Ahmad Bitar

437-882-1007 | ahmadbitar3007@gmail.com | LinkedIn | Portfolio

Education

Carleton University **Expected Graduation: Apr 2029**

Bachelor of Mechanical Engineering *Ottawa, Ontario*

- **Courses:** Thermodynamics, Materials, Solids, Fluids, Mechatronics, Calc I–III, Mathematical Methods and Simulations

Technical Skills

Tools & Software: SolidWorks, Fusion360, Microsoft Office, MATLAB/Simulink, ANSYS/SimScale, OpenFOAM, Python
Skills/Certifications: CSWA Certified, **2D/3D Design**, Drafting, Modeling, GD&T, FEA, R&D, CFD, Mechanical Design, Structural Analysis, Thermal Analysis, Inverse Kinematics, Control Systems, Technical Documentation

Work Experience

Raven's Racing **Sep 2025 – Current**

Simulation, Aerodynamics, Powertrain *Ontario, Canada*

- Improved track times by **25%** through in-house testing and **MATLAB simulations** using vehicle and drivetrain parameters.
- Spearheaded **flow bench testing**, **CFD**, **FEA**, and **MATLAB** simulations for multi-disciplinary design work.
- Working on **intake systems**, **engine timing**, and overall **drivetrain design and 3D modeling**.

Research Assistant **Sep 2026 – Current**

Carleton University *Ottawa, Ontario*

- Modeling and building test technology to accommodate high **thermal** and **pressure** loads in vacuum environments.
- Working in a **lab environment**, collecting data, and bridging in-between **theoretical** and **practical** applications.

Projects

Molten-Salt Reactor Thermal Analysis **ANSYS | Thermal FEA**

- Ran **ANSYS steady-state and transient thermal analyses** to verify that a **950 °C molten-salt reactor's** copper flange seal remains below its **450 °C design limit** before fabrication.
- Predicted **470 °C** at the gasket without cooling; sized a **cooling coil** to reduce it to **400 °C** and set a **380 W heater input** to maintain the melt at **950 ± 2 °C**.
- Modeled **24 thermal contacts**, radiation enclosures, and a **52-hour transient**; reduced mesh element count by **7.5×** while maintaining **energy-balance error below 1.5%**.

Drivetrain Mounting & Adjustability **CAD | FEA**

- Developed **3D CAD designs and mechanical details** for an adjustable drivetrain mounting system, integrating sprocket alignment, bearing supports, and **chain tensioning mechanisms**.
- Performed **free-body, shear-force, and bending-moment analyses** to calculate **bearing reactions**, chain tension loads, and structural constraints.
- Designed **adjustable tensioners and mounting components** for fabrication, packaging, assembly, and vehicle integration, incorporating **pinned connections and bolted joints**.

Warehouse Assembly Robot Design Project **Python | Robotics | ML**

- Developed a **3-DOF robotic arm** for automated warehouse assembly using **forward and inverse kinematics**, Jacobian matrices, and Cartesian trajectory planning.
- Trained a **3-layer multilayer perceptron (MLP)** on **50,000 simulated joint configurations** to predict inverse-kinematics solutions, achieving **2.1 mm mean positioning error**.
- Benchmarked **ML-based inverse kinematics** against a numerical IK solver using **PID joint control**, reducing computation time by **68%** (**8.4 ms to 2.7 ms**) while maintaining **98.5% target-reach success**.

Track Time Simulation and Gear Selection **MATLAB | Simulation**

- Applied **large-scale vehicle dynamics simulations** on real racing circuits to optimize **final-drive ratios** relative to shift-time penalties and vehicle parameters.
- Evaluated **gear selection, shift strategies, and drivetrain configurations** through iterative MATLAB simulations to improve overall track performance.
- Identified **$3,000+ in potential savings** by demonstrating that marginal improvements in shift time produced negligible reductions in total lap time.