Jonathan Sauder, Ph.D.

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Career Highlights

- ► Presidential Early Career Award for Scientists and Engineers (PECASE) for enabling new space missions via mechanical technologies and NASA Innovative Advanced Concepts (NIAC) Fellow
- ► Drove innovation resulting in $6M of profit by introducing, testing, and managing hardware and software for grain flow sensors in Argentina, Brazil, and New Zealand
- ► Implemented precision space mechanisms at https://www.youtube.com/watch?v=5rCXOOGsfDY and https://www.youtube.com/watch?v=vJi1qZUmYvw for deployment on orbit.

Industry Experience

NASA Jet Propulsion Laboratory, Pasadena, CA — Jun. 2014 to Present
Senior Mechatronics Engineer, Technology Infusion Group

- ► Charter member of a new group seeking to infuse technologies from universities, small companies and internal labs into JPL flight missions, overcoming the heritage barrier
- ► Principle Investigator on over $1M of successful proposals, and Co-I on another $3.6M
- ► Interface Engineer Lead for Europa Clipper Magnetometer and Test Lead for Surface Water Ocean Topography, designing non-metallic structures and arc-second accuracy test equipment
- ► Study lead for Interstellar Medium Probe, Solar Thermal Propulsion
- ► Lead mechanical engineer for the RainCube Spacecraft, the first active radar CubeSat and launched JPL's first metal additive part in space
- ► Created the Mechanical Maker Challenge crowd sourcing prize challenge and managed SBIR's
- ► Developed partnerships with universities and industry to infuse technology into JPL missions
- ► Conducted research on flexible composites, origami mechanisms structures, and inflatables
- ► Designed mission & tech. concepts for interstellar probes, Antarctic balloons, and Orion comms

NASA Jet Propulsion Laboratory, Pasadena, CA — Jan. 2014 to Jun. 2014
Technologist, Advanced Deployable Structures

- ► Designed a highly compact Ka-band parabolic deployable CubeSat antenna which increased data rate by 10,000x standard concepts and demonstrated in space on the 2018 RainCube Mission
- ► Led the mechanical development and costing effort for the pre-phase A high gain antenna design (HGA) for MarCO, the first CubeSat to Mars and assisted implementation of the design
- ► Designed and implemented a 10x14 meter gravity off-load structure
- ► Built functional proof-of-concept prototypes, wrote proposals and organized meetings

Precision Planting, Tremont, IL — Jan. to Aug. 2013
Field Engineer, contracted though Monsanto

- ► Managed and tested grain flow sensors and in-cab displays on 12 harvesters at 7 global sites
- ► Developed relationships with R&D partners across language and cultural barriers by conducting training, obtaining user feedback, and realizing requests; which surmounted test product failures
- ► Modified flow sensors and measurement tools with minimal resources to obtain quality test data and innovated methods to sync data to US software developers despite poor internet connection

Microsoft, Redmond, WA — May to Aug. 2011
Program Management Intern, Windows Phone

- ► Managed schedule, brainstorming sessions, and system integration with software development, software testing, UX/graphic design, and product planning to create a new phone call feature
- ► Conducted user tests personally, going beyond job description to overcome staff shortages

Mattel, El Segundo, CA — June to Aug. 2010
Mechanical Engineering Intern, Hot Wheels

- ► Improved performance of the Hot Wheels Booster by 60% while reducing cost 5% by designing a innovative experiment using a high-speed camera to quantify the performance of each component
- ► Developed Excel macros to update injection molding costs in pricing spreadsheets

Product Development Consultant, Los Angeles, CA May 2009 to Dec. 2013
- ► Consulted clients on product innovation including simplehuman, Kor Water, and startups
- ► Managed product design, created CAD models, built prototypes, and designed for manufacture
- ► Utilized design methods and Quality Function Deployments (QFD) to guide design processes

