YASH SANGHVI

CURRICULUM VITAE

Mobile Number: +91 9167345410

Email ID: sanghviyash7@gmail.com

Date of Birth: 12th July 1995

Nationality: Indian

12 D/ 7, Estee Apartments, Saibaba Nagar,
Borivali (W), Mumbai - 400092, India.

https://yash-sanghvi.github.io/

RESEARCH INTERESTS

Robotics, Human Computer Interaction, Haptics, Teleoperation, Mechatronics, Automation, Internet of Things

EDUCATION

B.Tech + M. Tech, Mechanical Engineering | Indian Institute of Technology Bombay | GPA: **9.39/10** '13 - '18

- **Ranked 2nd** in the department Dual Degree (i.e. B. Tech + M. Tech) Batch, out of 48 students
- Awarded the highest **AP** grade in the course *Introduction to Numerical Analysis*
- **Minor** degree in Electrical Engineering
- M. Tech Specialization: **Computer Aided Design and Automation**

Intermediate Examination | K.C. College, University of Mumbai | Performance: **90.33%** '13

Matriculation | Our Lady of Remedy High School | Performance: **92%** '11

KEY AWARDS AND HONORS

Graduation Awards | For performance throughout the stay at IIT Bombay

- **Dr. Shankar Dayal Sharma Gold Medal** | Awarded to 1 out of 2,500+ graduating students of IIT Bombay '18
  For being the most outstanding student in terms of general proficiency, excellence in academic performance, extra-curricular activities and social services; awarded by the Hon. Prime Minister of India, Shri Narendra Modi
- **Institute Organizational Roll of Honor** | Awarded to 1 out of 2,500+ graduating students of IIT Bombay '18
  For the demonstration of exceptional leadership skills and contributions to IITB and India through National Service Scheme (NSS) and the Student Satellite Team
- **Institute Technical Citation** | Awarded to 9 out of 2,500+ graduating students of IIT Bombay '18
  For the role played in taking IITB into the space age and mentoring several universities in their satellite endeavors

Yearly Awards | For performance in a particular academic year

- **Institute Technical Color** | Awarded to 12 out of 10,000+ on-roll students of IIT Bombay '17
  For writing the flight code (>10,000 lines) for Pratham, IITB's 1st student satellite, launched in September 2016
- **Institute Academic Prize** | Awarded to the top 2 rank-holders in every department '16, '15
  For ranking 1st (2015-16) and 2nd (2014-15) in the Mechanical Engineering Department (Dual Degree Batch)

PUBLICATIONS AND INVITED PRESENTATIONS

- Y. Sanghvi and S. Maiti, "Modeling and Detection of L and Inverted T Cracks in Laminated Composite Beams using Natural Frequencies" to be presented at *5th International Conference on Mechanics of Composites* (Instituto Superior Técnico, Portugal), July 1-4, 2019
- "Manufacturing Analytics: IoT based Overall Equipment Effectiveness (OEE) Measurement and Improvement", poster presentation at *Applied Materials India Engineering and Technology Conference* (IIT Bombay, India), September 27, 2018
- "Making of a Satellite: The Journey of Pratham from an Idea to Orbit", oral presentation at *Tech & RnD Expo* (IIT Bombay, India), October 7-8, 2017

KEY RESEARCH/ TECHNICAL PROJECTS

Electrical Subsystem Lead, Pratham | 1st Student Satellite, IIT Bombay Sep '13 - Apr '17

Launched on-board PSLV-C35 in Sep '16, Pratham was designed and built exclusively by the students of IIT Bombay

- Spearheaded the **Power system**; ensured detection of Pratham's separation from the PSLV and subsequent power-up, apt storage and distribution of solar power, battery charge management and health monitoring of critical components
- Devised and executed the functionality test plan for monitoring key parameters during environmental tests at ISRO
- Enacted SPI, I^2C, UART protocols between **ATmega128** μC (On-board Computer) and sensors, actuators, peripherals
- Implemented the **AX.25** error detection protocol to packet the telemetry data sent and received by Pratham
- Reviewed 10,000+ pages of documentation; presented before ISRO Scientists in the **Critical Design Review** and Pre-Shipment Review to obtain a launch slot for Pratham
- Felicitated by the **Hon. Governor of Maharashtra**, Ch. Vidyasagar Rao for the contribution in Pratham

Detection of L and Inverted T cracks in Composite Beams | Master's Thesis Apr '17 - Jun '18

Guide: Prof. Surjya K. Maiti, G K Devarajulu Chair Professor, Mechanical Engineering Department, IIT Bombay

Project: Formulation of a vibration based model for the detection of L and inverted T cracks in composite Euler Bernoulli beams for predicting the life of composite aerospace and mechanical structures

