Mithil Vakde CPI: 8.93/10
Third Year Undergraduate at IIT Bombay mvakde@iitb.ac.in
B.Tech in Engineering Physics and Minor in Mathematics https://mvakde.github.io/

ACHIEVEMENTS

Scholastic

- **Top 25 countrywide** in the Indian National Astronomy Olympiad; invited to **OCSC '19**, the final stage of selection of the **Indian delegation to the International Olympiad in Astronomy and Astrophysics** ['19]
- One among the **73 undergraduates selected nationwide** for the **NIUS** (Physics) program at **TIFR** ['20]
- **99.6th percentile** in JEE Main; **ranked 1506** in JEE Advanced (**0.9 & 0.16 million** candidates resp.) ['19]
- Recipient of the **KVPY fellowship** (funded by the Govt. of India); secured an **All India Rank of 326** ['18]

Technical

- **Runner up**, **IBM Bluemix hackathon** for developing a twitter monitoring AI tool using Watson's NLU API; successfully pitched the app to **industry leaders** and beat experienced teams **2 years senior** ['16]

RESEARCH AND COURSE PROJECTS

Bachelor's Project
[Jan '22 – Apr '22]

Guide: Prof. Anshuman Kumar | Laboratory of Optics of Quantum Materials, IIT Bombay

- We are working in the field of **quantum materials** and **nanophotonics**
- Providing theoretical support to a PhD student synthesizing a metamaterial for a specific experiment

Liquid State Machines
[Sep '21 – Present]

*Guide: Prof. Udayan Ganguly | **Neuromorphic algorithms**, MEmory LOgic DEvice & DEsign Labs, IITB*

- Aiming to explain the functioning of the reservoir; **implemented an original idea** with an accuracy of 75%
- Analysed the working of Liquid State Machines in MATLAB by varying parameters such as synapse order

UMIC
Jr. Machine Learning Engineer
[Sep '19 – Sep '20]

***Impact**: Designed the ML subsystem of an aerial robot; adopted by a world championship winning team*

- Developed **deep learning** code that can recognize **10-inch** characters in **complex backgrounds 80+ft** away
- **Reduced the runtime 45x** by integrating a custom-built classification algorithm with YOLOv4
- Achieved an **F1-Score of 0.81** despite capturing blurry frames due to high drone velocity
- Cleared the concept review & preliminary design review rounds of the **Barcelona Smart Drone Challenge**

PT-symmetric optics
[Jan '21 – May '21]

Guide: Prof. Anshuman Kumar | Course project on optical Phenomenon in balanced gain-loss systems

- Conducted a literature review of **non-hermitian hamiltonians** in optics and its resulting applications
- Implemented the Abeles' matrix formalism **in python**; plotted non-trivial ATRs and CPA laser points

Chaotic attractors
[Sep '20 – Dec '20]

*Guide: Prof. Amitabha Nandi | Course project on chaotic systems and their **fractal properties***

- Calculated and **plotted multidimensional chaotic trajectories** of 5 attractors using **Runge-Kutta** methods

Analysis of proton - proton collisions
[Oct '20 – Dec '20]

*Guide: Prof. Sadhana Dash | Course project on the Interpretation of **high energy data***

- **Reconfirmed deviations** from the expected results of the transverse momentum of emitted particles
- Analysed **19 million datapoints** (Monte Carlo data of 13 TeV collisions from PYTHIA 8) in CERN's ROOT

Quantum Computing
[Oct '20 – Dec '20]

Reading project | Maths and Physics Club, IIT Bombay

- Studied the basics of **QIC** and various quantum algorithms including the Deutsch-Josza, Quantum Fourier Transform, Grover's algorithm, and their implementations using quantum gates on **Qiskit**

POSITIONS OF RESPONSIBILITY

Teaching Assistant
[Dec '21 – Mar '22]

***PH 107, Quantum Physics and Applications** | Instructor: Prof. Sunita Srivastava*

- Responsible for guiding **45** students, conducting weekly tutorials and evaluations, and grading exams

Student Mentor
ISMP & D-AMP
[May '21 – Apr '22]

One of the 13 juniors in a team of 120 seniors selected to provide support to the student community

- Assisted **180+ students** in planning their careers by **connecting them to alumni** and **hosting talk sessions**
- Guiding **8 sophomores and 11 freshmen** through academic and interpersonal challenges

Coordinator - AeRoVe
Aerial robotics team
[Sep '19 – Sep '20]

***Impact**: Secured **INR 0.8 million in funding** through a grant proposal pitched to the STP committee, IRCC*

- **Reduced expenses by 40%** per aircraft by finding inexpensive procurement methods
- Designed a **rigorous 7-day training** program for recruits & mentored them through a **month-long project**

MISC.

Technical Skills

- Programming: Python, Tensorflow, Keras, C++, MATLAB
- Software: LTSpice, Arduino IDE, Qiskit, SolidWorks, AutoCAD

Extracurricular Activities

- Represented IIT Bombay **all over the country** and won prizes at prestigious dance competitions:
  - **Winner**: Zest '21 at IIIT Hyderabad
  - **2nd place**: 7 Lakes Fest '20 at IIM Calcutta
  - **2nd place**: Inter-IIT Cultural Meet '19
  - **Finalist**: Desi Beats, Mood Indigo '20
- **Hosted a live concert of the National Film Award winner**, Rekha Bharadwaj, in front of **2000+ people**