Precision Planting Inc., Tremont, IL May 2007 to Oct. 2008
R&D Engineering Intern
- ► Designed and researched products for an innovative planter monitoring and status display
- ► Created and analyzed models using Pro/Engineer and Pro/Mechanica, logging 1000s of hours
- ► Designed products for injection molding, investment casting, fabrication, and assembly
- ► Designed, prototyped and tested load sensors grossing $970k in revenue within the first year

Industry Related Committees
- ► Mechanical Systems Technical Discipline Team (TDT), NASA Engineering and Safety Center (NESC), NASA, 2018-Present
- ► Structures, Loads, and Mechanical Systems (SLaMS) Early Career Forum Planning Committee Lead, NASA, 2018-Present
- ► Blue Sky Studies Advisory Council, NASA JPL, 2017-Present
- ► Venus Surface Landed Platform Study, Technical State of the Art Panel Chair, NASA 2018-2019
- ► AIAA Small Satellite and Spacecraft Structures Technical Committee Member, 2019-Present

Education
University of Southern California, Los Angeles, CA Provost's Fellow, GPA: 3.91/4.00
Doctor of Philosophy in Mechanical Engineering Dec. 2013
Research Focus: Collaboration and Innovation in Engineering Design
Master of Science in Product Development Engineering Dec. 2011

Bradley University, Peoria, IL Summa Cum Laude, GPA: 3.95/4.00
Bachelors of Science in Mechanical Engineering May 2009

Academic Experience
University of Southern California, Los Angeles, CA Aug. 2015 to Present
Part Time Lecturer
- ► Taught the course AME410 "Engineering Design Theory and Methodology" which teaches students how to take an abstract problem and find an engineering solution.
- ► Rewrote and taught AME503 "Advanced Mechanical Design", which develops students practical engineering judgment by developing new mechanisms and mechanical systems.

University of Southern California, Los Angeles, CA Aug. 2009 to Dec. 2013
Doctoral Research: Collaborative Stimulation in Team Design Thinking
- ► Identified how collaboration stimulates creative thought process in engineering design through shared ideas and questions, providing insights into more effective collaborative techniques
- ► Developed a new experimental method to analyze thought processes during collaboration
- ► Wrote papers for journals, presented at conferences, and obtained an NSF grant

Viterbi Graduate Students Association, Los Angeles, CA May 2010 to May 2011
Aerospace and Mechanical Engineer Senator
- ► Organized the first annual "Viterbi Cup" soccer tournament, which has since become a key annual event in the organization.
- ► Assumed responsibility for and successfully coordinated a student talent competition with over 200 in attendance in two weeks after the Vice President of Programs suddenly resigned

Springboard Business Plan Competition, Bradley University, Peoria, IL March to April 2009
Product Design Lead
- ► Designed concepts for the housing and user interface of a touch screen restaurant menu
- ► Completed all work, from brainstorming to CAD, under an aggressive 3 week deadline

Stanford University, Stanford, CA Aug. to Nov. 2008
Team Leader, REE Fellows Program
- ► Collaborated on online entrepreneurial projects with an international multi-disciplinary team from 3 different continents, which required scheduling meetings around time zones
- ► Program concluded with a course and business plan contest at Stanford focusing on innovation, entrepreneurship, and collaboration. Plans were presented to an international group of faculty

