

Jessica J. Nicholson

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Portfolio: <https://www.jessicanicholson.info/professional>

Education

University of Illinois at Urbana-Champaign | December 2022 | Bachelor of Science in Mechanical Engineering, Minor in Business

- **GPA:** 3.39
- **Critical Engineering Courses:** Theory of Energy and Sustainable Engineering, Dynamics of Mechanical Systems, Industrial Control Systems, Mechanical Design, Structural Engineering, Fundamentals of Fluid Dynamics, Design for Manufacturing, Engineering Materials, Energy Conversion Systems, Thermodynamics, Heat Transfer, Signal Processing
- **Critical Business Courses:** Business Administration, Finance, Statistics, Accountancy

Work Experience

U.S. Army Corps of Engineers | Research Mechanical Engineer | February 2022 – Present

- Developed AMPeRRe, a program to predict reliability, resilience, and fuel savings of renewable-inclusive power grids
- Advanced renewable energy integration at Army installations by optimizing new power grids to maintain high resilience
- Expanded digital twin modeling of installation power infrastructure to improve multi-component simulation capabilities
- Drafted technical report sections on evaluating microgrid stability for the Tactical Microgrid Standard project portfolio

Marine Turbine Blade Research Project | Undergraduate Researcher | January 2022 – May 2022

- Evaluated composite material configurations to identify those most compatible with turbine blade operating conditions
- Conducted material property calculations, finite element analysis and simulation, and multiple forms of failure testing

Cummins Inc | Systems Performance Engineering Co-op | June 2021 – December 2021

- Investigated failures of components and implemented redesigns to solve the determined root cause(s) of failure
- Completed design projects and made quality-related changes to improve Cummins' engine products
- Generated a projected annual cost savings of \$112,575.40 through my cumulative design changes in each project

Advantage Solutions | Event Specialist | May 2019 – August 2019

- Demonstrated products and managed display materials at retail locations partnered with Advantage Solutions
- Engaged with customers to generate customer interest and make sales

Kumon | Mathematics and Reading Tutor / Teaching Assistant | June 2016 – August 2018

- Ensured that students of many ages learned and practiced critical concepts in the subjects of math and reading
- Oversaw and graded students' work, evaluated progress while working with several students simultaneously

Leadership, Activities and Community Service

Interagency Advanced Power Group | Renewable Energy Conversion Working Group Member | May 2023 – Present

- Participated in working group meetings as a representative of USACE to exchange ideas and work alongside other teams
- Collaborated with other government agencies on research projects that develop renewable energy in operational spaces

Illinois Climate Action Plan (iCap) Education Team | Chair | August 2021 – December 2022

- Created University initiatives to accomplish Illinois Climate Action Plan goals with a focus on sustainability education
- Collaborated with other student and faculty team members to determine the steps needed to implement these initiatives

Society of Women Engineers | Outreach Committee StepUP Chair | September 2018 – Present

- Planned, coordinated, and led the organization's StepUP event, an interactive STEM program for middle schoolers
- Created and implemented new events with other committee Chairs to encourage the pursuit of STEM careers

Illinois Student Government | Senator, Liaison to Champaign County Board | September 2018 – December 2022

- Authored resolutions and facilitated action to address needs among students, the university, and the community
- Initiated and maintained communication between the Champaign County Board and the Illinois Student Government

Illini Rotaract Service Organization | President, District Rotaract Representative | August 2018 – May 2021

- Led meetings and all organization activity including service projects, professional workshops, and social events
- Fulfilled the mission of Rotary International by focusing on community service and professional development

Innovation Living-Learning Community | Peer Leader | April 2019 – May 2020

- Built innovation skills of members in this community through a variety of programs for new college students
- Developed and led orientation activities meant to foster creativity and technological innovation skills

Awards and Certifications

Leadership Certificate | November 2021 – November 2022

- 3-Semester Certificate Program that develops critical leadership skills through coursework, workshops, and mentorship
- Critical skills include transformational leadership, adaptability, emotional intelligence, and fostering psychological safety

Fred S. Bailey Scholarship | June 2021

- Award given to students who demonstrate exceptional leadership, involvement, and a positive impact at UIUC

AP Scholar with Distinction | July 2018

- Students who achieve an average score of at least 3.5 on all AP Exams taken and score 3 or higher on at least five exams

2018-2019 Illinois State Scholar | May 2018

- Students who demonstrate outstanding academic achievement and score in at least the 95th percentile on the ACT or SAT

Skills and Qualifications

Research and Problem-Solving

- Studied the qualities that define reliable and resilient renewable energy grids to guide my development of AMPeRRe
- Wrote a report about the capabilities of photovoltaic solar power, potential innovations, and industry-beneficial policies
- Applied novel Digital Image Correlation methods to map a 3D crack surface as it propagates during a notch tensile test

Computer-Aided Design Software: Creo Parametric, Fusion 360, and Autodesk Inventor

- Modeled components, assemblies, full prototypes, and engineering drawings for Mechanical Design course projects
- Redesigned parts according to determined solutions from my failure investigations during my Cummins co-op

ANSYS

- Conducted Finite Element Analysis of consistently-failing components at Cummins to thoroughly evaluate root cause
- Performed static structural analysis and modal analysis to simulate water transfer tube stress and cyclic load conditions

MATLAB and Simulink

- Created mathematical programs to solve complex structural problems in Theoretical and Applied Mechanics coursework
- Built control system circuits using Simulink for Signals and Industrial Control Systems courses

Digmat

- Performed material analysis of potential carbon fiber composites for the Marine Turbine Blade research project
- Evaluated strength, ductility, and stiffness properties for varied composite fiber diameters, patterns, and density

Microsoft Office: Excel, Word, PowerPoint

- Gained experience in Excel functions, plotting and charts, data analysis with large datasets, and data simulations
- Employed control systems, feedback loops, and variable optimization in Excel to validate AMPERRE analysis methods

Technical Drawing and Drafting

- Sketched detailed prototype designs for several Mechanical Engineering course projects
- Created several engineering drawings in CAD programs, including dimensioning and tolerance analysis

Leadership and Project Management

- Built a team of service-oriented student members during my Illini Rotaract Presidency and led community service events
- Initiated my research pursuits at USACE and leveraged my findings to develop useful power system insights and tools
- Managed several simultaneous projects during my Systems Performance co-op at Cummins Inc.