

# Shrutikirti Singh

Pre-Final Year Undergraduate  
Department of Aerospace Engineering

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## Academic Qualifications

Year	Degree	Institute	CPI/%
2020 - Present	BT-MT	Indian Institute of Technology, Kanpur	7.6/10.0
2019	Class XII (CBSE)	Jawahar Navodaya Vidyalaya, Rajgir	91.6%
2017	Class X (CBSE)	Jawahar Navodaya Vidyalaya, Basti	10.0/10.0

## Work Experience/Research Work

VAWT with variable amplitude pitching 🔄 | Mentor: Dr. Abhishek 🏠 | Department of AE, IITK | UG Project 📅 Aug'23 - Nov'23

Objective	• To optimize <b>Vertical Axis Wind Turbines (VAWT)</b> efficiency, develop an <b>innovative solution</b> by the integration of a <b>custom screw gauge mechanism</b> , achieving <b>variable amplitude pitching</b> and enhancing overall performance.
Approach	• Derived <b>mathematical</b> relationship between pitch amplitude and length through <b>trigonometry</b> and <b>geometry</b> • Conducted comprehensive <b>simulations</b> to elucidate the relationship between <b>pitch amplitude</b> and the <b>length</b> of the L2 bar linkage in a <b>crank and rocker-based</b> mechanism, providing insights into the dynamic behavior of the <b>pitch control</b> • Engineered a precise screw gage mechanism for <b>effective control</b> and <b>manipulation</b> of length of the four-bar linkage
Outcome	• Successfully designed a precise mechanism, <b>optimizing VAWT efficiency</b> towards <b>renewable energy advancements</b>

## Key Projects

DeCAPTCHA 🔄 | Machine Learning | Dr. Purushottam Das 📅 Jul'23

- Developed a **character recognition model** by using **logistic regression** and **image preprocessing** techniques with **OpenCV**
- Achieved accuracy by **removing obfuscating lines** and **segmenting characters**, ensuring **robust** captcha code image identification
- Attained **99.8%** accuracy with rapid **1.431** ms training times, demonstrating exceptional precision in captcha recognition on images

Bayesian Machine Learning | Machine Learning | Dr. Purushottam Das 📅 Aug'23 - Sep'23

- Created a **Bayesian Linear Regression model** using **PyMC3(MCMC model)** ML package to predict the final grade of students
- Developed **Bayesian Neural network** using **Pyro** and **Pytorch** to predict the final grades using identical dataset employed for BLR
- Both Pyro and PyTorch approaches surpassed traditional methods such as Linear Regression, SVM, and Random Forest in performance

Rebalancing Portfolio Strategy Model 🔄 | Self Project 📅 Jun'22

- Developed the **calendar portfolio rebalancing** based trading strategy to identify the top 5 stocks with the highest return precisely
- Implemented functions to accurately calculate **Cumulative Annual Growth Rate**, **Annualized Volatility**, and **Sharpe Ratio**
- Used inbuilt python libraries **numpy**, **pandas**, **yfinance** & **matplotlib** for **fetching and visualizing** comprehensive data from **fxcm**

Helicopter Coupled Trim Analysis | Helicopter Theory | Dr. Abhishek 📅 Jan'23 - Apr'23

- Developed **coupled trim analysis** code for **UH-60A Black Hawk** & **MATLAB** simulations for blade aerodynamic performance
- Implemented numerical methods like six-point **Gaussian Quadrature** and **Newmark's Algorithm**, solving the blade flap equation
- Calculated blade hub **shear forces** and **moments** in rotating frame of reference with an azimuth angle of the rotating helicopter blades

## Technical Skills

Programming Languages	Libraries	Frameworks	Utilities
C++, Python, C, HTML, SQL, CSS, MATLAB	NumPy, Pandas, Matplotlib, Scikit-Learn	OpenCV, Keras	Git, L <sup>A</sup> T <sub>E</sub> X, MS Word, MS Excel, Illustrator

## Relevant Courses

Machine Learning      Probability and Statistics      Measurements & Data Analysis      Linear Algebra & ODEs  
Fundamentals of Programming      Introduction to Electronics      Real Analysis & Multivariable Calculus      Introduction to Robotics

## Positions of Responsibility

Organizer, Design Events and Competitions | Techkriti'23 | IIT Kanpur 📅 Dec'22 - Apr'23

Leadership	• Effectively led a <b>3-tier team</b> of <b>20+</b> students, ensuring coordination and management under guidance • <b>Formulated</b> competition rules and <b>problem statements</b> for Challenges providing clear guidance
Initiative	• Initiated <b>targeted outreach</b> , boosting participation to <b>500+</b> students from civil, and architecture branches • Proactively contacted colleges, <b>optimizing participation</b> of <b>women students</b> through emails & <b>networks</b>
Management	• Efficiently oversaw <b>logistics planning</b> , <b>registration</b> , & <b>testing setup</b> for the Bridge Design Challenge • Managed the <b>organization</b> of the <b>3</b> design competitions, including booking, crowd management and planning

Student Guide | Counselling Service | IIT Kanpur 📅 Nov'21 - Nov'22

Mentorship	• Guided and mentored <b>6 freshmen</b> students, facilitating their transition to the online institute environment
Teamwork	• Facilitated academic support through collaborative mentor meetings, cultivating enduring student rapport • Collaborated with the Counselling Service team for the organization of <b>Orientation Programme'21</b>

## Extracurricular Activities

- Represented IIT Kanpur at the **Inter IIT Sports Meet 2022 & 2023** as a team member of the **Women's Basketball Team'IITK**
- Received the prestigious **Governor Award** from **Bharat Scouts and Guides** in recognition of efforts in promoting young individuals
- Recipient of the prestigious **DRDO scholarship** awarded by the **R & D Board, Ministry of Defence**, Government of India
- Attained an impressive **top 30** ranking in the **Zuno Fellowship Aptitude Test 2023**, demonstrating aptitude reasoning skills
- Volunteered in **Prayas** to provide **Mathematics education** to economically disadvantaged students residing on the outskirts of IITK
- Initiated **transliteration** project of poem "Still, I Rise" by Maya Angelou and served as Secretary of **Hindi Sahitya Sabha**, IITK