

Holly Dinkel

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Education

University of Illinois, Urbana-Champaign

Urbana, IL

PH.D. IN AEROSPACE ENGINEERING (ANTICIPATED)

May 2025

- Graduate Researcher studying problems in learning-based robotic perception and control advised by Professor Timothy Bretl
- Mavis Future Faculty Fellow

Stanford University

Stanford, CA

M.S. IN AERONAUTICS AND ASTRONAUTICS

June 2020

- Stanford Technology Ventures Program Threshold Ventures Fellow (12 accepted from 80 Stanford graduate student in engineering applicants)
- Robotics Research Projects: "Spacecraft Attitude Determination Using Recursive Discrete-Time Estimation Techniques (UKF and MEKF)," "Optimal Coverage for an Arctic Sensor Network," and "Cooperative Transport in a Constrained Environment" (all work done in MATLAB or Julia)
- Robotics Design Project: implemented autonomy software stack in Python - including control, trajectory optimization, motion planning, computer vision, localization and filtering, and reinforcement learning - for autonomous control of a Turtlebot mobile robot
- Spacecraft Design Project: Used KiCAD to design the main flight computer for PyCubed-1, a PocketQube satellite demonstrating three-axis attitude control using a magnetorquer rather than a reaction wheel

University of Missouri

Columbia, MO

B.S. IN CHEMICAL ENGINEERING

May 2017

- Graduated *Magna Cum Laude* with University Honors (one of only three chemical engineering graduates to earn this distinction)
- Chemical Process Engineering Design Projects: "Comparison of Bio-Mass to Bio-Oils Reactor Systems: Direct Conversion vs. Companion Coal Gasification," "Oxidation of Propylene to Acrylic Acid," "Sour Water Stripping: Removal of Hydrogen Sulfide, Ammonia, and Propane from Wastewater Prior to Primary Filtration," and "Dehydration of 1,4-Butanediol to Tetrahydrofuran" (all designs modeled in AspenPlus)
- Undergraduate Research Projects: "Chromatographic Studies of Yttrium-90 for Radiolabeling of Pharmaceuticals" and "Modeling Burnup and Actinide Production of Thorium and Uranium Fuel Sources for Nuclear Power Systems"

University of Missouri

Columbia, MO

B.A. IN MUSIC

May 2017

- Emphasized studies in clarinet performance and music theory, graduated *Magna Cum Laude*
- Final Project: "A Geometry of Brahms: A Study of Geometrical Representations of Parsimonious Voice Leading in Johannes Brahms's F Minor Clarinet Sonata, Op. 120 Movement I"

St. Joseph Central High School

St. Joseph, MO

HIGH SCHOOL DIPLOMA

May 2012

- Class Valedictorian (Rank: 1 / 354), International Baccalaureate Diploma Recipient

Engineering Experience

Bastion Technologies, Inc. | NASA Marshall Space Flight Center, QD35

Huntsville, AL

PROBABILISTIC RISK ASSESSMENT (PRA) ANALYST

May 2017 - August 2018, 40 hrs/week

- Developed fault tree analyses in SAPHIRE for loss of mission and loss of crew scenarios for NASA's Space Launch System (SLS) rocket
- Maintained and developed system-level PRAs using SAPHIRE and Excel for the upper Reaction Control System (RCS); core, booster, and upper stage thrust vector control systems; and the SLS interface with exploration ground systems
- Supported the development, review, and assessment of the Day-of-Launch I-Load Update (DOLILU) operations support plan, which determines the day-of-launch weather-dependent SLS trajectory optimization routines
- Awarded a Bastion contract-wide on-the-spot award for identifying an upper stage reaction control system design in violation of NASA's single-fault-tolerance requirement and presenting the risks of this design to the SLS chief safety officer
- Recruited and mentored a Bastion full-time employee and a NASA Pathways summer intern in PRA and supported their developments of the interim cryogenic propulsion stage RCS PRA and the exploration upper stage RCS PRA, respectively
- Analyzed system reliability of the self-propelled modular transporter to identify risks of transporting the SLS core stage between NASA centers
- Supported presentation of the integrated SLS PRA model to the SLS engineering review board
- Consistently and clearly communicated PRA element model design and results to the NASA PRA team ahead of schedule, and developed a template for all future presentations
- Collaborated with a NASA reliability engineer to collect historical space shuttle hydrazine leak data and fit statistical distributions to this data in R for use in SLS risk quantification

