Russell E. Trahan, III

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EDUCATION

Doctor of Philosophy – Aerospace Engineering — December 2014
Texas A&M University, College Station, Texas
Concentrations: Dynamics and Control, Intensity Correlation Imaging, Stellar Occultation for asteroid characterization
Dissertation Topic: Phase Retrieval and Its Applications in Optics
Advisor: Dr. David Hyland

Master of Science – Aerospace Engineering — December 2012
Texas A&M University, College Station, Texas
Concentration: Dynamics and Control, Intensity Correlation Imaging
Thesis Topic: Phase Retrieval with Application to Intensity Correlation Interferometry
Advisor: Dr. David Hyland

Bachelor of Science – Aerospace Engineering — December 2010
Texas A&M University, College Station, Texas

Relevant Graduate Coursework: Celestial Mechanics, Complex Analysis, Continuum Mechanics, Estimation of Dynamic Systems, Fluid Mechanics, Methods of Applied Math, Modern Control Theory, Numerical Simulations, Optimal Control Theory, Random Dynamical Systems, Spacecraft Dynamics, Statistical Analysis

Relevant Undergraduate Coursework: Aerospace Structural Design (FEM intensive), Aerothermochemistry, Classical Control Theory, Spacecraft Design (Apophis asteroid mitigation project in conjunction with NASA Ames Research Center and King Abdullaziz City for Science and Technology)

WORK EXPERIENCE

NASA Jet Propulsion Laboratory – Optical Engineer — February 2016 – Present
Engineer in the Advanced Optical Instruments Group, Optics Section.

NASA Jet Propulsion Laboratory – Caltech Postdoctoral Scholar — April 2015 – February 2017
Post-doc in the Advanced Optical Instruments Group, Optics Section. Primary projects pertain to Inverse Synthetic Aperture LADAR (ISAL) and sub-pixel IR detector characterization and calibration as support for the Wide-Field Infrared Survey Telescope (WFIRST) mission.

Experimental Center for Applied Physical Systems – Consultant — Summer 2013 – December 2014
Mission simulation and design for an asteroid mitigation mission.

Texas A&M – Research Assistant — 2010 – December 2014
Dr. David Hyland, Interferometry, phase retrieval, and asteroid mitigation

NASA Michoud Assembly Facility – Intern — Summer 2009
Administrative assistant

Texas A&M – Research Assistant — 2009 – 2011
Dr. Tamás Kalmár-Nagy, Dynamics of Non-Linear Systems,
Work published in an ASME journal and presented at a conference

Texas A&M – Grader — Fall 2008
Dr. Tamás Kalmár-Nagy, Engineering Mechanics

Lockheed Martin – Intern — Summer 2008
Michoud Assembly Facility, New Orleans, La
Production support for the external tank of the space shuttle in the "propulsion & electrical design" department. Main summer projects involved wiring harness design and testing in cryogenic environments.

Lockheed Martin – Intern — Summer 2007
Michoud Assembly Facility, New Orleans, La
Production support for the external tank of the space shuttle in the "propulsion & electrical design" department. Main summer projects involved sensor design and product quality testing.

AWARDS

JPL Earth Science and Technology Directorate – Team Award — 2020
Development and demonstration of near-Earth object detection and tracking capabilities

SAE AeroDesign Intercollegiate Design Competition — 2014
1th place overall out of 33 universities, 1st place for oral presentation, 2nd place for written design report

SAE AeroDesign Intercollegiate Design Competition — 2012
4th place overall out of 35 universities, Tied 1st place for oral presentation

Texas A&M Student Research Week—1st place in aerospace engineering — 2011

SAE AeroDesign Intercollegiate Design Competition — 2011
6th place overall out of 33 universities, 1st place for oral presentation

Texas A&M Student Research Week—2nd place in engineering — 2010

Designated as Texas A&M Student Research Scholar — 2009 – 2010

Performance Recognition—Lockheed Martin — Summers 2008

Performance Recognition—Lockheed Martin — Summers 2007

SKILLS

Engineering Software: Matlab, Visual Studio, GIT, Solidworks, Solidworks Simulation, LabView, Abaqus, Maple, AutoCAD

Programming Languages: ISO C++, C++/CLI, C#, CUDA, CMake, Matlab, SQL, Python, TypeScript, Javascript, Java, Powershell, Bash, PHP, HTML, CSS

