Chinmay Makarand Pimpalkhare | **200100115**
Mechanical Engineering | **B.Tech.**
Indian Institute of Technology Bombay | **Gender: Male**
DOB: 21/12/2001

Examination	University	Institute	Year	CPI / %
Graduation	IIT Bombay	IIT Bombay	2024	
Intermediate	Maharashtra State Board	Dr. Kalmadi Shamarao Junior College	2020	93.38%
Matriculation	Maharashtra State Board	Sevasadan English Medium School	2018	95.60%

Pursuing a Minor in **Mathematics** at the Department of Mathematics, IIT Bombay

Academic Achievements

- Attained **Department Rank 7** among **194** students in the department of Mechanical Engineering *('22)*
- Conferred with the highest grade **AP** in **PH 108 (Electromagnetism)**, given to only **13** out of 1350 students *('21)*
- Recipient of the prestigious **Kishore Vaigyanik Protsahan Yojana** (**KVPY**) fellowship with **All India Rank 615** *('19)*
- Recipient of the **National Talent Search Examination** (**NTSE**) scholarship by NCERT, Government of India *('18)*
- Secured State Rank **1** in the **Maharashtra Talent Search Examination (MTSE)** for two consecutive years *('17, '18)*
- Awarded **Gold** and **Silver** medals in the state-level **Dr. Homi Bhabha Balvaidnyanik Competition** *('14, '17)*

International Conferences

36th Annual Small Satellite Conference | **Utah State University, USA** *(Aug '22)*
Annual international conference that explores the key advancements for small satellite missions
- Co-authored a **technical poster** for presentation "In-orbit thermal analysis of CubeSats using Ansys Workbench"

International Conference for Small Satellites | **Society for Small Satellite Systems** *(Apr '22)*
- Secured **2nd** position in the **Student Project Competition** for presenting "Sanket- Antenna Deployment System"

Technical Projects

Algorithmic Trading | **FinSearch** *(Jun '22 - Present)*
Finance Club, IIT Bombay
- Understood the basics of **algorithmic trading** and how it differs from **quantitative trading** and **automated trading**
- Studied the effectiveness of **reinforcement learning** techniques such as **LSTM**-based **Q-Networks** in this domain
- Analysed trading **strategies** such as **mean reversion, market timing, arbitrage, index-fund rebalancing**

Graph Theory | **Summer of Science** *(May '22 - Present)*
Maths and Physics Club, IIT Bombay
- Studied **discrete mathematical** and **linear algebraic** properties of graphs such as **isomorphism** and **graph eigenvalues**
- Analyzed various graph traversal algorithms such as **Depth First Search, Breadth First Search, Dijkstra and A***
- Studying the application of **graph theory** in the fields of **neural networks**, **financial markets** and **neuroscience**

Genetic Feature-based Face Generator | **Seasons of Code** *(May '22 - Present)*
Web and Coding Club, IIT Bombay
- Studied the mathematical framework behind **CNNs**, **RNNs** and algorithms like **K-Means**, **Random Forest** and **SVM**
- Explored various CNNs and GANs such as **TCGAN**, **ACGAN**, **CycleGAN** to understand their exact applications
- Training a supervised **DCGAN** model to synthesize **realistic** images of a child given the images of its parents

Optimization Algorithms for Linear Programming | **Self Project** *(Oct '21 - Dec '21)*
- Studied **tensor calculus**, **tensor algebra**, **projective geometry**, **convex optimization** and **Riemannian geometry**
- Implemented **local curvature-based** algorithms for solving multidimensional linear programming **optimization** problems
- Analyzed the natures of solution trajectories on application of the **Stieltjes** and **Projective** transforms

Procedural Terrain Generation | **Self Project** *(Jun'22 - Jul '22)*
- Studied **computer graphical** techniques such as **rasterization**, **ray tracing**, **texture mapping** and **compute shaders**
- Generated a **pseudo-random** 2D landform map with features like rivers and mountains and valleys using **Perlin noise**
- Improvised the model by adding layers for environmental factors like **elevation, erosion, temperature and precipitation**

Hyperspectral Imaging | **Institute Technical Summer Project** *(May '22 - Present)*
Institute Technical Summer Project, IIT Bombay
- Developing a **low-cost** hyperspectral imaging camera using a **RaspiCam** sensor module, lens and diffraction grating
- Studying **surface vegetation** through analyzing **polychrome** data obtained by processing low pixel images

Mechanical Subsystem | IIT Bombay Student Satellite Program *(May'21 - Present)*

A 70-member student team dedicated to the vision of making IIT Bombay a centre of excellence in space technology