Forward Problem	• Analytically predicted (>**85% accuracy**), the natural frequencies of a damaged orthotropic symmetric cantilever composite beam given the location and size of the L or inverted T shaped crack • Validated the frequencies using **ANSYS Composite PrepPost** (ACP), achieved a match of 80%
Inverse Problem	• Graphically predicted the **location** and **size** of cracks in a cantilever beam with more than 75% accuracy, given any four natural frequencies of the cracked and intact beams • Used **Genetic Algorithm** to solve the inverse problem with just the natural frequencies of the cracked beam as input and achieved similar accuracy as the graphical approach

PROFESSIONAL RESEARCH EXPERIENCE

Research Associate | National Centre for Aerospace Innovation and Research (NCAIR) Sep '18 - Present

NCAIR is an industry-academia consortium founded in IIT Bombay in collaboration with Boeing and Hindustan Aeronautics Limited (HAL), with a vision to create a world-class aerospace manufacturing ecosystem in India

Guide: Prof. Asim Tewari, G K Devarajulu Chair Professor, Mechanical Engineering Department, IIT Bombay
Project: Industrial Internet of Things (IIoT) based monitoring of shop floor machines

- Determined the state of the shop floor machines (ON/ OFF/ Cutting) using current and vibration sensors
- Fabricated the **IoT device**; developed and tested the device software for optimal collection of sensor data, its subsequent conditioning and interface with the server side PHP script for the transfer of data
- Devised the test cases for training the **Machine Learning** back-end algorithm to identify the machine state
- Interfaced with the Machining Group, Analytics Group and Front-end team to understand their constraints and requirements pertaining to sensor locations, volume and type of data, and the transfer speed

Mechanical R&D Intern | Hindustan Unilever Limited, Mumbai May - Jul '16

Developed an Environmentally Sustainable Refrigeration System for PureIt Floor Standing RO Water Purifier

- Awarded **Pre-Placement Interview** based on output and leadership skills displayed during the internship
- Reduced **carbon footprint** by >40 kg CO_2 e/unit by modifying the system to replace HFC R-134a refrigerant with eco-friendly HC R-600a, satisfying Unilever Sustainable Living Plan (USLP)
- Dimensionally optimized the existing system design and reduced cooling time by **30%** (23 to 16 minutes)
- Consulted Western Refrigeration, Emerson etc. to obtain practical viewpoint in design decisions

SELECT COURSE PROJECTS

Motion Simulation of L.A.Rygg's Mechanical Horse Feb - Mar '17

Guide: Prof. Anirban Guha Course: Computer Aided Simulation of Machines

- Performed the kinematic and dynamic analysis of Rygg's design in **MSC Adams**; validated the results analytically
- Modeled stop joints using contact forces to accurately simulate the motion of fore and hind legs

Mass Minimization of a Satellite Monopole Antenna Oct-Nov '17
Guide: Prof. Salil Kulkarni Course: Design Optimization

- Formulated the optimization problem incorporating the constraints on size, material and fundamental frequency
- Used **Sequential Quadratic Programming** (SQP) algorithm to find the optimum properties for the antenna
- Performed **sensitivity analysis** to determine the change in the objective function due to the change in constraints

LEADERSHIP AND SOCIAL SERVICE

Project Manager, Advitiy | 2nd Student Satellite, IIT Bombay May '17 - Apr '18
Advitiy is the next step after Pratham towards making IIT Bombay a Center of Excellence in Satellite Technology

- Took over leadership to improve reliability while ensuring a reduction in the project time-line by >50%
- Finalized the mission statement and **payload** for Advitiy, after evaluating 30 proposed payload ideas for feasibility, impact (both technical and social), alignment with long term goals of the project and resource availability
- Introduced kaizens like instituting **Quality Assurance (QA)** practices, setting up a detailed inventory, etc.
- Conceptualized, structured and launched a **Satellite 101 Wiki**, for institutes aiming to venture into satellite technology, acknowledged by **AMSAT-UK**, the world's largest organization for amateur satellites.
- Facilitated the *pro bono* establishment of a **Ham Radio club** in IITB; participation of 40+ students

Overall Co-ordinator, National Service Scheme (NSS), IIT Bombay Apr '16 - Mar '17
NSS is the largest student volunteer body of IIT Bombay, serving >100K people via public welfare activities

- Led a **3 tier team** of 400+ volunteers solving problems in sectors like education, sustainability, health-care etc.
- Facilitated the launch of **Voice For Purpose** for making quality audio content available to blind people
- Initiated **Adult Literacy Program** for providing basic English training to 50+ mess workers
- Organized a Cashless Transactions Awareness Drive post **demonetization** of Rs. 500 and 1000 notes; impacted over 80 fish vendors/ small shops around the campus
- Increased the online presence of NSS IITB by >**200%** through activities like
  - The Artistic Impact - A nationwide *Socio-Art* competition; participation from 15 cities of India
  - Letters of Love - Global Outreach program for Syrian kids; participation of 300+ campus residents

Founder & Manager, Open Learning Initiative (OLI) | An initiative under NSS Jan '15 - Jul '17
A YouTube channel breaking language barriers, OLI hosts 250+ educational videos in 8 regional languages of India

