Samarth Rastogi

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Education

Purdue University — West Lafayette, IN

Master of Science in Mechanical Engineering — Aug. 2026 – Aug. 2027 (Expected)

Bachelor of Science in Mechanical Engineering (4+1 BS/MS) — Aug. 2022 – May 2026

GPA: 3.54, Honors College, Dean's List, Study Abroad: **KTH**, Stockholm, Sweden

Coursework: Advanced Dynamics, Advanced Manufacturing Equipment, Fundamentals of Microchip Packaging

Experience

Warsinger Water Lab — Aug. 2025 – May 2026

Team Lead, MECC '26 & HCC '26 (DOE Collegiate Competitions) • Club President — *West Lafayette, IN*

- Won **Best Build & Test** honors against **27 teams** at the DOE Marine Energy Collegiate Competition, validating the team's prototype design and testing rigor.
- Led **20** undergraduate and graduate researchers across two DOE competitions; set MECC technical direction, drove industry-mentor strategy, and aligned HCC planning with its incoming lead.
- Designed a modular finned channel for the conductive-gap membrane-distillation module supporting interchangeable fin configurations; built and led testing of the lab-scale prototype.
- Engineered a fully marine-energy-powered desalination platform modeled to produce 28,600 L/day—freshwater for 1,430 people—by harvesting low-grade ocean-thermocline heat instead of active heating.
- Cut projected levelized water cost 51% against the Gizo, Solomon Islands baseline by eliminating grid and fuel dependence.
- Secured $21,000 in staged competition funding tied to proposal deliverables; built and managed the budget before delegating ownership.
- Directed three K-12 outreach events reaching 226 students through hands-on builds and experiments, including a waterwheel activity for 120 middle schoolers; co-authored and presented "Utilizing Ocean Thermoclines for Water Desalination" at NCUR 2026 in Richmond, VA.

Purdue University ME Project Machine Shop — Aug. 2024 – Present

Student Employee — *West Lafayette, IN*

- Trained ME students on manual mill, lathe, and bandsaw operation; guided 400+ students per semester through laser cutting, welding, and machining for coursework and design projects.
- Mentored students on diverse projects including robotic grippers, machinist clamps, and sheet-metal toolboxes using **DFM**, **DFA**, and **GD&T**; created an interim design-screening process to flag designs exceeding shop capabilities before fabrication.
- Caught and corrected 3–4 unsafe tool-mounting and tool-selection errors before operation, averting near-miss injuries across three semesters.

The Data Mine, Purdue University — Aug. 2024 – Dec. 2024

Undergraduate Data Science Researcher: Data Analysis Team Lead — *West Lafayette, IN*

- **Led** a 5-person analytics team in direct partnership with startup **HUMN Capital**, scoping milestones and a delivery timeline to ship a fundraising-ready MVP within one 16-week semester
- Architected a data pipeline integrating multiple **AI agents** on 7 hours of sample meeting data, automating a classification workflow that would otherwise require hours of manual review
- Trained and tested a 4-class NLP classifier in **Python**, reaching 80% accuracy on 100 labeled examples
- Delivered findings through an interactive **Tableau** dashboard surfacing 12+ key metrics across two views, earning an "exceeds expectations" program evaluation

Thermodynamics (ME 200) Undergraduate Teaching Assistant — Aug. 2024 – Dec. 2024

Purdue University — *West Lafayette, IN*

- Assisted the professor in managing a class of 100 students focused on grading weekly assignments and providing detailed feedback on common errors to improve concept understanding and exam scores
- Conducted weekly office hours clarifying concepts and answering student questions

Milestones - Introduction to Electronics — Mar. 2024

Purdue University — *West Lafayette, IN*

- Breadboarded a prototype for a Night Light using Light dependent resistors, LED, and capacitors
- Created schematic and board drawings in EAGLE for the PCB and another one with OpAmp, Diodes, Capacitors etc.
- Soldered (both surface soldering and through hole soldering) and troubleshoot faulty connections and or parts.