Honors/Awards
- ► Presidential Early Career Award for Scientists and Engineers (PECASE) for demonstrating innovative mechanical technologies to enable a new class of space missions, White House, 2019
- ► NASA Exceptional Technology Achievement Medal for "exceptional achievement in the development and operation of the 0.5-meter, Ka-band Parabolic Deployable Antenna (KaPDA) for CubeSat telecommunications", NASA, 2019
- ► NASA Group Achievement Award for "RainCube", NASA, 2019
- ► Aerospace Mechanisms Symposium Herzl Best Paper Award, 2018, for "Lessons Learned from a Deployment Mechanism for a Ka-band Deployable Antenna for CubeSats"
- ► IEEE Antenna and Propagation Society's Sergei A. Schelkunoff Best Journal Paper Award, 2017 for "CubeSat Deployable Ka-band mesh reflector antenna development for Earth Science Missions"
- ► NASA Innovative Advanced Concepts (NIAC) Fellow, NASA, 2016 for Automaton Rover for Extreme Environments
- ► Explorer Award for Outstanding Technical Development of the Ka-band Parabolic Deployable Antenna, Jet Propulsion Laboratory, 2016
- ► AIAA SciTech Spacecraft Structures Best Paper for "Starshade Mechanical Architecture and Technology Effort", 2016
- ► NASA Group Achievement Award for "Starshade Technology Development", NASA, 2015
- ► Provost's Fellow, University of Southern California 2009-2013
- ► Roundtable Entrepreneurship Fellow, Stanford University, 2008
- ► Tau Beta Pi Engineering Honor Society and member of 2007 All-Illinois Academic Team

Selected Funded Proposals
- ► 05/17-Present: PI, Automaton Rover for Extreme Environments, NASA Innovative Advanced Concepts (NIAC) Phase 2 Funded Study, $500k
- ► 10/16–9/17: PI, Characterization of Antenna Mesh Surfaces, ESD Spontaneous Engineering Improvement (ESEI), $65k
- ► 05/16–03/17: PI, Automaton Rover for Extreme Environments, NASA Innovative Advanced Concepts (NIAC) Phase 1 Funded Study, $100k
- ► 05/16–Present: Co-PI, Large Aperture Deployable Reflectarray (LADeR) Antenna, Presidents Directors Fund (PDF) Funded Study, $300k
- ► 01/15–Present: Co-I, Ka Band Highly Constrained Antenna for RaInCube, Research Opportunities in Space and Earth Sciences (ROSES) Funded Study, $900k
- ► 10/15–12/16: Co-I, Inflatable Antennas for CubeSats Communication and Science in Deep Space, Center Innovation Fund (CIF) Funded Study, $100k
- ► 10/15–Present: Co-I, Ka Band Parabolic Deployable Antenna for RaInCube, a precipitation profiling Radar In Cubesat, JPL R&TD Funded Study, $400k

Selected Publications
- ► **JF Sauder**, M Arya, N Chahat, E Thiel, S Dunphy, M Shi, G Agnes, T Cwik, "Deployment Mechanisms for High Packing Efficiency One-Meter Reflectarray Antenna (OMERA)", AIAA Scitech 2019 Forum, San Diego, CA, Jan. 2019
- ► M Arya, **JF Sauder**, R Hodges, S Pellegrino, "Large-Area Deployable Reflectarray Antenna for CubeSats", AIAA Scitech 2019 Forum, San Diego, CA, Jan. 2019
- ► **J Sauder,** N Chahat, R Hodges, E Peral, M Thomson, "Lessons Learned from a Deployment Mechanism for a Ka-band Deployable Antenna for CubeSats", Aerospace Mechanisms Symposium, Cleveland, OH, May 2018
- ► **J Sauder**, B Wilcox, J Cutts, "An Airborne Turbine for Power Generation on Venus", VEXAG, Laurel, MD, Nov. 2017

