VARDAAN SRIVASTAVA

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PROFESSIONAL SUMMARY

I am a second-year Mechanical Engineering student at the Indian **Institute of Technology - Madras**, India's premier engineering institute. Experienced in **mechatronics**, **microcontrollers**, and **analytical/numerical simulations** through hands-on projects including a **3-axis CNC plotter**. Currently developing a **5-axis 3D printer** and a **GoTo astronomical tracker** using spherical trigonometry and real-time coordinate transformations. Eager to contribute and learn from world changing problems.

EDUCATION

Indian Institute of Technology, Madras — August 2024 - Present
Bachelor of Technology in Mechanical Engineering — CGPA: **9.36** /10.0

Delhi Public School, Harni
Senior School Certificate Examination — Graduated 2024
Secondary School Examination — Graduated 2022

ACADEMIC ACHIEVEMENTS

- **Joint Entrance Examination (Advanced) 2024:** Secured *All India Rank 1852* among 150,000 candidates.
- **Joint Entrance Examination (Main) 2024:** Achieved *All India Rank 2009* (99.88 percentile) among 1.4 million candidates.
- **National Standard Examination in Astronomy (NSEA) 2024:** Placed in the *top 1% nationally* among 17,100 candidates.
- **National Standard Examination in Physics (NSEP) 2024:** Placed in the *top 1% statewide* among 2,800 candidates.

TECHNICAL PROJECTS

Completed Projects

1. **Travelling Flame (IPT 2025)** — September - October, 2024
   - Contributed to an **International Physicist's Tournament (IPT)** problem by analysing flame propagation in a fuel tube.
   - Developed a computer vision script in Python to track and quantify flame movement from high-speed experimental video.
   - Extracted and processed key data (e.g., flame velocity, position) to help the team validate its theoretical model.
2. **Sulekhak** — February - May, 2025
   - Designed and built a **3-axis CNC handwriting machine** prototype, integrating ESP32 for firmware control of stepper motors.
   - Implemented image processing techniques for handwriting detection and letter extraction.
   - **Secured 3rd Place** and a 4,000 Rupees prize in the TechSoc BuildSchool 6.0 competition.
3. **BMS for Weather Station** — April - May, 2025
   - Prototyped a **Battery Management System (BMS)** circuit to support simultaneous solar charging and load discharge for a **remote weather station**.
   - Integrated off-the-shelf components to manage power flow and ensure battery protection.

Ongoing Projects

1. **Chaos To Code** July 2025 - Present
   - Developing a **first-principles simulation library** for core mechanical engineering phenomena using **Python (Numpy, Sympy, Scipy).**
   - Developed symbolic models for **cam profile generation** (e.g., 3-4-5 polynomial, cycloidal) using SymPy to analytically derive and visualise their kinematic properties (jerk, acceleration).
   - Developing a **2D convection-diffusion** solver by numerically discretising Reynolds' Transport Theorem.
2. **Kinetic Voltmeter (IPT 2026)** October - December 2025
   - Investigating the correlation between the coefficient of restitution of a cell and its state of charge.
   - Developing a novel, non-intrusive method to reliably determine the state of charge of a battery
3. **GoTo Tracker andfor Dobsonian Mount** November - December 2025
   - Designing and fabricating a **custom Dobsonian mount and GoTo tracking system** from scratch using CAD software, and using FEA for structural validation.
   - Applying kinematics and spherical trigonometry to model celestial motion and mount dynamics.
   - **Developing embedded firmware** for the alt-azimuth (AZ) mount to perform real-time coordinate transformations and enable automated object tracking.
4. **5 Axis 3D Printer** November 2024 - Present
   - Adapting the Prusa i3 3D Printer for 5-axis motion based on the Open5x project
   - Designing and fabricating the required mechanical parts and hardware modifications.
   - Researching and implementing conformal slicing for non-planar printing

TECHNICAL SKILLS

Simulation	Python (Numpy, Pandas, Sympy, Scipy), ANSYS (Learning)
CAD	Fusion 360, SolidWorks (Learning), AutoCAD, EasyEDA
Prototyping	ESP32, Actuation, CNC/3D Printing, Power Electronics (BMS)
Software	LaTeX, Git

RELEVANT COURSEWORK

Completed
- Linear Algebra
- Engineering Mechanics
- Engineering Drawing

Ongoing
- Kinematics and Dynamics of Machinery
- Fluid Mechanics
- Strength of Materials

Upcoming (January - May 2025)
- Foundations of Thermal Engineering
- Materials and Design
- Manufacturing Technology
- Measurements and Instrumentation

LEADERSHIP & ACTIVITIES

1. **Project Member, Astrophotography Team** (June 2025 – Present)
   Collaborated on capturing deep-sky objects; gained practical exposure to telescopes and tracking.
2. **Coordinator, 3D Printing Club (CFI)** (June 2025 – Present)
   Led technical workshops and managed maintenance for the CFI's rapid prototyping lab.[1]
3. **Class Representative** (August 2024 – Present)
   Elected representative of the ME24B batch. Contact between faculty and students.
4. **Deputy Head, Comedy Contingent** (August 2025 – Present)
   Led a team of **9 members** to the Inter-IIT 2025, held at IIT Kanpur, as part of the improv contingent.
5. **Content Creator, IITM-TV** (August 2025 – Present)
   Worked on creative projects, including branding videos and short films.[2]

[1] Previously served as Deputy Coordinator.
[2] Previously served as an Assistant Content Creator.