Teaching Experience

Stanford University | Department of Aeronautics and Astronautics

Stanford, CA

GLOBAL POSITIONING SYSTEM (AA 115Q) COURSE DEVELOPMENT ASSISTANT

December 2019 - March 2020, 10 hrs/week

- Responsible for building course projects involving using a sextant for celestial navigation and determining the accuracy of global positioning system measurements in the presence of interference

Stanford University | Athletic Academic Resource Center

Stanford, CA

ACADEMIC SKILLS TUTOR

September 2019 - Present, 6 hrs/week

- Facilitated undergraduate group tutorial sessions for ENGR 15: Dynamics, MS&E 120: Probabilistic Analysis, MS&E 111: Introduction to Optimization, ME 80: Mechanics of Materials, and MATH 19: Introduction to Single-Variable Calculus

Stanford University | Schwab Learning Center

Stanford, CA

ACADEMIC SKILLS TUTOR

January 2019 - Present, 5 hrs/week

- Provided individual tutoring to ensure academic success for students with attention-deficit hyperactivity disorder, dyslexia, and other learning disabilities for ENGR 15: Dynamics and Physics 45: Light and Heat

University of Missouri | Community Music Program

Columbia, MO

COMMUNITY MUSIC PROGRAM CLARINET INSTRUCTOR

August 2016 - May 2017, 5 hrs/week

- Coached clarinet performance techniques to middle- and high-school music students, stressing the importance of performance as a learning tool through encouraging every student to participate in a public recital each semester

Research Experience

Astrobee Robot Flight Software Intern

Mountain View, CA

NASA AMES RESEARCH CENTER INTELLIGENT ROBOTICS GROUP

June 2020 - Present, 40 hrs/week

- Developing Astrobee object perception, segmentation, and reconstruction capability using deep learning methods to enable Astrobee's inspection and shape completion of non-rigid objects
- Built, labeled, and iterated on custom training data sets including common ethernet-connected device networks in order to perform cable and device topology mapping
- Used PyTorch and OpenCV on Google Colaboratory to develop learning models

Stanford University Assistive Robotic Manipulation (ARM) Laboratory

Stanford, CA

GRADUATE STUDENT RESEARCHER

January 2020 - August 2020, 6 hrs/week

- Studying fast motion planning for catching flying objects using Python and simulating a Franka Emika Panda manipulator using ROS and Gazebo
- Advised by Professor Monroe Kennedy III

Argonne National Laboratory

Lemont, IL

DOE SCIENCE UNDERGRADUATE LABORATORY INTERN

January 2016 - August 2016, 40 hrs/week

- Studied the dissolution of Scandium, Yttrium, and Titanium in hydrochloric, sulfuric, and hydrogen fluoride acids to optimize a novel separation process for the production of electron linear accelerator-produced therapeutic and diagnostic medical radioisotopes
- Prepared scientific methods, results, and further studies of scandium medical radioisotope research for inclusion in U.S. patent No. 10344355, "Process for the separation and purification of scandium medical isotopes"
- Collected and analyzed radioactive decay data using Matlab for a project seeking to manufacture a Neptunium tracer for nuclear forensics use in the Argonne Analytical Chemistry Laboratory (ACL)

Fermi National Accelerator Laboratory

Batavia, IL

LEE TENG FELLOW IN ACCELERATOR PHYSICS

May 2015 - August 2015, 40 hrs/week

- Developed a Matlab script to extract position, momentum, global time, and particle data group identification (PDGid) data for each particle tracked in G4Beamline, a particle tracking simulation software
- Used G4Beamline data to collaborate on the design of a hadron monitor for the Long Baseline Neutrino Facility, comprising the world's highest-intensity neutrino beam. G4Beamline data enabled definition of the electric field and calculation of the number of electron-ion pairs within the monitor, as well as prediction of the spatial arrangement of the neutrino beam cross section incident on the monitor

University of Missouri Department of Chemical Engineering

Columbia, MO

HONORS UNDERGRADUATE RESEARCHER

August 2013 - August 2016, 6 hrs/week

- Simulated irradiation and isotopic depletion of small samples of uranium and thorium using OrigenARP and the TRITON sequence in the Oak Ridge National Laboratory-developed SCALE package to assess the risks involved with utilizing thorium as a fuel source in accelerator-driven, portable-power systems
- Assisted a graduate student with irradiation of lithium-intercalated graphite and radioactivity detection for advanced beta-voltaic battery research using the cyclotron at the University of Missouri Research Reactor (MURR)