- **JF Sauder**, E. Hilgemann, J. Hall, B. Bienstock, M. Johnson and A. Parness "An Automaton. Rover Enabling Long. Duration In-Situ Science in. Extreme Environments", IEEE Aerospace Big Sky, MT, Mar. 2017
- N Chahat, RE Hodges, **J Sauder**, M Thomson, Y Rahmat-Samii "The Deep-Space Network Telecommunication CubeSat Antenna: Using the deployable Ka-band mesh reflector antenna.", IEEE Antennas and Propagation Magazine 59 (2), 31-38, Apr. 2017
- **JF Sauder**, N Chahat, B Hirsch, R Hodges, Y Rahmat-Samii, E Peral, M Thompson "From Prototype to Flight: Qualifying a Ka-band Parabolic Deployable Antenna (KaPDA) for CubeSats", 4th AIAA Spacecraft Structures Conference, Grapevine, TX, Jan. 2017
- N Chahat, RE Hodges, **J Sauder**, M Thomson, E Peral, Y Rahmat-Samii "CubeSat Deployable Ka-band mesh reflector antenna development for Earth Science Missions", IEEE Transactions on Antennas and Propagation 64 (6), 2083-2093, Jun. 2016
- **JF Sauder**, N Chahat, R Hodges, E Peral, Y Rahmat-Samii, M Thomson, "Designing, Building, and Testing a Mesh Ka-band Parabolic Deployable Antenna (KaPDA) for CubeSats". AIAA SciTech, San Diego, CA, 2016.
- **JF Sauder**, B Trease, "Deployment Testing of Flexible Composite Hinges in Bi-Material Beams." AIAA SciTech, San Diego, CA, 2016.
- D Webb, B Hirsch, V Bach, **JF Sauder**, S Bradford, M Thomson "Starshade mechanical architecture & technology effort." AIAA SciTech, San Diego, CA, 2016.
- **J Sauder**, Y Jin, "A qualitative study of collaborative stimulation in group design thinking", 2016 Design Science, 2016; 2:e4.
- **Sauder, J**., Chahat, N., Thomson, M., Hodges, R., Peral, E., & Rahmat-Samii, Y. "Ultra-compact Ka-band parabolic deployable antenna for RADAR and interplanetary CubeSats." 29th Small Satellite Conference. Logan, UT, 2015.
- **J Sauder**, N Chahat, M Thompson, R Hodges, Y Rahmat-Samii, "Ultra-Compact Ka-Band Parabolic Deployable Antenna for CubeSats", 3rd Interplanetary CubeSat Workshop. Pasadena, CA, 2014.
- **Sauder, J.,** & Jin, Y. "Collaborative stimulation of memory retrieval in design". International Journal of Design Creativity and Innovation, 2014; 2(2), 63-81.
- **Sauder J.**, Lian E., & Jin Y. "The Effect of Collaborative Stimulation on Design Novelty", ASME International Design Engineering Technical Conferences (IDETC). Portland, OR 2013
- **Sauder J.**, Jin Y. "Training the Participatory Renaissance Man: Past Creative Experiences and Collaborative Design"; Sauder & Jin; ASME IDETC. Portland, OR 2013
- **Sauder J.**, Jin Y. "Collaborative Stimulation of Memory Retrieval in Creative Design". Second International Conference on Design Creativity. Glasgow, UK 2012

Invited Talks

- "Automaton Rover for Extreme Environments: Steampunk Meets Spacecraft", Keck Institute for Space Studies Lecture, Pasadena, CA, Nov. 2017
- "Automaton Rover for Extreme Environments", Inventive Genius Lecture: From Science Fact to Science Fiction, Museum of Science and Industry, Chicago, IL, May 2017
- "Strandbeests on Venus", COFES: The Congress on the Future of Engineering Software. Scottsdale, AZ, Apr. 2017
- "NASA Innovative Advanced Concepts" Panel Member, AIAA Scitech, Grapevine, TX Jan. 2017
- "Technology for CubeSats" Panel Member, Committee on Achieving Science Goals with CubeSats, The National Academies of Sciences, Engineering, and Medicine, Irvine, CA Sept. 2015
- Brigham Young University Museum of Art Invited Talk: "Origami in Space: How NASA Finds New Technologies in Novel Places", Spring 2015

Other Activities

- Served as a USC Viterbi Ambassador by visiting universities and recruiting graduate students
- Founding member and treasurer in Bradley University Engineers Without Borders chapter
- Collaborator and guest writer on blog launchingrocketbabies.com