Patrick "Ricky" Hillgardner

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EDUCATION

University of Illinois Urbana-Champaign, IL
Major: Aerospace Engineering ***Expected Graduation: May 2025***

- 3.76 GPA | Fall 2021, Spring 2022 Dean's List

EXPERIENCE / LEADERSHIP ROLES

Grainger College of Engineering Champaign, IL | ***September 2024 - Present***
Undergraduate Researcher – Hypersonic Aerothermodynamics

- Take high-resolution CT scans of heat shield material samples for precise microscopy analysis using **Dragonfly 3D**.
- Apply deep learning and machine learning models for image segmentation in **Dragonfly 3D** to identify and derive key material properties (porosity ratio, thermal conductivity, ablative rate) and to predict performance in hypersonic environments.

Power Systems Manufacturing Jupiter, FL | ***May 2024 – August 2024***
Service Engineering Intern

- Worked with the Monitoring and Diagnostics team to design, create, and implement instrumentation (thermocouples, accelerometers, proximity probes, magnetic pickups, and pressure transducers) into an existing CAD model of the GE 7FA Gas Turbine engine using **Creo**.
- Created over twenty CAD models to aid in communication with customers and plant managers, and to train clients and new hires.
- Investigated unusual gas turbine engine data and analyzed control logic (Mark VI, Ovation) to diagnose problems that arose from various power plants using knowledge of the GE 7FA / SW 501F engines and the gas turbine process.
- Examined problems such as compressor/turbine efficiency degradation and analyzed sensor data to determine the cause of performance losses.
- Created a prototype for a CAD web-viewer in Streamlit to be used for the company website using open-source Python libraries (PyVista).

Grainger College of Engineering Champaign, IL | ***January 2024 – May 2024***
Undergraduate Researcher – Applied Aerodynamics

- Conducted research in aerodynamic optimization of an electric VTOL concept, focusing on integrating **boundary layer ingestion** and **distributed electric propulsion** technologies to maximize aerodynamic efficiency.
- Simulated fluid flow around multiple complex wing/propulsor configurations using **Ansys Fluent** to evaluate system performance and identify the most aerodynamic and cost-efficient design.
- Designed and analyzed wing configurations with varying nacelle geometries, aiming to balance drag reduction and thrust efficiency gains by integrating different degrees of flow diversion proportionate to the wetted area of each system.
- Explored various degrees of nacelle integration and propulsor placement on the wing to maximize the **lift-to-drag ratio** of each wing model.

Illinois Space Society Champaign, IL | ***September 2022 – May 2024***
Member of Structures Design and Analysis Sub-team

- Designed the internal and external rocket hardware and optimized the fin configuration of a cutting-edge model rocket using **Siemens NX**.
- Reconfigured and refined avionics structures, reducing bulkhead shear stresses from parachute deployment by 20%.
- Simulated rocket launch conditions to test the structural integrity of the model rocket using **Ansys Mechanical.**
- Collaborated with other sub-teams within the organization to ensure that all rocket systems were integrated properly.

University of Illinois Campus Recreation Champaign, IL | ***March 2022 - May 2024***
Personal Trainer

- Conducted one-on-one training sessions with 8 different students/faculty members of the university to set goals, assess fitness levels, and develop personalized workout plans tailored to their objectives and maintained a 100% customer retention rate.
- Taught proper exercise techniques and mentored clients on the importance of mentality in fitness.

Delta Tau Delta Fraternity Champaign, IL | ***November 2022 - May 2023***
New Member Educator

- Led a group of potential new members and introduced essential behavioral codes for fostering a mutualistic relationship with the fraternity.
- Counseled potential new members on valuable life and leadership skills, as well as the age-old values of the fraternity.

Aerospace CAD Champaign, IL | ***Spring 2022***
Grainger College of Engineering Course

- Created a to-scale CAD model of the Atlas V-401 rocket and RD-180 engine in **Siemens NX.**

Design, Build, Fly Champaign, IL | ***Fall 2021***
Technical Elective Course

- Designed and constructed a lightweight ejection system proportionate to a remote-controlled plane, given weight and size requirements.

Massapequa Public Schools Massapequa, NY | ***June 2021 - July 2023***
Camp Supervisor

- Supervised and taught kids ages 5-13 what it takes to work as a team, proper baseball technique, and sportsmanship.

RELEVANT SKILLS / COURSES

- **Computer/Software Skills:** Python, MATLAB, Microsoft Office, Siemens NX, Ansys, Creo, Dragonfly 3D, AVL, KeyShot
- **Additional Skills:** Mentoring, leadership, problem-solving, teamworking, adaptability, communication, detail-oriented, analytical

Relevant Courses: Aerospace Propulsion, Hypersonic Aerothermodynamics, Applied Aerodynamics, Aerospace Systems Design, Aerospace Control Systems, Autonomous Systems, Applied Aerospace Structures, Electrical and Electronic Circuits