Sanskrati Agarwal

Junior Undergraduate
Department of Mechanical Engineering

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Academic Qualifications

Year	Degree/Certificate	Institute	Performance
2023-Present	B.Tech	Indian Institute of Technology Kanpur	7.0/10
2023	Class XII (CBSE)	Dr Lokmandas Public School, Etah	95.8%
2021	Class X (CBSE)	Assisi Convent School, Etah	98.8%

Major Achievements

- Secured **1st position** in **Formula Bharat 2026 Rulebook Quiz** in the **EV category** among **40+** FSAE teams in India
- Secured **All India Rank 6787** in the **Joint Entrance Exam Advanced 2023** among **1.8 lakh** shortlisted candidates
- Secured **All India Rank 4635** in the **Joint Entrance Exam Mains 2023** among **11.2 lakh** applicants
- Qualified for **Stage - II** in **National Talent Search Examination** (NTSE) among **10 lakh+** candidates in India
- Secured **State Rank 3** in **UP Genius 2017** as the youngest finalist from Class **6**, competing with students up to Class **12**

Key Projects

○ **Planetary Gear Design** | **SAE IITK Motorsports** (Advisor: Dr. Amarendra Edpuganti) *(May'25-Jul'25)*

Objective	• To design a **compact, lightweight**, and **structurally reliable Planetary Gearbox** for an electric drive-train **dual motor setup** used in a formula student car ensuring efficient transmission and compact packaging
Approach	• Calculated optimal number of **gear teeth** for the **sun, planet and ring** gears using **MATLAB** script, guided by the gear ratio constraints obtained from various research papers and SAE literarure on gear theory • Developed a MATLAB script to calculate optimal **face width** using **AGMA** equations, integrating material-specific parameters - **allowable bending stress, allowable contact stress** and **safety factor constraints** • Performed **topological optimization** on the CAD model in **SolidWorks** for enhanced structural efficiency • Performed **Finite Element Analysis** (FEA) on the finalized CAD model in **ANSYS** to evaluate **stress distributions** and **overall structural integrity** of the gearbox when subjected to real-world load conditions
Result	• Manufactured **final gearbox** with weight under **3.5 kg** while meeting the performance and safety requirements • Maintained a **factor of safety** (FOS) of **2.4**, validating the gearbox's structural robustness for track conditions • Contributed to the team's shift to **dual motor setup**, improving traction and drivetrain efficiency at event

○ **Formula Student Electric** | **IITKMS** (Advisor: Dr. Amarendra Edpuganti | Budget: INR- 37 Lakhs) *(Apr'24-Present)*

- Engineered the team's **first dual motor rear-wheel-drive** system with integrated **torque vectoring** to boost traction
- Developed a **planetary gearbox** ensuring **compactness** and **weight reduction**, leading to improved drivetrain efficiency
- Optimized **gear ratios** using **MATLAB** and **OptimumLap** to achieve a balance between **acceleration** and **peak speed**
- Enabled dynamic torque control, leading to a **5 sec** improvement in **lap time** on the **Kari Motorway** and a **0.1g** increase in **acceleration** performance
- Selected **motor, motor controller**, and **components** using **co-factor matrix** consisting of weight, cost, and performance
- Designed **powertrain assembly** ensuring robust motor mounting, efficient power transmission, and integration with chassis

○ **Quadrotor Dynamics Simulation** (Mentor: Prof. Dipayan Mukherjee | IIT Kanpur) *(May'25-Present)*

- Analyzed **X4 quadrotor dynamics** using **rigid body kinematics** and extensive, comprehensive review on flight dynamics
- Formulated dynamic equations via the **Newton-Euler method** capturing thrust, drag, torque, and aerodynamic effects
- Implemented **MATLAB** simulations to model **Vertical takeoff and landing** (VTOL) behavior of the quadrotor system
- Analyzed real-time flight trajectories, incorporating all lift forces in order to determine the equilibrium **hover conditions**

○ **YouTube Analytics and Content Trends** (Finlatics Data Science Program) *(Dec'24-Feb'25)*