Notable APIs: C++ STL, CUDA, DirectX (9 & 11), OpenGL, WinForms, wxWidgets, ZeroMQ, SQLite3, TCP Sockets (Windows & Posix), .Net Framework, Android SDK, CMake, Arduino, Angular

Licensed: HAM radio operator call sign W5RET, FCC Record #2343036

Project Management:

- Software cost estimation using COCOMO.
- Task scheduling to meet milestones using Gantt charts, PERT charts, precedence diagrams, critical path tracking, and workforce tracking

Example laboratory skills and experience:

- Optical lab equipment: proficient in basic opto-mechanical design and alignment, fiber optic system design, optical power meters, lens cleaning, precision motion control (PZT, stepper motor, and servo actuated), polarization controllers, incoherent sources (tunable and fixed freq. lasers), optical switches
- Manual and software interfacing with electronic test equipment such as oscilloscopes, function generators, spectrum analyzers, frequency counters, frequency synthesizers
- Trained and experienced with lasers up to 1000 Watts CW, including design of associated safety systems and protocols with the FAA and Laser Clearing House.
- High-speed analog-to-digital Data Acquisition (DAQ)
- CMOS and CCD camera characterization
- Use of machine shop tools: various hand tools, drill press, lathe, mill, sheet metal bending brake, tap & die, precision measurements, laser cutter
- Trained and experienced with liquid helium and liquid nitrogen cryogenic pressure systems
- Trained and experienced with soldering, electronics board layout and fabrication

ACTIVITIES

Reviewer for The Optical Society: Applied Optics — 2014

Sigma Gamma Tau Aerospace Honors Society — Inducted 2014

SAE Intercollegiate Aero Design competition

- Technical director of 17 students, 1st place overall, 1st oral presentation, 2nd design report — 2013 – 2014
- Technical director of 16 students, 4th place overall, tied 1st oral presentation — 2011 – 2012
- Technical director of 18 students, 6th place overall, 1st oral presentation — 2010 – 2011
- Program co-founder, structural design leader — 2008 – 2009

American Institute of Aeronautics and Astronautics (AIAA) — 2008 – Present
Served as officer for 2010-2012 school years

Sigma Nu Fraternity – Served on the executive committee — 2006 – 2010

National WWII Museum – Restoration of a Higgins PT boat electrical systems — 2010 – 2012

Society of Automotive Engineers (SAE) – Aerospace Division — 2008 – 2014

Amateur Radio Relay League (ARRL) — 2001 – 2002

Academy of Model Aeronautics (AMA) — 1999 – 2001, 2007 – Present

PUBLICATIONS

C. Zhai, M. Shao, N. Saini, P. Choi, R. Trahan, K. Nazli, M. Zhan, and N. Evans, *Role of Topocentric Parallax in Near-Earth Object Initial Orbit Determination*
Publications of the Astronomical Society of the Pacific, Volume 134, Number 1031 — 2022

Ryan Blackman, Debra Fischer, et. al., *Performance Verification of the EXtreme PREcision Spectrograph*
The Astronomical Journal, 159:238 (30pp) — 2020

C. Zhai, Q. Ye, M. Shao, et. al., *Synthetic Tracking Using ZTF Deep Drilling Data Sets*
Publications of the Astronomical Society of the Pacific, 132:064502 (8pp) — 2020

M. Shao, R. Trahan, C. Zhai, N. Saini, S. Turyshev, *Synthetic Tracking on a Small Telescope*
Advanced Maui Optical and Space Surveillance Technologies Conference (AMOS) — 2018

M. Shao, H. Zhou, S. Turyshev, C. Zhai, N. Saini, R. Trahan, *A Constellation of MicroSats to Search for NEOs*
Proc. SPIE 10769-20 — 2018

C. Pellizzari, R. Trahan, C. Bouman, S. Williams, S. Williams, M. Shao, B. Nemati, H. Zhou, *Optically-Coherent Image Formation and Denoising Using Plug and Play Inversion Framework*
Applied Optics, Vol. 56, No. 16. — 2017

C. Pellizzari, R. Trahan, H. Zhou, S. Williams, S. Williams, B. Nemati, M. Shao, C. Bouman, *Synthetic Aperature LADAR: A Model-Based Approach*, The IEEE Transactions on Computational Imaging, Vol. PP, Issue 99 — 2017

