Awards

USC Associates Scholarship

Fredricka Gordon Scholarship

Farr Memorial Scholarship

USC Provost's PhD Fellowship

L.D. Moore Merit Award

USC Leadership Award

Other

Secret Security Clearance – Obtained in Artillery, Maintained throughout Career

Tau Beta Pi Member – National Engineering Honors Society

USC Men's Club Soccer Team – Central mid-fielder, captain and president

Eagle Scout – Youth award for leadership, development, and community service

Journal Publications

G.R. Spedding, J. McArthur, "Span efficiencies of airfoils and wings at low Re", *J. of Aircraft*, vol. 47, no. 1, 120-128, Feb. 2010

G.R. Spedding, A.H. Hedenstrom, J. McArthur, M. Rosen, "The Implications of Low-Speed Fixed-Wing Aerofoil Measurements on the Analysis and Performance of Flapping Bird Wings", *J. Exp. Biol.*, **211**, 215-223, Jan. 2008

John McArthur, Ph.D.

Conference Proceedings

J. McArthur, T. Boehm, B. Hegwood, O. Watts, "Decentralized Engine Control System Simulator", GT2013-95105, ASME Turbo Expo, Conf. Proc., San Antonio TX, Jun. 2013

G.R. Spedding, J. McArthur, M. Rosen, "Deducing Aerodynamic Mechanisms from Near- and Far-Wake Measurements of Fixed and Flapping Wings at Moderate Reynolds Number", AIAA-2006-33, Aerospace Sciences Meeting, Conf. Proc., Reno NV, Jan. 2006

G.R. Spedding, J. McArthur, M. Rosen, "Estimating Fluid Forces from PIV Measurements", 6th International Symp. on Particle Image Velocimetry, Conf. Proc., California Institute of Technology, Sep. 2005

G.R. Spedding, M. Rosen, A. Hedenstrom, J. McArthur, "Force Measurements and Flow Structure for Fixed and Flapping Wings at Low Reynolds Number", 11th International Symp. on Flow Visualization, Conf. Proc., Notre Dame, Aug. 2004

Selected Presentations

"Decentralized Engine Control Systems", Propulsion Dynamics and Controls Workshop, NASA Glenn Research Center, Dec. 2013

"Boundary Layer Separation in Low Reynolds Number Aerodynamics", Southern California Symposium on Flow Physics, UC Los Angeles, Apr. 2008

"Effects of Leading Edge Vortices of Wings at Re=5,000", Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Salt Lake City UT, Nov. 2007

"Aerodynamics of Small Scale Wings", Air Force Office of Scientific Research Workshop on Micro Air Vehicles, Denver Colorado, Jun. 2006

Courses Taught

University of Southern California

Aircraft Stability and Control (M.S.) 2016-2020

Mechoptronics (B.S.) 2017-2018

Senior Project Laboratory (B.S.) 2017-2018

Univ. of Indiana / Purdue Univ. @ Indianapolis

Aircraft Dynamics (B.S.) 2014

Linear Controls (B.S.) 2013

California State University - Northridge

Advanced Fluid Dynamics (M.S.) 2010-2011

How Things Work (B.S.) 2009

Unique Courses Attended

Post-Doctoral Modeling/Controls/Optimization Courses

Model Predictive Control and Optimization, 2014, Rolls Royce

Lumped Systems Theory, Fall 2013, EE Department, Purdue Univ. at Indianapolis

Non-Linear Controls, Fall 2010, EE Department, California State Univ. at Northridge

Graduate Aero/Mech/Controls Courses - Univ. of Southern California

Geo-Physical Fluid Dynamics Linear and Non-Linear Waves

Turbulence Modeling Perturbation Methods

Advanced Controls Transitions to Chaos

Undergraduate Math/Physics Courses

Partial Differential Equations, Math Department, USC

Advanced Classical Mechanics, Physics Department, USC

Discrete Dynamical Systems, Math Department, West Point