Taha Kachwala

Energy Engineering
Indian Institute of Bombay

21D170043
Dual Degree(M.Tech + B.Tech)
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Examination	University	Institute	Year	Percentage
Graduation	IIT Bombay	Indian Institute of Technology, Bombay	2026	
Intermediate	CBSE	Bright Day School, Vadodara	2021	95.60 %
Matriculation	CBSE	Global Discovery School, Vadodara	2019	93.80 %

RESEARCH EXPERIENCE

Modelling Two-Stage Cascaded Vapour Compression Refrigeration Cycle (Jul'23-Sep'23)
Course Project | Professor Anish Modi   *Solar Thermal applications research*

- Performed **simulation study** using **Python** to identify all the operational parameters of the cascaded system, given the system capacity of **10 TR** & operating temperatures of **-50°C and 30°C**, and resultant system coefficient of performance was **1.587**
- Performed **parametric studies** to observe the effect of change in compressor isentropic efficiencies on the system performance
- Performed a detailed **modelling & sizing** of the heat exchangers involved, also performed **economic analysis** of the system
- Based on modelled system, extensive literature review and market study selected the **various components** for cascaded cycle

Solar Thermal Systems Research Trainee (Dec'22-Jan'23 & May'23-Jun'23)
Cosmo Powertech Pvt. Ltd. | Raipur, Chattisgarh   *Solar Thermal applications research*

- Part of a team of 3 members, responsible for assessing the practicality of employing a **parabolic trough concentrator**-based thermal system designed for the provision of **heating** and **cooling** services within both residential and commercial settings
- Utilized **E20** sheet & **Hourly Analysis Program** software to ascertain optimal cooling capacity for 3 BHK residence (767sq.m)
- Designed Parabolic Trough Concentrator with theoretical **optical concentration ratio** of **43**, the maximum theoretical **optical efficiency** of **76%** and simulated the concentrator using Tonatiuh software, employing the Monte Carlo Ray tracing method
- Conducted **international market research** (10+ Parabolic Trough Concentrator manufacturers) & research literature review

Modelling a Polgeneration Power Plant (Aug'23-Present)
Research Project | Professor Anish Modi   *Solar Thermal applications research*

- **Modelling** a polygeneration cycle using **Python** with energy from parabolic trough solar thermal concentrators as the primary source of energy, steam turbine as prime mover with the aim of fulfilling electricity, heating, cooling needs and producing H_2
- Conducted extensive research **literature review** to develop deep understanding in the operation of the polygeneration cycles

Solar Powered Autonomous Airship Research (Dec'22 - Present)
Solar Powered Airship Research Team (SPART) | IIT Bombay   *Solar Photovoltaic applications research*

- Part of a 40+ team aiming to represent India by building a **solar-powered** autonomous airship to fly across the South Atlantic
- The airship will cover **6000+ km** using H_2 as lifting gas to promote sustainable air transport in World Solar Airship Race '24
- Developing detailed **MATLAB** and then **SIMULINK** model of solar panel configurations on an airship to **study** the **overall power output** of the system under various external conditions of temperature, humidity, altitude, location, tilt and irradiance
- Conducting extensive research literature review on diverse varieties of **solar cells** and **fabrication** methods, with the purpose of establishing an **in-house solar panel fabrication** facility to meet the requirements of solar-powered autonomous airship

SSNNL Canal Top Solar Photovoltaic Power Plant Study (Jul'22)
Course Project | Professor Shireesh B. Kedare   *Solar Photovoltaics applications research*

- Visited the **10 MW** segment in Vadodara, developing a comprehensive understanding of **operation** (solar power system disconnects, battery charge controller, solar power system inverter, etc), **maintenance** & **risk management** strategies employed
- Collected data of **power generated** 6.5 years post commissioning & calculated till-date **efficiency (11%)** of the power plant

Energy Supply Chain Analysis | United States of America (Jan'23-Apr'23)
Course Project | Professor Sandeep Kumar   *Energy Sustainability & Environmental Impact analysis*

- Analyzed US energy supply data using **energy balance** method, **Sankey** & **PECSS** Diagram, emission & economic **indicators**
- Reviewed sectoral energy consumption predictions, **policies** implemented & **indicated nationally determined contributions**
- Implemented Logistic Curve analysis to evaluate and compare reserve-to-production ratios for Coal and Oil in India and USA

Impact of Electrification of Refinery Operations (Jul'23-Present)
Course Project | Professor Yogendra Shastri   *Energy Sustainability & Environmental Impact analysis*

