BRIAN TREASE

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OBJECTIVE ► To contribute to a dynamic team that excels in the design, development, simulation, and delivery of innovative mechanical systems. With over 20 years of experience spanning aerospace, robotics, and mobility in both academic and industrial settings, I bring expertise in advancing technology readiness and driving mechanical systems from ideation through prototyping to operational hardware.

I thrive in cultures that foster innovation, collaboration, and personal growth. My approach integrates physical prototyping with advanced engineering simulation to uncover creative solutions and drive impactful results. I am passionate about mentoring, cross-disciplinary learning, and clear communication that leverages storytelling and visualization to effectively convey engineering concepts. When tackling complex challenges, I've drawn design inspiration across disciplines as diverse as biology and art. Driven by curiosity and a passion for novelty, I am eager to embark on my next adventure and explore new frontiers.

EXPERIENCE

Director of Robotics, Elemental Agronomy, Inc., Denver, CO...9/2023 – 4/2024
- Co-founder of a small start-up company of three full-time engineers (worked remotely from Michigan)
- Designed and delivered two developmental Proof-of-Concept 4-wheeled robots to serve as testbeds for software, communication, vision, AI, and marketing of an **autonomous robot farming service**
- Met with farmers to develop requirements and features
- Directed work of one part-time engineer in Toledo, OH
- <u>Exit</u>: Brought company to decision point of acquiring an 'off-the-shelf' outdoor mobile robotics development platform. Under lean cash-flow conditions, transitioned to Advisory Board role, allowing remaining software team to continue pursuing investor-targeted field demonstrations

Professor (Tenure-track), University of Toledo, Mechanical Engineering (MIME Dept) ....10/2015 – 5/2023
- Founder and Director: 3MDL (Mechanisms, Mobility, & Multifunctional Design Lab)
- **Funding**: NASA, Ohio Space Grant Consortium, NSF REU, NOAA, Ohio Sea Grant Program
- **Research**: Swarm Robotics, Novel Mobile Robotics, Soft Robotics, Biologically-inspired Design, Origami-inspired Design, Compliant Mechanisms, Multibody Simulation, Remote Sensing, Shape-Memory Alloys
- Graduated 12 graduate students; advised 26 undergraduate research students
- **Teaching**: 800+ lectures; **Courses:** Mechanical Design, Senior Design Capstone, Design & Analysis of Mechanical Systems (kinematics), MATLAB for Engineers, Design for Automation
- Mentored over 30 Senior Design Capstone projects (external & internal clients, 3-6 students per team)
- Student Organization Advisor: UT Rocketry Club, UT Rocket Robotics Club, UT NASA Robotic Mining Competition Team, UT AquaSci Adventure – Eriehack Competition Team, Toledo Hyperloop Student Competition Team, UT Aviation Club

Mechanical Engineer & Research Technologist..1/2008 – 9/2015
- **NASA Jet Propulsion Laboratory**, Pasadena, CA
- Mechanical Engineering Division 35, Technology Infusion Group 355Z (see **appendix** for projects)
- Key Roles: Hardware Engineer for Spacecraft Structures & Mechanisms; Engineer and Analyst for Rover Mobility Systems; Research Engineer for Deployable Structures, Solar Sails, & Flexible Mechanisms
- Hired and directed 11 summer student interns; built partnerships with research universities
- Participated in competitively funded mission architecture studies for advanced concept development
- Led high-profile workshops for NASA and external participants. Oversaw more than 65 participants and $80K in funds: xTerramechanics *2011*, Compliant Mechanisms in Space *2012*, Origami in Space *2014*
- Published 7 NASA Technical Briefs between 2010-2014

EDUCATION

University of Michigan .... Ann Arbor, MI
    Ph.D. Mechanical Engineering (2008), **M.S.** Mechanical Engineering (2002), Advisor: Sridhar Kota
      Thesis: *Embedded Actuators, Sensors, & Structure in Distributed and Compliant Systems*
University of Toledo ....Toledo, OH
    B.S. Mechanical Engineering (1999), 1st in class, Honors Program, Minor in Business Admin

