Eric Randolph

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EDUCATION

Worcester Polytechnic Institute **Expected December 2025**
Bachelors of Science, Mechanical Engineering

PROJECTS & EXTRACURRICULARS

Thermal Optimization of Heat Sink Designs **Jan. 2025 – Feb. 2025**
- Iteratively refined the heat sink's geometry and material properties using parametric CAD modeling to enhance heat dissipation of 3 computer chips while minimizing excess mass and complexity
- Conducted finite element analysis (FEA) to evaluate thermal performance, ensuring steady-state temperatures closely approached but did not fall significantly below or above 85°C
- Analyzed temperature gradients and heat flux using simulation results to ensure uniform thermal distribution and prevent localized overheating

Tetherless Oceanographic Drone - *Mechanical Design Lead* **Aug. 2024 – Current**
- Designed a pressure vessel for the electronics bay of an unmanned underwater vehicle (UAV), ensuring structural integrity under hydrostatic pressures at 200 meters in depth
- Developing an acoustic transducer using piezoelectric plates for tetherless data transmission
- Engineered end cap wire routing solutions, balancing sealing integrity and accessibility, to enable reliable electrical connections in a high-pressure underwater environment

Development of Autonomous RC Cars for Machine Learning Labs **Oct. 2024 – Dec. 2024**
- Performed failure modes and effects analyses to evaluate the critical sections of numerous 3D-printed suspension components, redistributing material to reduce the probability of failure over time
- Reduced part count and complexity of the servo steering mechanism, decreasing turning backlash by ~66%
- Designed and implemented a standardized electronics mounting solution using custom 3D-printed housings for various components, ensuring ease of assembly and improved reliability across all 20 kits

Indoor Wheelchair Exerciser Design Project **Oct. 2024 – Dec. 2024**
- Designed an adaptable indoor wheelchair exerciser, incorporating a DC generator system with a variable electrical load for dynamometric resistance
- Performed stress and fatigue analyses on critical machine elements, such as shafts and bearings, to ensure a practically infinite lifetime for the components through the selection of optimal materials and geometries
- Optimized mechanical design by applying failure theories, fatigue life calculations, and deformation analysis to produce a robust, low-maintenance solution with the intent of improving the user's experience

WPI Combat Robotics - *Club Treasurer; Competitor* **Sept. 2021 – Current**
- Designed, manufactured, and iterated combat robots using robust, parametric CAD modeling techniques
- Engineered electromechanical systems from cradle to grave, applying design for manufacturing and assembly (DFMA) to streamline fabrication and integration
- Conducted impact testing and failure analysis on structural and mechanical components, refining design geometries to withstand high-energy collisions
- Fabricated lightweight and durable components using CNC machining, additive manufacturing, laser cutting, and water jetting, in-house through the WPI machine shop and personal printers

WPI Vex U Robotics - *Mechanical Lead; Mentor* **Sept. 2021 – Sept. 2023**
- Led the mechanical development of two competition robots for the Vex U Robotics Competition, utilizing rapid prototyping and precision manufacturing techniques to iterate mechanical system designs

- Collaborated on 500+ part CAD assemblies with a team of students
- Lead the team to a record of 8-2 at the world championship (2022-2023) and a 33-4 record overall
- Maintained an engineering notebook to document design iterations, workflow decisions, and reasoning behind mechanical and strategic refinements

WORK EXPERIENCE

WPI ME1800 **October 2022 – August 2023**
Peer-Learning Assistant; Teaching Assistant *Worcester, MA*
- Taught the laboratory section of ME1800 *Manufacturing Science, Prototyping, and Computer-Controlled Machining* course, covering CNC milling and turning, laboratory safety, and computer-aided manufacturing
- Administered and graded the ME1800 final practical exams and assignments

CME Associates **June 2023 – August 2023**
Technical Assistant - Transportation Division *Parlin, NJ*
- Drafted road construction plans using Autodesk Civil 3D, ensuring accurate designs and compliance
- Documented road conditions in the field to produce accurate documentation for road construction drafts
- Graded sidewalk curb ramps on road work plans to ensure ADA compliance for wheelchair accessibility

SKILLS

- **Softwares:** SolidWorks, Onshape, Autodesk Fusion 360/Inventor, MathCAD, ANSYS, Microsoft Excel
- **Design:** GD&T, DFMA, Surface Modeling, Top-Down Modeling, FMEA
- **Manufacturing:** Additive Manufacturing, CNC Machining, Rapid Prototyping, CAM, Soldering