- Utilized **NumPy** and **Pandas** in **Python** to analyze YouTube data and extract meaningful patterns across multiple trends
- Created visualizations by using **Matplotlib** to discover trends like subscriber growth and channel creation patterns over time
- Built **Python scripts** to analyze data from scratch - gaining hands-on experience in working with real-world messy datasets

○ **Personal Portfolio Website** (Self Project) 🜉 *(Mar'25-Apr'-25)*

- Developed an interactive portfolio website showcasing personal projects, achievements, and skills using HTML, CSS, and JS
- Designed intuitive UI/UX with **AOS** (Animate On Scroll) effects, **custom cursor animations**, and **gradient typography**
- Implemented features like **theme toggling**, **audio control**, **animated text intro**, and **smooth navigation transitions**

○ **Mental Health Chatbot** (Self Project) 🜉 *(Dec'24-Jan'25)*

- Built an AI powered chat-bot for mental wellness through a custom-trained neural network **(Keras)** on conversational data
- Enabled language detection and bi-directional English-Hindi translation via **Hugging Face** models for broader accessibility
- Developed a **Flask** based web app delivering **multilingual responses** in real time to improve access for non-English speakers

Positions of Responsibility

○ **Secretary** | **Chess Club, IIT Kanpur** *(Jun'24-May'25)*

- **Authored** informative **articles, emails, and social media posts** promoting chess events across the campus community
- Led registration for 80+ teams pan India for the **India Collegiate Chess Championship Fall 2024**, hosted by **Chess.com**
- Coordinated **Chess Master Premier League** (CMPL) which attracted **5000+** participants from **80+** colleges across India
- Collaborated with club leadership to **organize** and **execute events**, maintaining smooth coordination and communication

	○ **Senior Technical Member (Powertrain) | SAE IITK Motorsports**	*(Mar'25-Present)*

Leadership	• Mentored **6** junior team members, transferring **design knowledge** of components in the powertrain subsystem • Collaborated in team's **brainstorming sessions** to ensure efficient **project planning** and **management**
Management	• Organized **written test** and **shortlisting interviews** for the **recruitment** of **44 junior team members** • Developed and implemented **subsystem timeline**, ensuring targets are met for achieving the team's goals • Instilled a **documentation strategy** which helps **organise team resources** for the **long-term benefits**
Impact	• Led **introductory session** and **FSEV showcase**, engaging **450+** freshmen, the highest audience in **3** years • Received **250+** student applications from the freshers batch during the **team recruitment** for term 2025 • Initiated and led the integration of planetary gearbox in our **EV** for the very **1st** time in the **team's history**

Technical Skills

- **Languages & Tools:** C, C++, Python, LaTeX, SQL
- **Software and Libraries:** Fusion360, Solidworks, AutoCAD, Ansys, MATLAB, Optimum Lap, Matplotlib, NumPy, Pandas

Relevant Courses

Dynamics	Mechanics of Solids
Thermodynamics	Primary Manufacturing Processes
Nature and Properties of Materials	Fluid Mechanics
Theory of Mechanisms and Machines	Fundamentals of Computing
Introduction to Electronics	Complex Variables
Linear Algebra	Partial and Ordinary Differential Equations
Engineering Graphics	Electrodynamics
Introduction to Critical Thinking	Sustainability, Energy and Climate Change

Extra-Curricular Activities

- Secured **3rd Rank** in Uttar Pradesh among **1000+** candidates in the Inter-State tournament- **Anuvrat Essay Writing Competition (2017)**, showcasing my excellence in creative expression, english literature, and written communication skills
- Secured **Gold Medal** in **Chess** at **Inferno**, the **Inter-Hall competition**, among **30+** participants from different batches
- Served as the **anchor** of the **Annual Day event** at school during **2016** featuring the **District Magistrate** as **chief guest**
- Awarded by the **District Magistrate** every year from class **I to IX** for maintaining **top academic rank** across **4** sections
- **Elected** as **Head Girl** of Assisi Convent School, leading student body operations and overall coordination of school activities