- Conducting extensive research on feasibility of **electrification** of **heating operations** in Indian refineries for decarbonization
- In a team of 3, calculating **carbon emission reductions** from electrification, supporting sustainability & environmental goals
- Striving to offer essential insights on electrification's technical, economic, and environmental facets to make informed choices

Simulation and Analysis of Two Dimensional Fluid Flow *(Apr'23)*
Course Project | Professor Manaswita Bose *Fluid Mechanics*
- Utilized two-dimensional geometry and boundary conditions created in **OpenFoam** to solve the **Navier Stokes Equation** for Laminar flow and visualized the results using a **velocity profile** on **ParaView** software, and compared it to a analytical profile
- Created a **wedge-shaped geometry** in OpenFoam to solve the Navier Stokes Equ, and used ParaView software for analysis

SCHOLASTIC ACHIEVEMENTS

- Pursuing a **Minor** degree in the **Industrial** Engineering and **Operations Research** Department of IIT Bombay *(Present)*
- Ranked **2nd** amongst the 2021 undergraduate batch of the Energy Science and Engineering Department *(Present)*
- Secured All India Rank of **1592** in JEE Advanced amongst **1.41 lakh** candidates conducted by IIT Kharagpur *(2021)*
- Achieved **99.88** percentile amongst over **14 lakh** aspirants who appeared for JEE Mains conducted by NTA *(2021)*
- Ranked **1st** at school level for the **Intermediate** examination conducted by Central Board of Secondary Education *(2021)*
- Ranked **2nd** at school level for the **Matriculation** examination conducted by Central Board of Secondary Education *(2019)*

TECHNICAL SKILLS

Languages & **Libraries**	Python, Numpy, Pandas, Matplotlib, C++, OpenFoam
Software	MATLAB, SIMULINK, openLCA, System Advisor Model, Tonatiuh, ParaView, Microsoft Excel, HAP

KEY COURSES UNDERTAKEN

Solar Technologies	Thermal and Fluid Engineering Lab*, Solar Photovoltaic Fundamentals Technologies & Applications, Thermo-Fluid Devices*
Sustainability	Sustainable Engineering Principles*, Energy Resources, Economics and Environment
Mathematics	Optimization Models*, Introduction to Numerical Analysis, Data Analysis & Interpretation
Miscellaneous	Transport Phenomena, Thermodynamics & Energy Conversion, Material Science for Energy Applications, Renewable Energy Technologies, Electrical Machines & Power Electronics Lab

*Courses ongoing

POITIONS OF RESPONSIBILITY

Class Representative *(Jul'23-Present)*
Elected representative by the students of the 2021-26 batch of the Department of Energy Science and Engineering, IIT Bombay
- **Representing** and **advocating** for the interests of students of the 2021-26 batch of Dept of Energy Science and Engineering
- **Liaison** between students and faculty, effectively **addressing concerns** to maintain a positive learning environment for everyone

Publicity Coordinator | TechFest, IIT Bombay *(Jun'22-Jan'23)*
Asia's largest Science and Technology Festival | Events: 100+ | 1,80,000+ Footfall
- Part of **team of 12 members** involved in publicizing various events of TechFest to 3000+ colleges globally via various medias
- Negotiated a barter deal worth **$18,000** with a Digital Out-Of-Home Advertising Media company on behalf of TechFest, IITB
- Creating content and managing social media handles of TechFest, Facebook (**3M+**), Instagram(**56.5K+**) and Twitter(**24K+**)

EXTRACURRICULAR ACTIVITIES

Sports	• Bagged **third** place as a part of 14-membered team in the Inter-Hostel Kho-Kho General Championships • Trained rigorously for 2 yrs as a part of National Cadet Corps, 2 MAH ENGR REGT, Indian Armed Forces • Represented Hostel-5 in Long Jump and Football for Inter-Hostel General Championships, IIT Bombay
Culturals	• Awarded **first** place at the Debate General Championship at National Cadet Corps, 2 MAH ENGR REGT • **Hosted** the cultural showcase concluding Combined Annual Training Camp-410 for 2 MAH ENGR REGT • Participated in Photography Inter-Hostel General Championships 2022-23 representing Hostel-5, IITB • Attended the 4-week Comic Strip Design Workshop and designed a comic strip titled "Shifting Horrors"
Miscallaneous	• Awarded Letter of Recommendation upon completion of the Finlatics Financial Markets Experience Program for creating and managing a real-time simulated portfolio of the S&P BSE 500 index • Won **district-level** Bournvita General Knowledge contest backed by Derek O'Brien & Associates, 2016 • Nominated amongst **400+** students to represent Hostel-5, IIT Bombay, managing a budget of **$12,000** to aid the maintenance and upgradation of student facilities as a part of **7 membered** Hostel council