

Avanthika Vuppala

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WORK EXPERIENCE

Learning Assistant

September 2026 – Present

Department of Mathematics - Rutgers University

New Brunswick NJ

- Facilitate collaborative Calculus I recitation and study-group sessions for undergraduate engineering and science students, strengthening problem-solving skills, conceptual understanding, and student engagement in fast-paced academic environments.
- Support faculty-led instruction by guiding peer learning, answering technical mathematics questions, and helping students improve performance through structured practice, communication, and active-learning techniques.
- Collaborate with faculty mentors and peer leaders to prepare instructional materials, coordinate weekly academic-support activities, and foster an inclusive learning environment that supports student success and long-term academic development.

Mechanical Design Intern

July 2026 – Present

ULimo

Princeton, NJ

- Established the foundation for ULimo's first autonomous electric limousine by translating initial concepts into detailed SolidWorks vehicle and component models.
- Supported product development and design reviews by creating and revising CAD models, engineering drawings, and technical documentation.
- Improved design feasibility by evaluating materials, manufacturability, and alternative concepts with the engineering team.

Mechanical Engineering Intern

June 2026 – July 2026

Hanna's Mechanical Contractor's, Inc

Milltown, NJ

- Supported mechanical engineering activities involving review of technical drawings, system schematics, and construction documentation; collaborated with multidisciplinary project teams across institutional and commercial engineering environments.
- Assisted with field verifications, installation walkthroughs, and engineering evaluations including load calculations, airflow assessments, equipment sizing, and technical documentation support for HVAC, plumbing, and fire protection systems.
- Utilized AutoCAD, Microsoft Office, and engineering documentation tools to support project coordination, testing, commissioning, and communication between engineers, architects, subcontractors, and field personnel throughout multiple project phases.

SUPER Research Scholar

May 2026 – July 2026

Douglass Residential College - Rutgers University

New Brunswick, NJ

- Led silicone and microfluidics research within the MINETS project, investigating PDMS curing behavior, working-fluid compatibility, and material-processing challenges for advanced energetic-material applications.
- Conducted experimental characterization and materials analysis on silicone-based systems, evaluating fluid interactions, curing performance, and surfactant-assisted approaches to improve stability and manufacturability of microfluidic and combustion-related materials systems.
- Collaborated with PhD researchers and faculty mentors on multidisciplinary propulsion-materials research involving microfluidics, energetic composites, and combustion-property relationships; supported laboratory testing, data collection, and material characterization across multiple experimental studies.

Undergraduate Research Assistant

Feb 2025 – May 2026

Hybrid Micro/Nanomanufacturing Laboratory - Rutgers University

New Brunswick NJ

- Generated validated experimental datasets and formal lab test reports used by faculty and research teams; supported hardware setup, measurements, and data collection, and contributed to a documented 20% improvement in material-selection efficiency through data-driven recommendations.
- Evaluated material-selection trade-offs and defined mechanical and thermal property targets to inform test plans, material formulation decisions, and evaluation of mechanical parts and assemblies for reliability-focused applications.
- Performed data analysis and visualization using MATLAB and Python (NumPy, Matplotlib); used vectorized NumPy operations for efficient summary-statistics computation and documented test results to validate outputs across repeated laboratory experiments.

PROJECTS

SolidWorks Vending Machine Design & Animation

- Developed a fully integrated vending machine assembly in SolidWorks, creating detailed part models, assemblies, and motion studies to evaluate dispensing mechanisms, component interactions, and overall system functionality.
- Applied tolerance analysis and design-for-manufacturing principles while refining component layouts and moving assemblies; assessed mechanical feasibility and assembly constraints to improve reliability and manufacturability.

On-Site Refueling Device - Universal Magnetic Docking Interface

- Defined a validation framework and early-prototype test targets including coupling-strength evaluation, leakage testing, repeatability, and stability under simulated docking conditions; target acceptance criteria included $< 1\%$ leakage during fluid transfer and > 10 successful coupling cycles without degradation.
- Designed a passive self-alignment magnetic capture approach (coarse positional/angular capture followed by magnetic capture) to increase alignment tolerance and reduce dependence on precision-guided mechanisms; conducted trade studies refining geometry and magnet placement to balance alignment capability and structural stability, supporting a qualitative reduction in system complexity compared to probe-and-drogue approaches.

Portable Refracting Telescope and Tripod System Design

- Designed a 65-lb load-bearing tripod support system using analytical calculations and SolidWorks CAD modeling, creating mechanical assemblies and supporting manufacturability and structural evaluation.
- Performed structural calculations and FEA-based load evaluation to assess tripod stability, leg loading, buckling resistance, and component strength under multiple operating conditions.

Avionics Thermal Control CFD Simulation

- Simulated forced-convection cooling of a heated aircraft electronics box in Ansys Fluent, applying velocity-inlet, pressure-outlet, heated-wall, and adiabatic-wall boundary conditions to evaluate airflow-driven thermal management behavior in a simplified aerospace electronics system.
- Performed mesh convergence analysis across 708, 1352, and 3616 element cases using average outlet temperature, then analyzed temperature contours and velocity-vector fields to characterize heat removal, downstream wake behavior, and cooling performance.

EDUCATION

B.S. Mechanical and Aerospace Engineering | Concentration: Robotics

Sept 2023 – May 2027

Rutgers University

New Brunswick, NJ

Relevant Coursework: Statics, Dynamics, Mechanics of Materials, Thermodynamics, Fluid Mechanics, Differential Equations, Mechatronics, CAD in Mechanical Engineering, Dynamic Systems and Controls, Aerospace Structures, Aerospace Materials

TECHNICAL SKILLS

SolidWorks • AutoCAD • Ansys Fluent • MATLAB • Python • Microsoft Office • CAD Modeling • CFD • Engineering Drawings • Technical Documentation • Project Coordination • Material Characterization • Laboratory Testing • Data Collection • Load Calculations • Airflow Assessments • Equipment Sizing • Testing and Commissioning • Tolerance Analysis • Design for Manufacturing • Material Selection • Manufacturability Evaluation • Trade Studies • Prototype Test Planning • Mesh Convergence Analysis