SKILLS & SOFTWARE

HARDWARE: Prototyping, Mechanisms, Flexures, 3D Printing, H/W Debugging, PDR/CDR Review & Release Cycle

SOFTWARE: Mechanical Design & Simulation, Kinematics, Deformation/Stress, Dataset Analysis
- **MATLAB** & **Simulink** [25+ years] (taught hands-on college courses on MATLAB for Engineers)
- **Adams** (MSC/Hexagon) [24 years] – Kinematics and Multibody Dynamic Simulation
- **SolidWorks** CAD [20 years] (assemblies, drawings, motion simulation, FEA stress analysis)
- **UG NX** / **Teamcenter** CAD (Siemens) [5 years]
- **Excel** [30 years] (VBA macros, pivot tables, data aggregation)
- Embedded systems / microcontrollers: **Raspberry Pi, Arduino, REV Robotics Control Hub**
- Working Knowledge: **Altair Inspire** + **Motion**, **Python, Java, JavaScript, MS DOS, Ansys, Abaqus, Maple, LabVIEW, C++, FORTRAN, Modelica, Simscape, DOORS, Confluence, Jira, GitHub**
- Competence in developing data workflows between MATLAB, Excel, FEA, MBD, and datasets

PROJECT COORDINATION AT SCALE: Directed UToledo Senior Design Program [3 years]
- Expanded and managed diverse external project and client portfolio
- Coordinated and mediated clients, mentors, faculty advisors, and university prototyping resources
  - Approximately 25 projects and 100 students per semester

HONORS & RECOGNITIONS

- 2018 Outstanding Undergraduate Research Mentor Award (UToledo Engineering)
- 2018 Invited Keynote Speaker: "Origami-Inspired Engineering", SPIE Smart Structures Conf, Denver, CO
- 2016 NASA Early Career Public Achievement Medal (NASA Honor Award)
- 2015 NASA JPL Team Awards (2) for Outstanding Contributions to the Deep Space Atomic Clock
- 2014 NASA Tech Briefs Spotlight: "Who's Who at NASA - Brian Trease", December Issue
- 2010 NASA JPL Mariner Award: Delivery of the ARTEMIS Software for MER Rover Operations
- 2010 Mason High School Hall of Fame, Inaugural Induction Class (Erie, MI)
- 2002 NSF Graduate Research Fellowship
- 2000 Tau Beta Pi National Fellow
- 1995 Eagle Scout
- 1994 YFU Exchange Student to Japan

PROFESSIONAL ACTIVITIES

- Robotics Competition Coach: FIRST Lego League, FIRST Tech Challenge, Bedford Robotics, 2022 – current
- Mentor, Ability Center of Toledo, High School Summer Mentoring Program, 2020 (link)
- Executive Board Member of ASME Northwest Ohio Section, elected (2017-2020)
- ASME Mechanism & Robotics Committee, elected (2010-2016) (link)
- Chair, ASME Student Mechanism & Robotics Design Competitions (2009-2017) (link)
  - Lead coordinator of judges, participants, funding, & awards for international collegiate competition
- Conference Session Chair: ASME IDETC, SPIE Smart Structures, ASME SMASIS, ASCE Earth & Space
- Grant Proposal Reviewer (NSF, NASA)
- Faculty Coordinator and Chaperone of two Senior Design Project Teams (8 students) to attend SMST Conference in Konstanz, Germany for CASMART Student Competition, May 2019

SAMPLE OF RESEARCH PUBLICATIONS

Google Scholar Indices: B. TREASE ------ **Citations**: 2,517 (1,123 since 2020) ------ **i10-index**: 26 (18 since 2020)