R. Trahan, B. Nemati, H. Zhou, M. Shao, I. Hahn, W. Schulze, *Low-CNR inverse synthetic aperture LADAR imaging demonstration with atmospheric turbulence*, Proc. SPIE 9846-14 — 2016

H. Zhou, B. Nemati, M. Shao, C. Zhai, W. Schulze, R. Trahan, *Low-cost chirp linearization for long-range ISAL imaging application*, Proc. SPIE 9846-13 2016

R. Trahan & D. Hyland, *Mitigating the effect of noise in iterative projection phase retrieval* in *Proceedings of the 2014 Imaging and Applied Optics: Optics and Photonics Congress (OPC).* Seattle, Washington. July 2014

R. Trahan & D. Hyland, *Phase retrieval applied to stellar occultation for asteroid characterization.* Applied Optics, Vol. 53, Issue 15, pp. 3540-3547 2014

R. Trahan & D. Hyland, *Phase retrieval of images using Gaussian radial bases*, Applied Optics, Vol. 52, Issue 36, pp. 8267-8633. 2013

R. Trahan & D. Hyland, *Mitigating the effect of noise in the hybrid input-output method of phase retrieval*, Applied Optics, Vol. 52, Issue 13, pp. 3031-3037. 2013

R. Trahan & T. Kalmar-Nagy, *Equilibrium, stability, and dynamics of rectangular liquid-filled vessels,* Journal of Computational and Nonlinear Dynamics, Vol. 6. October 2011

R. Trahan & T. Kalmar-Nagy, in *Proceedings of the 13th Nonlinear Vibrations, Dynamics, and Multibody Systems Conference.* Blacksburg, Virginia. May 2010

CONFERENCES

SPIE Defense and Commercial Sensing, Baltimore, MD April 2016
AIAA Space 2014, San Diego, CA August 2014
Imaging and Applied Optics: Optics and Photonics Congress (OPC), Seattle, WA July 2014
International Symposium on Asteroid Mitigation & Exploration, Texas A&M University April 2011
Duke Vibrations Workshop, Duke University May 2010
13th Non-linear Vibrations, Dynamics, and Multibody Systems Conference, Virginia Tech May 2010

PATENT

M. Shao, S. Rao, B. Nemati, N. Saini, R. Trahan, T. Werne, & C. Zhai, "Systems and Methods for Tracking Moving Objects." US Patent 10,301,041 B2, issued May 28, 2019.

TECHNICAL PRESENTATIONS

"NEO Search Using a Cluster of Small Synthetic Tracking Telescopes" Michael Shao, Russell Trahan, Chengxing Zhai, Navtej Saini, Leon Harding. Division for Planetary Sciences (DPS): 50th Annual Meeting, Knoxville, Tennessee, October 21-26, 2018.

"Laser Ranging with High Power CW Lasers" Michael Shao, Slava Turyshev, Inseob Hahn, Russell Trahan The 15th International Workshop on Laser Ranging, Canberra, Australia, October 15-20, 2018.

"NEO Search with Small Synthetic Tracking Telescopes" Michael Shao, Chengxing Zhai, Russell Trahan, Navtej Saini. 231st AAS Meeting, Washington, DC, January 8-12, 2018.

"High Precision Focal Plane Astrometry … and possibilities for the HDST" Mike Shao, Bijan Nemati, Chengxing Zhai, Slava Turyshev, Russell Trahan. LUVOIR Science and Technology Definition Team (STDT) in Pasadena, CA July 22, 2016.

"Investigation into the Potential for Human Travel into Deep Space Using Current or Imminently Available Technology." AIAA Space 2014 conference, San Diego, CA. Presented on behalf of David Kanipe & Dr. David Hyland. August 2014.

"Phase Retrieval Applied to Asteroid Silhouette Characterization by Stellar Occultation." Primary science mission presenter for a feasibility study for a space-based stellar occultation mission to Team Xc at the NASA Jet Propulsion Laboratory. April 2014.

VOLUNTEER EXPERIENCE

National WWII Museum, restoration of a Higgins PT boat electrical systems
Texas A&M Undergraduate Summer Research Grant (USRG) final presentation judge, August 2013
Altar Server, Lector, and Extraordinary Minister of Holy Communion at St. Nicholas of Myra Catholic Church and Jesuit High School, New Orleans, La
Our Lady of the Americas - Missionary to Yucatan, Mexico, Summer 2005
Post-Hurricane Katrina reconstruction - Resurrection of Our Lord Parish School, New Orleans, LA.