SADAIVAL SINGH

B.Tech - Mechanical Engineering
Minor in Electronics and Communication Engineering
Meng – Mechanical Engineering (Current)

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Education

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
M. Eng	McGill University	3.75/4 (Current)	2025(expected)
B.Tech	Indian Institute of Technology, Guwahati	8.43/10	2021
Senior secondary	CBSE board	92.2%	2017
Secondary	CBSE board	9.4	2015

Experience

Bajaj Auto

April 2022- Oct 2022

- **Assistant Manager at Bajaj Auto.**
  - Worked as Component Development Engineer in Casting department, handling operations for production of Engine castings. Planning of tools, fixture, and process for manufacturing engine castings with required production rate and quality standards. implemented Cycle time optimization, Cost reduction, Tool and part commonization for various casting parts.
- **GTE at Bajaj Auto.** *Sep 2021- April 2022*
  - Worked in 2-wheeler fuel tanks paint shop for calculation of all major machinery equipment required for new Paint shop (Pumps, Blowers, Ovens).
  - Optimized Wood usage for bike packaging palette by doing force calculations for wooden beams and saving cost.
- **Summer Intern at Bajaj Auto.** *June 2020- July 2020*
  Determined critical wall thickness points in blow molded and rotomolded fuel tanks. Designed a common fixture for accommodation and handling of fuel tank.

Ace Manufacturing Systems

- **Research and Development** *Nov 2022- June 2023*
  - Worked on Vision based control system for WAAM (Wire Arc Additive Manufacturing) and PBF (Powder Bed Fusion) machines.
  - Developed Vision based tool measurement and breakage system.
  - Developed a low-cost 3D Scanner for inspection of 3D printed parts and substrate by capturing the point cloud data through a line laser.
  - Optimization of kinematic mechanism of door within required constraints using python.

Teaching Assistant

- **MECH 383 – Applied Electronics and Instrumentation** *Jan 2024- April 2024*

Comet Group

- **Internship at Dragonfly** *May 2024- Present*
  - Worked on improving Deep learning model accuracy for vision applications in industry
  - Software development and Large Language Models (LLMs) related project

Publications

- Singh, Sadaival, Ambrish Singh, Sajan Kapil, and Manas Das. "**Utilization of a TSP solver for generating non- retractable, direction favouring 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 application in Additive Manufacturing** *Nov 2022-present*
  Prof. Sajan Kapil, Assistant Professor, Dept. of Mechanical engineering, IIT Guwahati

  Implementation of Computer Vision and Deep learning Algorithms for in-situ quality control of Additive manufacturing processes of WAAM and PBF. Melt-pool monitoring in WAAM and defect monitoring in powder bed deposition and laser melting process of PBF

- **Morphing Wing Design Optimization**

  Mech559 – Course Project *Jan 2024-April 2024*

  The three subsystems of aerodynamic performance, structural analysis and actuating mechanisms are studied separately for optimization. Many constraints pertaining to dimension restrictions, deformation of the wing and available power have been defined to limit the design space. x-foil solver is coupled with the optimization codes for aerodynamic performance.

- **Acoustic Tactile Sensor Mapping**

  Prof. Audrey Sedal, Assistant Professor, Dept. of Mechanical engineering, McGill University *Sep 2024-Present*

  The project involves mapping of height profile of a surface by using a Tactile sensor working on acoustic principles. The problem is formulated as SLAM (Simultaneous Localization and Mapping) problem and solved using Factor graphs and data from other sensors.

- **Area Filling Method for 3D Printing**
  Prof. Sajan Kapil, Assistant Professor, Dept. of Mechanical engineering, IIT Guwahati *May 2019-present*
  Investigated on application of Traveling Salesman Problem for Area-filling strategies in 3D printing. Developed different methods to fill a given 2D geometry. Made software to generate and export toolpath for given input geometry.
  - Sadaival Singh, Ambrish Singh, Sajan Kapil, (2021), "Non-retractive toolpath planning using TSP solver", 4th international conference on "Holistic innovation in Additive Manufacturing (HI-AM)",1– 2 June, the University of Waterloo, Canada in Online Mode

- **SAE Efficycle 2018** *Jun 2018-Sep 2018*
  SAE, IIT Guwahati *http://bit.ly/2018AEGS*
  Manufactured Efficycle, which is a three-wheeler tadpole configuration hybrid vehicle. Designed Automatic gear shifters for the Efficycle which changed gears according to speed automatically for proper power transfer.

- **Formula Student Vehicle** *Dec 2018-Jan 2020*
  SAE, IIT Guwahati

  Designed and Manufactured a Formula Student race car for participation in Formula Bharat. Responsible for suspension and electronics subsystem. Overall technical management of other subsystems as team captain.

- **Hand Gesture Recognition** *Feb 2018*

  Implemented Computer Vision on Python to detect various hand gestures from camera. *http://bit.ly/2018HGR*

Technical skills

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

Key courses taken

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

Positions of Responsibility

- **Team Captain, Formula Team of IITG:** Responsible for distribution of work, setting up deadlines and proper work execution of a team of 20 members.
- **City representative for Technothlon 2018:** Organized the Technothlon Exam in Chandigarh, by bringing 300 registrations from various schools in Chandigarh, establishing a Test Centre and managing the final exam.

Achievements

- **Innovation Award:** Won Innovation award at SAE EFFICYCLE 2018 for designing automatic electronic gear shifters. The team achieved an overall rank of 9 among 72 teams in the event.
- **Group Mathematics Olympiad 2015:** Selected in top 30 students from India to participate in INMO (Indian National Math Olympiad).
- **Joint Entrance Examination 2017:** Secured All India Rank 2346 among 1.286 million candidates appearing for the test.

Extracurriculars

- **Conducted Lecture Series:** Gave lectures on engine and suspension subsystem on behalf of SAE IITG.
- **Spardha 2018:** Secured 4th rank in inter-hostel sports event in squash.
- **Kriti 2018:** Secured 2nd rank in inter-hostel technical event on making brake fitted RC car.