

Ayush Agrawal

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EDUCATION

University of California, Los Angeles

California, USA

Master of Science in Mechanical Engineering, specializing in Robotics and Controls

Sept 2024 - March 2026

- Recipient of the prestigious **Narotam Sekhsaria Foundation PG Scholarship** given to 15 students across India 2024

Indian Institute of Technology (IIT) Bombay

Mumbai, India

Bachelor of Technology in Mechanical Engineering with minors in Controls Engineering; **GPA: 9.37/10.0** July 2017- June 2021

- Conferred with the **MITACS Globalink Research Fellowship** for conducting research at the **University of Toronto** 2020

TECHNICAL SKILLS

Programming	C++ (Object Oriented Programming), Python, MATLAB, Maple, Git, Excel VBA
Robotics	ROS 1/2, Gazebo, Simulink, MATLAB - Robotics Toolbox, MATLAB - Control Systems Toolbox
Software	CarMaker 8.1, SolidWorks, ABAQUS, Jira, Confluence, LaTeX, AutoCAD, Autodesk Fusion 360
Relevant Coursework	Automatic Control, Computer Vision, Optimization, Solid Mechanics (A+), Dynamics of Machines
Machining Experience	3-Axis CNC Milling, CNC Lathe, Laser Cutting, 3D Printing

PROFESSIONAL EXPERIENCE

Jaguar Land Rover TBSI Pvt. Ltd. | Motion Controls Engineer

Bangalore, India

Active Ride Functionality | Dept. of Chassis & Motion Controls Systems | [Publication](#)

August 2021 - August 2024

- Spearheaded the **model-based design of optimal controllers** to reduce road-induced vibrations in Range Rover by **38.6%**
- Tuned **MPC** to limit actuation power consumption to **0.08% of battery capacity** for 30-minute-long **WLTP test cycle**
- Designed **Kalman Filter** for **state-estimation** of heave velocity, pitch, and roll angle signals with **max RMS error = 0.11**
- Responsible for maintaining the **Git repository** for the active ride functions, including **LQR**, **MPC**, and **H-infinity** algorithms
- Assessed the controller's performance in the presence of noise, delays, and 5% actuation bandwidth in **Carmaker + Simulink**

Torque Split for Efficiency (TSE) | Dept. of Powertrain Energy & Thermal Management Systems

April 2023 - Sept 2023

- Modified TSE for improved efficiency by integrating **energy consumption maps** for vanes, fans, & pumps in the cost function
- Designed the **logic architecture diagram** outlining the signal flow among EDUs, powertrain cooling and refrigeration circuits
- Reported **80Wh** energy saving using the updated algorithm by co-simulating 30min WLTP test cycle in **GTSuite + Simulink**

Crash Pulse Prediction | Dept. of Structural Integration

August 2021 - July 2022

- Developed a **physics engine** to simulate vehicle crash kinematics with **92% accuracy** in **4 minutes** compared to **8-hour FEA**
- Delivered the engine as a **MATLAB application** to save **20% workdays** in CAD model development of **Panthera's** body-in-white
- Utilized the app to estimate the crashworthiness of **Lucid Air**, **BMW iX**, **Mercedes EQS** to set the benchmark for **JLR's EMA**

AI & Robotics Technology Park | Robot Programming & Controls Intern | [Publication](#) May '21 - Aug '21

- Developed a novel path tracking controller ensuring **99.18% tracking accuracy** and smooth saturation of robot's speed limits
- Extended the tracking controller as a **scalable formation control framework** for navigating goods inside a warehouse
- Verified the stability of control framework for a formation of $n = 5$ **Turtle bot 3** through simulations in **ROS2/Gazebo**

University of Toronto | Mitacs Globalink Research Intern | [Report](#)

April 2020 - August 2020

- Modeled and simulated the novel vertical post-tensioned connection using **Finite Element Analysis** in **ABAQUS** for assessing the self-centering properties and **30% higher energy dissipation capabilities** compared to welded steel structures
- Reported hysteresis and seismic capabilities of vertical post-tensioned connection with **91% accuracy** relative to experiments
- Researched contact models and fracture criteria in **ABAQUS** to achieve **99.75% accuracy** in the frictional dissipation model

KEY AUTOMATION PROJECTS

Control design of ABB-IRB 1600 - 6-DoF Robotic Manipulator | [Report](#)

Jan 2020 - April 2020

- Modelled the dynamics of 6-DoF robotic manipulator with spherical joint using DH parameters in **MATLAB robotics toolbox**
- Implemented **Independent Joint Control** with **1% tracking error** for end-effector path planned using quintic polynomials
- Reduced tracking error to **0%** using **Joint Space Inverse Dynamics Controller** even with 5% error in gravity load estimation

Image Creating Robotic Arm | [Certificate](#) | [Report](#)

May 2018 - July 2018

- Designed a **2-link manipulator** in **SolidWorks** and determined the requisite torque capacity for servo motor using **FEA**
- Deployed **Canny Edge Detection** algorithm to convert an input RGB image to **bit-Matrix** for planning end-effector's path
- Determined the joint space trajectory using **Inverse Dynamics** and programmed **Arduino** with **PD control** to trace the edges