Riya Singh

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Education

Bachelor of Technology, **GPA: 9.36/10**
Major: **Mechanical**, Minor: Physics

Honors and Awards

Undergraduate Research Award (URA 01), IIT Bombay, 2019
Future Research Talent Award, Australian National University, 2019
Kishore Vaigyanik Protsahan Yojna (KVPY), IISc, 2016

IIT Bombay Student Satellite Project

2019-2020 **System Leader, Great Lunar Expedition for Everyone (GLEE)**

GLEE is a collaboration of different institutions around the globe with a mission to conduct scientific experiments and test technology by deploying a network of 5-gram chipsatellites on the lunar surface.

- Supervised a team of **9 members** to select payloads, ideate the setup for their on-ground testing and develop electrical and communication design of the chipsats
- Evaluated the use of chipsats to **space-qualify technologies developed at IIT Bombay** such as AJIT Microprocessor and Nanosniff gas detector; chose AJIT microprocessor for the purpose

2017-2018 **Payload Engineer, Advitiy: Second Generation Student Satellite of IIT Bombay**

- Spearheaded a team to develop **quality assured** "satellite **simulation-framework**" for the ground-verification of control-algorithms; my leadership led to publication of a book-chapter in **Springer**
- Proposed different payloads and analyzed their system requirements as per the guidelines of **ISRO**
- Executed three-step recruitment process to ensure **team-continuity**, selecting **10** students out of **50+** applicants by evaluating them on their technical ability, practical approach, and teamwork

Social Goal | *A pro bono outreach effort to facilitate knowledge sharing*

- Contributed to Satellite 101 wiki which now has **1Lakh+** views and **38.5k** users around the globe
- Conducted **Ground Station Workshop** attended by **50+** students and faculties from **15+** colleges

Internship

Winter 2018 **Gear Shift/Select Malfunction in Manual Transmission** | Ford Motor Company

Identified the failure point in production line where mishandling of components led to malfunctioning of manual transmission; improved the **instruction system** for workers to solve the problem

Winter 2017 **Aerostat for Military Surveillance** | Manastu Space Technologies Private Limited

Developed two-dimensional gore-profiles for a given design of kytoon (a combination of kite and balloon) and **manufactured** its **prototype** to experimentally determine the increase in the lift

Positions of Responsibility

Summer 2020 **Summer of Science Mentor** | Maths and Physics Club, IIT Bombay

Guided **4 students** in learning various topics and tools of astrophysics and cosmology

Summer 2018 **Teaching Assistant** | Prof. D M Dwaikar, Department of Civil Engineering, IIT Bombay

Tutored **35** undergraduate students to help them get better insight of Engineering Mechanics

2017-2018 **Associate Secretary** | Department of Mechanical Engineering, IIT Bombay

Organized events like orientation, convocation, lab-visits, department trip etc. to facilitate the interaction among **1100+** students and with 62 department faculties

Publications

1. **Riya**, S. Chirame et al., Closed-Loop Simulation for Attitude Control of Nano-satellite, *Advances in Small Satellite Technologies*, pp 87-97, **Springer**, Singapore (2020).
2. **Riya** and V. Rentala, Neutrinos from the cosmic noon: a probe of the cosmic star formation history (2020), **arxiv**:2007.02951.
3. Y. Gupta, Aakash V, **R. Singh** et al., Lunar Exploration through ChipSats, International Astronautical Congresses (2020), **IAC**-20,A3,2C,30,x59667.

Conference Presentations

1. Resolution of discrepancy in SFR at Cosmic Noon using Diffuse Supernova Neutrino Background
   Advances in Astroparticle Physics and Cosmology 2020, Kolkata, India
2. Closed Loop Simulation for Attitude Control of Nano-Satellite
   International Conference on Small Satellites and Systems 2019, Hyderabad, India
3. Star Formation Rate using Diffused Supernova Neutrino Background
   National Space Science Symposium 2019, Pune, India

Research Project

2018-2020 **Neutrinos from the Cosmic Noon: a probe of the Cosmic Star Formation History**

Supervisor *Prof. Vikram Rentala, Department of Physics, Indian Institute of Technology (IIT), Bombay*

- Concluded that values of maximum Star Formation Rate (SFR) inferred from two different sets of methods disagree after reviewing the existing methods
- Simulated the detection signal at HyperK due to Diffuse Supernova Neutrino Background (DSNB)
- Based on χ^2 test-results **claimed potential of DSNB to resolve the discrepancy** in 1.6-20 years

Course Projects

Spring 2020 **Chaos modelling of coupled ODEs** | Computational Tools for Process Modeling
- Provided rank to different **solvers** on their capability to solve the chaotic system by simulating a double pendulum; included their sensitivity for abnormal length and mass ratio in the analysis

Spring 2020 **Thermohydraulic Modelling of flexible transfer lines** | Cryogenic Engineering
- Developed a **numerical model** in python for the optimization of liquid helium transfer line design

Autumn 2019 **Exoskeleton Leg** | Machine Design
- Prototyped an exoskeleton leg to increase endurance by **20%** by reducing the ankle and knee torque

Autumn 2018 **Microlens array using Spin Coating Process** | Manufacturing Processes
- Developed a mathematical model to predict the shape of final lens based on manufacturing parameters
- Manufactured different arrays varying process-parameters; characterized them to verify the model

Technical Skills

Machine Learning, Python, R, C++, MATLAB. Simulink, LaTeX, HTML

Relevent Coursework

Data Science Machine Learning, Linear Regression, Data Analysis and Interpretation, Numerical Analysis

IEOR Industrial Engineering and Operations Research, Computational Tools for Process Modeling

Miscellaneous

- Taught basic mathematics to **underprivileged students** for **a year** at Abhyasika, IIT Bombay
- Attended Football Girls Camp for two years and **won** institute girls' first **football** tournament
- Represented IIT Bombay as a contingent member in 6^{th} and 8^{th} **Inter-IIT Technical Meet**