Student Consultant Aug. 2024 – Dec. 2024

Frank Lloyd Wright's Samara House through Purdue's Honors College *West Lafayette, IN*

- Worked with curator of Frank Lloyd Wright's Samara House to increase overall revenue and impact focusing on the visitor experience
- Created framework for diversifying tours and connected with relevant local organizations collaboration based on research and similar trends in historical properties
- Suggested diversifying tours and collaboration opportunities with relevant local organizations based on research and similar trends in historical properties

Projects

Thermal Simulations | *Fundamentals of Microsystems Packaging, Purdue University* Jan 2025 – May 2026

- Built a static-structural FEA of a solder microbump under -55 → 125 °C thermal cycling in ANSYS, quantifying 100 MPa peak von Mises stress and per-cycle plastic-strain accumulation, and ran a coarse-vs-fine mesh study (5 → 1 µm) to confirm the stress concentration was physical, not a meshing artifact.
- Authored a physics-based technical review of Integrated Fan-Out (InFO) advanced packaging, synthesizing 40+ IEEE Xplore and Google Scholar papers (2016–2026) and applying junction-to-ambient thermal-resistance (θ_{ja}) and CTE-mismatch strain models to benchmark thermal, electrical, and reliability gains over flip-chip package-on-package.
- Extracted interconnect R/L/C and simulated transmission-line crosstalk and eye diagrams in ANSYS Electronics (microstrip vs. stripline), and analyzed chip-level cooling across thermal-interface contact resistance, two-phase immersion boiling, and heat-pipe sizing.

Simulation of Electrical Motors | *Design of Electrical Machines, KTH* Jan. 2025 – June 2025

- Reverse-engineered an Interior Permanent Magnet Synchronous Machine (IPMSM) in FEMM, automating 500 magnetostatic solves per run through a MATLAB–Lua pipeline on a 10M+ element mesh converged to 10^{-7}
- Characterized the machine end-to-end — phase resistance (2.36 Ω), PM flux linkage, line-to-line BEMF (289 V RMS at 2.83% THD), and d/q inductances yielding a 1.62 saliency ratio confirming IPMSM behavior
- Solved the MTPA operating point and cross-validated FEA average torque (10.17 Nm) against an analytical dq model, agreeing within 4.6%
- Designed a polyphase induction motor from scratch, sizing geometry and windings from target specifications (output power, voltage, frequency, pole count, rated speed, efficiency, power factor)
- Validated the analytical design against targets — matched nominal torque exactly (9.55 Nm, 0.00%), power factor within 0.33%, and output power within 3.84%, while meeting the 85% efficiency target

3-D Printed Jewelry | *Additive Manufacturing, KTH* Jan. 2025 – June 2025

- Led a 3-person team designing Inconel 718 jewelry for **Selective Laser Melting (SLM)**, cutting slicer support-structure volume 90% by optimizing build orientation and overhang angles (**DFM**)
- Iterated 7 Blender designs incorporating lattices and internal channels to demonstrate SLM geometric capability and stage a planned laser surface-finishing pass

Modular Workstation for Frontline Engineers | *Sophomore Design* Aug. 2023 – Dec. 2023

- Scoped requirements from market research with 40 interns to address the absence of a stable work surface near machines, then designed a folding modular workstation with a 4-person team
- Achieved a 10 kg load capacity at 2 kg unit weight (5:1 load-to-weight ratio) with sub-4-second single-handed deployment
- Iterated 4 design generations to meet industrial reliability targets; built and demonstrated a medium-fidelity prototype

3-D Printed Drone | *ASME Small Projects* Sept. 2023 – Nov. 2023

- Designed a 3D-printed drone frame in Fusion 360 within a $150 team budget, applying FEA to reduce frame mass and verify factor of safety
- Sized the propulsion battery from motor specifications, supporting 10 min flight time at full throttle; team placed 3rd of 10 in ASME competition

Skills

Computer Aided Design (CAD): SOLIDWORKS, Siemens NX, Fusion 360, AutoCAD, OnShape, Blender
Manufacturing: Additive Manufacturing (FDM, EBM, SLM, SLS), Laser Cutting, Machining (Lathe/Mill), Composite Manufacturing (Carbon Fiber and Fiberglass with Resin), Welding
Programming & Tools: MATLAB, C, **Python**, **G-Code**, **ROS**, Simulink, Autodesk EAGLE (PCB design), R, SQL, Java, Tableau, Git