- BR Arn, MS Hefzy, A Mustapha, B Trease, "On the Kinematics of the Cross Body Abduction & Hand Behind the Back Tests to Assess Osteoarthritis of the Acromioclavicular Joint," *J. Res Orthopaedics,* 2023
- J.S., A.S., B Trease, "Rolling Locomotion of Hexagonal Kinematic Chain Robot," ASME IDETC 2022
- J Ansary, J O'Donnell, N Fyza, B Trease, "Swarms of Aquatic Unmanned Surface Vehicles (USV), a Review from Simulation to Field Implementation," ASME IDETC 2020
- A Schroeder, L Marshall, B Trease, A Becker (undergrad), and SL Sanderson, "Development of Helical, Fish-Inspired Cross-step Filter for Collecting Harmful Algae," *J. Bioinspiration & Biomimetics*, 2019
- A Schroeder, B Trease, A Arsie, "Balancing Robot Swarm Cost and Interference Effects by Varying Robot Quantity and Size," *J. of Swarm Intell,* 2018
- JP Marshall, RC Hurley, D Arthur, I Vlahinic, C Senatore, K Iagnemma, B Trease, and JE Andrade, "Failures in Sand in Reduced Gravity Environments," *J. Mechanics and Physics of Solids,* 2018
- F Zhou, R Arvidson, K Bennett, B Trease, R Lindemann, P Bellutta, K Iagnemma, C Senatore, "Simulation of Mars Rover Traverses," *J. of Field Robotics*, 2014
- S Zirbel, R Lang, M Thomson, D Sigel, B Trease, S Magleby, L Howell, "Accommodating Thickness in Origami-based Deployable Arrays," *J. of Mechanical Design*, 2013

SELECT PROJECT ROLES & POSITIONS at JPL

- **Starshade**, Structural "Origami" Engineer for Deployable 34-meter Optical Shields, 2014-2015 (link)
- **Europa Ice Challenge**, Architect, 2014-2015 (public NASA Centennial Challenge for Aerial Robot Technology)
- **xTerramechanics**, Principal Investigator, 2010-2016 (Modeling & Experiments in Reduced Gravity) (link)
- **Compliant Mechanisms**, Principal Investigator, 2012-2016 (Deployable Structures, Flexures, Origami, Cubesats, Multifunctional Materials)
- **Deep Space Atomic Clock**, Mechanical Configuration Lead, 2013-2014 (link)
- **Lead Solar Sail Engineer, "**SSEARS: Solar System Escape Architecture for Revolutionary Science", NASA NIAC Study (2013), Lead Mechanical Engineer on Phase 2 NIAC Proposal, FY14 $488K
- **Multi-body Dynamicist and Simulation Engineer,** Soil-Moisture Active/Passive (SMAP, 2010), DARPA Advanced Vehicle Make program (AVM, 2012-2013), Mars Exploration Rovers (MER, 2009-2013)
- **Structures Lead Engineer,** Jason-3 Spacecraft Electronics Support Structure (2009-2012)
- **Hardware Engineer,** Classified Rotating Mechanism (2012-2013), Mars Science Laboratory (2010-2011), Nuclear Spectroscopic Telescope Array (2008), Space Interferometry Mission (2008-2009)
- **Proposal Team Engineer,** New Frontiers Small-Body Proposals: Galahad (Asteroid) and Comet Odyssey (2008-2009), Mars InSight Proposal Team (2011-2012)

PUBLICITY & OUTREACH (selection)

- Invited Talk: Fresh Inspiration: Looking to Art & Biology for Novel Directions in Engineering, NSPE-OH, 2019 Ohio Engineering Conf, Perrysburg, OH
- Invited Talk: Origami-Inspired Engineering, from Minimally Invasive Surgery to Exoplanet Exploration, Tucson Botanical Gardens, Tucson, AZ, 2018
- Interview: The Origami Code (Documentary Film), CuriosityStream, 2015
- Interview: Wired Magazine: NASA Invents a Folding Solar Panel Inspired by Origami, 2014
- Interview: NPR (radio): To Make A Spacecraft That Folds And Unfolds, Try Origami, Joe Palca, 2014

STUDENT INTERNSHIPS & CO-OPS

Summer Intern, Sandia National Laboratory, Microsystems Engineering (Albuquerque, NM) ·········· 2001, 2002
Summer Intern, Air Force Research Laboratory (Wright Patterson AFB, Dayton, OH) ····························· 2000
Year-long Intern, Dana Corporation, Design Analysis Team (Holland, OH) ···································· 1999