- Benefited **1000+ students** in Giridih (an insurgency affected district) in absence of permanent teachers
- Amassed >75,000 subscribers, >6 million views (highest in IIT Bombay) in 3.5 years, **4000% growth** in 2016-17
- Videos hosted on the educational portal of **Madhya Pradesh** state government
- Success story published by Business Insider and Indian Express
- Invited by the **Ministry of Human Resources Development, Government of India** to contribute to DIKSHA - National Teacher Platform, to enable, accelerate and amplify solutions in the realm of education

TEACHING AND MENTORING EXPERIENCE

- Served as a **Teaching Assistant** (TA) for the following courses:
  - MA 214: Introduction to Numerical Analysis | 50 students Summer '15 and '17
  - ME 201: Strength of Materials, IIT Goa | 30 students Autumn '17
  - ME 616: Fracture Mechanics | 20 students Spring '18
  - SSWC101x: Soft Skills and Workplace Communication | MOOC on IIT BombayX Spring '18
- Organized **Ground-station Workshop** for 50+ students from 15+ colleges of India; taught *Systems Engineering Principles* and *Useful Team Building Practices* Jun '17
- Mentored and guided **5 colleges** across India in starting their own student satellite projects

RELEVANT SKILLS

Programming Languages	C, C++, Python, embedded C, Arduino, HTML, CSS, PHP
Softwares	MATLAB, ANSYS, SOLIDWORKS, Eagle, LaTeX, Audacity, MSC Adams, Atmel Studio, LT-Spice, Adobe Photoshop, MS Office, COMSOL Multiphysics, Advanced Excel

RELEVANT COURSES

Controls	Microprocessors and Automatic Control, Control and Communication, Modeling and Identification of Dynamical Systems
Computer Aided Design and Automation	Computer Aided Simulation of Machines, Textile Machines: Design and Automation, Computer Graphics and Product Modeling, Design Optimization, Computational Structural Dynamics
Electrical Engineering	Digital Electronics, Power Electronics, Signals and Systems, Electronic Devices and Circuits
Mechanical Engineering	Machine Design, Kinematics and Dynamics of Machines, Computer Numerical Control (CNC) and Programming, Finite Element and Boundary Element Methods, Industrial Engineering and Operations Research I
Audited Courses	Systems Engineering Principles, A System View of Communications: From Signals to Packets (Part 1) offered by the Hong Kong University of Science and Technology on edX

EXTRA-CURRICULAR ACTIVITIES

Public Speaking

- Delivered a speech representing the U.G. batch at the **Institute Valedictory Function**, 2018 — Apr '18
- Delivered an **Institute Lecture** on Pratham on Tinkerer's Lab Inauguration Day — Mar '17
- Presented Pratham before 3500 students and parents in **VEDH** (Vocational Education, Direction and Harmony) organized by the Institute for Psychological Health — Dec '16

Miscellaneous

- Developed the prototype of an '**Autonomous Sweeper bot**' under Institute Technical Summer Projects, at one third of the price of commercial robotic vacuum cleaners — Summer '14
- Taught 'General Knowledge' in **NGO Asha** to students of class 7-9 — Autumn '17
- Successfully cleared the Elementary and Intermediate **Drawing Grade Examinations** conducted by the Art Examination Committee, Government of Maharashtra — '07, '08
- Proficient in **4 languages**: English, Hindi, Gujarati and Marathi
- Hobby blogger, reader and pianist

REFERENCES

Prof. Surjya Kumar Maiti,
G K Devarajulu Chair Professor,
Dual Degree Project Guide,
Department of Mechanical Engineering,
Indian Institute of Technology Bombay.
Email: skmaiti@me.iitb.ac.in

Prof. Asim Tewari,
G K Devarajulu Chair Professor,
Professor In-charge, NCAIR,
Department of Mechanical Engineering,
Indian Institute of Technology Bombay.
Email: asim.tewari@iitb.ac.in

Prof. Anand Rao,
Faculty Advisor, National Service Scheme,
Centre for Technology Alternatives for Rural Areas,
Indian Institute of Technology Bombay.
Email: a.b.rao@iitb.ac.in

Prof. Prabhu Ramachandran,
Faculty Advisor, Student Satellite Project,
Department of Aerospace Engineering,
Indian Institute of Technology Bombay.
Email: prabhu@aero.iitb.ac.in

Prof. Varun Bhalerao,
Faculty Advisor, Student Satellite Project,
Department of Physics,
Indian Institute of Technology Bombay.
Email: varunb@iitb.ac.in

RELEVANT LINKS

- **Open Learning Initiative (OLI), NSS IITB:** https://www.youtube.com/c/OLINSSIITB
- **Satellite 101 Wiki:** https://www.aero.iitb.ac.in/satelliteWiki/index.php/Satellite_101
- **Personal blog:** https://theiinaniitian.wordpress.com/