SADAIVAL SINGH

https://sadaival.github.io/ sadaival.singh@gmail.com
https://www.linkedin.com/in/sadaival-singh/ +1 438 779 5005

Education

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
M. Eng Mechanical	McGill University	3.73/4	2025
B. Tech Major Mechanical, Minor ECE	Indian Institute of Technology, Guwahati	8.43/10	2021
Senior secondary	CBSE board	92.2%	2017
Secondary	CBSE board	9.4/10	2015

Experience

Research Associate — Polytechnique Montréal *June 2025 – Dec 2025*

- Working with team on a novel elastic registration algorithm to accelerate CT image acquisition, reconstruction, and segmentation.
- Built a Python-based UI for the backend API of the Elastic Registration system.

Research Intern — Comet Group (Dragonfly Division) *May 2024 – Apr 2025*

- Improved deep learning model accuracy for industrial vision applications and quantified measurement repeatability.
- Automated code understanding and documentation by generating call graphs, type hints, and docstrings using LLM for RAG pipeline.

Teaching Assistant — McGill University *Jan 2024 – Apr 2024*

- Assisted in labs and grading for the course *MECH 383: Applied Electronics and Instrumentation*

R&D Engineer — Ace Manufacturing Systems *Nov 2022 – Jun 2023*

- Designed vision-based control systems for WAAM and PBF additive manufacturing.
- Built a low-cost 3D scanner for part inspection using line-laser triangulation.
- Developed a vision-driven tool measurement and breakage detection system in Python.
- Optimized mechanism using constraint-based analysis and optimisation tools for WAAM machine.

Assistant Manager / GTE / Intern — Bajaj Auto Ltd. *Jun 2020 – Oct 2022*

- Assisted component development for engine castings, improving process efficiency and cost.
- Designed tools, fixtures, and manufacturing processes ensuring quality and production targets.
- Optimized paint shop equipment layout and reduced packaging costs through stress-based pallet redesign.
- Analyzed critical wall thickness in blow-molded and rotomolded fuel tanks; designed universal handling fixtures.

Publications

- Singh, Sadaival, Ambrish Singh, Sajan Kapil, and Manas Das. "**Utilization of a TSP solver for generating non-retractable, direction favoring toolpath for additive manufacturing**." Additive Manufacturing (2022): 103126.
- Singh, Sadaival, Ambrish Singh, Sajan Kapil, and Manas Das. "**Generation of Continuous and Sparse Space Filling Toolpath with Tailored density for Additive Manufacturing of Biomimetics**." Computer-Aided Design (CAD) (2024): 103718

Projects

- **Computer Vision in Additive Manufacturing** – *IIT Guwahati, Prof. Sajan Kapil (Nov 2022 – Jun 2023)*: Implemented computer vision and deep learning algorithms for in-situ defect detection and melt-pool monitoring in WAAM and PBF processes.
- **Morphing Wing Design Optimization** – *McGill University (Jan 2024 – Apr 2024)*: Optimized aerodynamic, structural, and actuation subsystems of a morphing wing using XFOIL-coupled multi-objective optimization.
- **Acoustic Tactile Sensor Mapping** – *McGill University, Prof. Audrey Sedal (Sep 2024 – Apr 2025)*: Developed an acoustic-based tactile sensor and formulated the mapping problem as factor-graph SLAM using IMU and encoder data.

- **Area-Filling Method for 3D Printing** – *IIT Guwahati, Prof. Sajan Kapil (May 2019 – Present)*: Designed a TSP-based continuous toolpath algorithm and software for 2D geometry infill; results published at HI-AM 2021.
- **SAE Efficycle 2018** – *IIT Guwahati (Jun 2018 – Sep 2018)*: Built a three-wheeled hybrid vehicle with automatic electronic gear shifting; won Innovation Award (Rank 9/72).
- **Formula Student Vehicle** – *IIT Guwahati (Dec 2018 – Jan 2020)*: Led the design and manufacture of a Formula Bharat race car as team captain, overseeing suspension and electronics.
- **Hand Gesture Recognition** – *IIT Guwahati (Feb 2018)*: Implemented real-time gesture recognition using Python and OpenCV for camera-based interaction.

Technical skills

Programming Language	Python, C, C++, MATLAB
Miscellaneous	Machine Learning, Deep Learning, Computer Vision, ROS, PyTorch
CAD software	SolidWorks, Catia, NX, Solid Edge
Simulation software	Ansys, EDEM
Operating System	Windows, Linux

Key Courses Taken

- Statistical Computer Vision
- Applied Robotics
- Control Systems
- Optimization methods in Engineering
- Industrial Engineering and Operations Research
- Probability, Statistics and Machine Learning
- Fluid Mechanics
- Machine Design
- Soft computing in Engineering
- Kinematics of Machinery

Leadership and Achievements

- **Team Captain, Formula Student IIT Guwahati** (2018–2020): Led a 20-member team, managing design, manufacturing, and integration of a Formula Bharat race car; coordinated deadlines and ensured timely project delivery.
- **City Representative, Technothlon 2018**: Organized Chandigarh exam center; secured 300+ student registrations and oversaw smooth event execution.
- **Best Innovation Award – SAE Efficycle 2018**: Designed an implemented an automatic electronic gear shifter, earning the prize money for Best Innovation Award and achieving 9th rank among 72 teams overall.
- **Group Mathematics Olympiad (2015):** Selected among top 30 students in India for the Indian National Mathematics Olympiad (INMO).
- **Joint Entrance Examination (2017):** Achieved All India Rank 2346 among 1.28 million candidates in JEE Advanced.