University of Missouri Department of Molecular Microbiology and Immunology

Columbia, MO

RESEARCH ASSISTANT

August 2012 - May 2013, 10 hrs/week

- Assisted a graduate student with protein analysis of tetanus neurotoxin by completing ion-release assays and phase partitioning assays

Presentation

Reliability, Availability, and Maintainability (RAM) X Training Summit

Huntsville, AL

PRESENTER, "AN ASSESSMENT OF LAUNCH FAILURES FROM 1989 - PRESENT

November 2017

- Presented original research on orbital launch failure proximate causes and historical risk drivers to an audience of professional NASA- and U.S. Army-affiliated reliability engineers to warn current rocket scientists about the dangers of complacency in the space sector

Certification and Additional Training

Stanford d.School

Stanford, CA

STANFORD GRADUATE SUMMER INSTITUTE: ADVENTURES IN DESIGN THINKING: A D.SCHOOL EXPERIENCE

September 2019

- Practiced design thinking, a methodology for creative and human-centered problem solving, through addressing a sustainable transportation innovation challenge in an interdisciplinary team

Stanford Graduate School of Business

Stanford, CA

STANFORD IGNITE, CERTIFICATE IN INNOVATION AND ENTREPRENEURSHIP

June 2019 - July 2019

- Practiced core business skills through courses taught by Stanford Graduate School of Business faculty in marketing, operations, accounting, finance, and economics. Applied and practiced design thinking, negotiation, teamwork, communication, leadership, and pitching skills in workshops and through the development of a plan to commercialize an idea into a new venture
- Developed a business model, identified business assumptions and uncertainties, developed financial projections, and built and delivered a pitch deck to venture capitalists for Zero Emissions New (ZEN) Mobility, a manufacturer of light electric vehicles for micromobility

Stanford Law School

Stanford, CA

STANFORD GRADUATE SUMMER INSTITUTE: INTERNATIONAL NEGOTIATION AND DECISION MAKING

September 2018

- Practiced the fundamentals of negotiation through two-party and multi-party negotiation exercises. Led negotiations on behalf of the Afghan Taliban as the Military Commander of the Islamic Emirate of Afghanistan in a complex, dynamic, 60-party simulation of the negotiation of peace in Afghanistan and Central Asia

NASA Marshall Space Flight Center

Huntsville, AL

NASA SAFETY AND MISSION ASSURANCE TECHNICAL EXCELLENCE PROGRAM (STEP), LEVEL 2 CERTIFICATION

December 2017 - May 2018

- Developed specialized expertise in system safety through completion of STEP Level 2, including practicing fault tree analysis, decision analysis, risk-informed decision making, risk management, probability and statistics, designing for reliability, and hazard analysis

U.S. Particle Accelerator School

East Brunswick, NJ

FUNDAMENTALS OF ACCELERATOR PHYSICS AND TECHNOLOGY WITH SIMULATIONS AND MEASUREMENT LAB

June 2015

- Exposed to accelerator design through understanding the function of components - such as bending and focusing magnets, beam diagnostics and radio frequency accelerating structures - and through studying the basic principles of single particle motion, special relativity, dynamics, and electromagnetic theory as applied to beam properties

Outreach and Community Activities

Stanford Orchestras

Stanford, CA

CLARINETIST, BASSOONIST

September 2018 - March 2020

- Principal clarinet in Stanford Symphony Orchestra, the university's largest orchestra, performing three concert cycles per year with guest artists Rob Kapilow, Lynn Harrell, and Nitin Sawhney
- Bassoonist in Stanford Summer Symphony
- Founding clarinetist for the Stanford University Ragtime Ensemble, a group performing free concerts on the Stanford University campus and at the San Francisco Botanical Garden
- Founding clarinetist of the Stanford Wind Kwynthet, a student woodwind quintet offering free chamber music concerts on the university campus throughout the year
- Developed skills in teamwork, communication, self-motivation and discipline to maintain the high caliber of musicianship of Stanford music department ensembles

Future Problem Solving Program

Melbourne, FL

GLOBAL ISSUES PROBLEM SOLVING EVALUATOR

October 2016 - Present

- Evaluated the feasibility and originality of solutions to future scenarios analyzed by interdisciplinary problem-solving students in an international writing competition to teach students how to think creatively about the future