- **Sanket- Antenna Deployment System**

  The mission aims to design an indigenous Antenna Deployment System with Technological Readiness Level (TRL)-8
  - Simulated thermal conditions in the LEOs using **Steady-State** and **Transient Thermal** Analyses in **Ansys Workbench**
  - Analyzed **thermal control** methods to restrict temperatures to operating ranges of the electronic components
  - Performed static and dynamic **thermostructural** simulations to simulate in-orbit and launch conditions in **Ansys Workbench**
  - Performed extensive **static structural, modal, random vibration and harmonic response** analyses on the antenna system to ensure structural integrity of the framework and assess its strength, robustness and stability
- **CubeSat**

  The mission aims to design a fully-functional 1U/2U/3U CubeSat for launch into Low Earth Orbit at an altitude of 720 km
  - Designed a **monobloc structure** for a 1U CubeSat in **SolidWorks** and validated its **robustness** through simulations
  - Co-ordinated a review of the mechanical structure and explored the **manufacturing feasibility** from various aspects
  - Modeled sensor **noise** by changing various different **statistical parameters** such as **bias, drift and covariance** for sensors including the gyroscope, ADC and the magnetometer that will be used for calculations by the ADCS subsystem
  - Explored the feasibility of various payloads such as **LoRa**, **debris management systems** and **cryogenics** for the mission

Finite Element Analysis of the Rolling Process | Course Project *(May '22 - Jul'22)*

Guide: Prof. Ramesh Kumar Singh, Department of Mechanical Engineering, IIT Bombay
- Conducted a **literature survey** about the open issues and current methodologies in the experimental study of the process
- Explored numerical models associated with different variations in the process such as **helical, 3-mill and ring rolling**
- Analyzed the resultant **stresses** inside the metals through **a finite element analytical simulation** in **Ansys Workbench**

Aerodynamics and Fluid Mechanics | Summer of Science *(May '21 - Jul '21)*

Summer of Science, IIT Bombay
- Studied phenomena like **turbulence**, Rayleigh-Taylor and Kelvin-Helmholtz **instabilites** and the Marangoni effect
- Explored mathematical concepts like **stream and potential functions**, **Crocco's Theorem** and **Fluid Circulation**
- Studied **potential flows**, shear effects, subsonic, **supersonic**, hypersonic flows, vortex rings and **isentropic effects**

Positions of Responsibility

Subsystem Head, Mechanical Subsystem, Sanket | IIT Bombay Student Satellite Program *(Apr '22 - Present)*

The mission aims to design an indigenous Antenna Deployment System with Technological Readiness Level-8 (TRL-8)
- Leading an interdisciplinary team of **15** students to develop a low-cost and indigenous antenna deployment system
- Executed a **3-step recruitment** process to select **5** out of **40+ applicants** evaluating their technical ability and teamwork
- Mentored **2** students during their recruitment phase and ensured that they properly adapt to the functioning of the team

Manager | Controls and Dynamical Systems Student Reading Group, IIT Bombay *(Jul '22 - Present)*
- Ideating a series of upcoming talks aiming to increase the reach and expose students to the exciting world of control systems

Teaching Assistant | PH 108 - Basics of Electricity and Magnetism *(Apr '22 - Jul '22)*

Guide: Prof. Alok Shukla, Department of Physics, IIT Bombay
- Conducted regular **problem-solving** tutorial sessions for **35+** first year undergraduate students across various departments
- Created **content** on difficult topics as a supplement to lecture slides in order to **enhance** the **learning** process
- Focused on academically weak and enthusiastic students and solved doubts and queries personally to **boost** their **performance**

Technical Skills

Languages	Python, C++, Fortran, Haskell, MATLAB, LaTeX, Bash, HTML, 8085 Assembly
Frameworks	Scikit-learn, Tensorflow, Keras, Pytorch, Numpy, OpenCV, Scipy, Matplotlib, Pandas
Softwares	Ansys Workbench, Thermocalc, SolidWorks, Git, Scilab, Gnuplot
Key Courses	Calculus, Linear Algebra, Differential Equations, Numerical Analysis, Complex Analysis , Economics Real Analysis , Computer Programming and Utilization, Introduction to Probability * (* to be done by Dec'22)

Extra-Curricular Activities

- Awarded **Gold** and **Silver** medals for project reports on '**Energy Conservation At Home**' and **'Promoting Indigenous Flora'** as a part of the penultimate round of the state-level **Dr. Homi Bhabha Balvaidnyanik Competition** ('14, '17)
- Secured **1**st place in the district-level **Sanskrit language** competition organized by the **Sanskrit Bhasha Sanstha** ('15)
- Secured **2**nd place in district-level **quiz** conducted by the **Inter-University Centre for Astronomy and Astrophysics** ('17)
- Awarded **second-highest B Grade** in the **Intermediate Drawing** Examination conducted by the Maharashtra Board ('17)
- Attended the **Vijyoshi** Camp at **IISc, Bangalore** as a part of the **Kishore Vaigyanik Protsahan Yojana (KVPY)** ('19)
- Completed an year-long course in **Hindustani Vocals** at IIT Bombay as a part of the NSO culturals programme ('21)