Dr. Jonathan Sauder

www.jonathansauder.com

Achievements

- ► NIAC Fellow (NASA Innovative Advanced Concepts) and Principle Investigator on automaton rover for Venus, with successful Phase 1 and Phase 2 awards
- ► 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
- ► Led an interdisciplinary team of designers, packagers, and a psychologist in brainstorming, prototyping and presenting a nighttime toy which wowed the Mattel CEO and executive team

Industry Experience

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

- ► Charter member of a new group seeking infuse technologies for universities and small companies and infuse them into JPL flight missions, overcoming the heritage barrier
- ► Principle investigator on a number of successful proposals totaling $1M, and Co-I on another $1.4M
- ► Lead mechanical engineer for the RainCube Spacecraft, the first active radar CubeSat
- ► Developed partnerships with universities and industry to infuse technology into JPL missions
- ► Conducted research on flexible composites, origami mechanisms structures, and inflatables

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 implemented the design on the RainCube spacecraft for 2018 launch.
- ► 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
- ► Wrote proposals winning over $1.6M in funding

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

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 AME403 "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 products.

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

University of Southern California, Los Angeles, CA Aug. 2011 to Dec. 2013
Teaching Assistant
- ► Developed the course plan, assignments, and taught an introductory Solidworks course
- ► Organized visits by industry professionals and added DFM lessons to enrich class for students

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
- ► Presented entrepreneurial business plan to a panel of industry experts and won second place

Independent Research, Bradley University, Peoria, IL Jan. to May 2009
Design of an In-draft Supersonic Wind Tunnel
- ► Designed an in-draft (vacuum based) supersonic wind tunnel for instructional laboratory use
- ► Conceptualized a design based on compressible flow equations and constructed and tested a working representation for design verification
- ► Captured Schlieren images from an existing blow-down supersonic wind tunnel

Senior Project, Bradley University, Peoria, IL Aug. 2008 to May 2009
Flow Visualization Inside a Lab, for Los Alamos National Laboratory
- ► Project found hazardous chemical concentrations in a scale model laboratory after a spill
- ► Designed the scale model in Pro/Engineer and analyzed in Pro/Mechanica to find stresses
- ► Replaced water with air to achieve appropriate Reynolds number at smaller lab scale
- ► Constructed the model and support structure using a mill, CNC machine, and MIG welder

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

Selected Publications
- ► **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
- ► N Chahat, **J Sauder**, M Thomson, Y Rahmat-Samii, R Hodges "Ka-band deployable mesh reflector antenna compatible with the deep space network" Antennas and Propagation (EUCAP), 2017 11th European Conference on, 546-548, Mar. 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 P"Automaton Rover for Extreme Environments", Inventive Genius Lecture: From Science Fact to Science Fiction, Museum of Science and Industry, Chicago, IL, May 2017
- ► eral, 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.
- ► **J Sauder**, Y Jin, "A qualitative study of collaborative stimulation in group design thinking", 2016 Design Science, 2016; 2:e4.
- ► Chahat, Nacer, et al. "CubeSat Deployable Ka-Band Mesh Reflector Antenna Development for Earth Science Missions." IEEE Transactions on Antennas and Propagation 64.6 2016; 2083-2093.
- ► A Babuscia, T Choi, **J Sauder**, A Chandra, J Thangavelautham, "Inflatable antenna for CubeSats: Development of the X-band prototype". IEEE Aerospace Conference, Big Sky, Montana, 2016
- ► **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", Inventive Genius Lecture: From Science Fact to Science Fiction, Fiske Planetarium, Boulder, CO, Oct. 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

Major Awarded Proposals

- 05/17-Present: PI, Automaton Rover for Extreme Environments, NASA Innovative Advanced Concepts (NIAC) Phase 2 Funded Study, $500k
- 10/16–Present: 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

Honors/Awards

- Co-recipient IEEE Antenna and Propagation Society's Sergei A. Schelkunoff Best Journal Paper Award, 2017
- NASA Innovative Advanced Concepts (NIAC) Fellow, NASA, 2016
- Explorer Award for Outstanding Technical Development of the Ka-band Parabolic Deployable Antenna, Jet Propulsion Laboratory, 2016
- Co-recipient AIAA SciTech Spacecraft Structures Best Paper for "Starshade Mechanical Architecture and Technology Effort", 2016
- Co-recipeint 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
- Recipient of the Illinois Space Grant Consortium and ASME John and Elsa Gracik scholarships, 2008
- Presidents Honor List, Deans List, and National Deans List, 2005-2009

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
- Volunteered on the Mt. Baldy Ski Patrol to rescue and medically assist injured skiers