Sammy Hallaj

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EDUCATION

Temple University, College of Engineering — *Master of Science in Mechanical Engineering (+1)* Philadelphia, PA
- **GPA: 4.0** | Expected Graduation: Spring 2028

Temple University, College of Engineering — *Bachelor of Science in Mechanical Engineering* Philadelphia, PA
- **GPA: 3.63** | Expected Graduation: Spring 2027 | Dean's List (Spring 2023 – Spring 2026)
- **Selected Coursework:** Multiscale Design (Grad Level), Impact & Crashworthiness (Grad Level), Modern Dynamics for Robots (Grad Level), Machine Theory, Mechanical Vibrations, Mechatronics.

RELEVANT ENGINEERING & RESEARCH EXPERIENCE

Temple University Mechatronics Laboratory — *Mechatronics Research Assistant* Jan 2026 – Present
- Formulated experimental test procedures applying Acoustic Emission (AE) transducers for bearing structural degradation and microfracture analysis under high dynamic loads.
- Designed and fabricated a lab-scale gantry with a water-coupling fluid recovery system to achieve laminar flow for non-destructive acoustic imaging of mechanical components.
- Processed complex acoustic and thermal sensor signals using MATLAB to isolate predictive failure signatures, preventing catastrophic bearing seizure.

Temple University Mechanical Engineering Dept. — *Lead Design & Test Engineer (Wind Tunnel & DAQ)* Jan 2026 – May 2026
- Engineered and 3D printed a modular sub-scale wind tunnel in SOLIDWORKS to visualize streamlines and measure aerodynamic pressure variations down to 5 Pascals.
- Developed an Arduino-based Data Acquisition (DAQ) system paired with high-accuracy Honeywell pressure sensors to record real-time flow telemetry during testing.
- Formulated MATLAB mathematical models using Bernoulli analysis and Reynolds numbers to compute pressure coefficients and velocity distributions.
- Executed Computational Fluid Dynamics (CFD) simulations in ANSYS Fluent to validate experimental results, confirming boundary layer behavior and sensor resolution.

TECHNICAL & MANUFACTURING EXPERIENCE

Philadelphia Racing Products (PRP) — *CNC Machining & Manufacturing Operator* May 2026 – July 2026
- Managed end-to-end CNC manufacturing processes for high-precision billet aluminum automotive components from CAD design review to final product inspection.
- Operated two Haas EC400 CNC horizontal machining centers to manufacture 1,000 components daily for drag racing vehicles, ensuring strict dimensional tolerances.
- Re-engineered assembly workflows from batch assembly to an optimized assembly line layout, increasing overall component output by 15% and part quality by 10%.

BLVD Auto Repair — *Automotive Class B Technician & Heavy Equipment Specialist* Jan 2020 – May 2026
- Executed state vehicle safety and emissions inspections for passenger vehicles and light/medium commercial trucks under 10,000 lbs in compliance with NHTSA standards.
- Assisted Senior Class A Technicians with complex engine and transmission overhauls, hydraulic brake system diagnostics, and mechanical troubleshooting.
- Maintained, serviced, and operated heavy shop machinery, including hydraulic vehicle lifts, material transport vehicles, and industrial forklifts.

ENGINEERING PROJECTS

Low-Temperature Differential (LTD) Stirling Engine Analysis — *Course Project* 2025
- Re-engineered an LTD Stirling engine operating on a 1°C thermal gradient; developed comprehensive MATLAB scripts to calculate dynamic forces, velocity, acceleration, and thermal efficiency.

Bed-Mounted Structural Retention Bracket — *Personal Project* 2025
- Designed a lightweight (50g) structural mounting bracket in SOLIDWORKS featuring a linear suspension mechanism; validated load capacity through static FEA stress and deformation simulations.

TECHNICAL SKILLS

- **CAD & Mechanical Design:** SOLIDWORKS, Creo, Parametric 3D Modeling, GD&T;, Rapid Prototyping, 3D Printing (FDM & Resin)
- **Simulation & Analysis:** ANSYS FEA, ANSYS Fluent (CFD), Structural Topology Optimization, Stress & Strain Analysis
- **Data Acquisition & Controls:** MATLAB / Simulink, Arduino DAQ, Sensor Integration (Pressure, Acoustic Emission, Temperature), Signal Processing
- **Manufacturing & Equipment:** CNC Programming & Operations (Haas EC400), Machine Shop Operations, Heavy Equipment Maintenance, Quality Control

ACTIVITIES & AFFILIATIONS

Temple Formula Racing (TFR - SAE Formula Student) • ASME • Mechatronics Laboratory • Engineers for Climate Action