Om Mihani

Email: om.v.mihani@gmail.com

RESEARCH PROFILE	
Research Interests	Catalysis, Biotechnology and Scale-up Strategies
Research Exposure	Computational Fluid Dynamics, Computational Thermodynamics, molecular simulations, granular simulations, process plant simulation, and metabolomics
EDUCATION	
Oct '24 - Current	**Technical University of Munich (TUM) Germany** *Master of Science in Chemical Biotechnology*
Nov '20 - Apr '24	**Indian Institute of Technology (IIT) Bombay** *Bachelor of Technology with Honors in Chemical Engineering* | CPI: **9.53/10**
ACADEMIC HONORS	
2024	Graduated with **Department Rank 4** in a batch of 155 students
2021	Conferred with an **AP grade** in 2 core courses for exceptional performance
2020	Bagged an All India Rank of **708** in JEE Mains out of 1.1 Million students
2020	Attained an All India Rank of **832** in JEE Advanced out of **250,000** candidates
RESEARCH EXPERIENCES	
Prof. S Mahajani, IIT Bombay [Jun '24 - Current]	**PROCESS INTENSIFICATION FOR ETHYL LACTATE PRODUCTION** *Conceptual and Practical Process Design for Economical Ethyl Lactate Production* ● Conducted in-depth literature review and techno-economic analysis to identify optimal process parameters for cost-effective ethyl lactate production. ● Executed comprehensive experimental and simulation studies to evaluate process configurations, optimize yield, and minimize energy consumption. ● Scaled up the optimized process to pilot scale, incorporating advanced control strategies for enhanced product quality and operational efficiency.
Prof. P Wangikar, IIT Bombay [Jan '23 - Apr '24]	**PROTOCOL OPTIMISATION FOR GCMS BLOOD ANALYSIS** *Optimisation of Sample collection and extraction steps for human blood metabolomics* ● Explored the use of Liquid-Liquid Extraction to improve Signal to Noise ratio ● Validated volumetric absorptive microsampling for high-accuracy sampling

Prof. P Kusalik, U of Calgary [May '23 - July '23]	**STABILITY OF NANOBUBBLES** *Molecular Dynamics simulations to explore the properties of nanobubbles* • Performed MD simulations to study stability of nanobubble in Electric Fields • Developed a suite of simulation analysis tools using Python
Dr Pankaj Doshi, Pfizer [May '22 - July '22]	**CALIBRATION OF POWDERED DRUGS** *Optimisation of granular simulations in ROCKY using coarse-graining* • Simulated & analysed powders using coarse-graining & Python PrePost scripts • Developed a method to expedite the calibration of powders to granular models
Prof. J Adhikari, IIT Bombay [Dec '21 - Aug '22]	**HYDROGEN MOBILITY BY STORAGE AS H_2 HYDRATE** *Towhee Molecular Simulations to gauge the feasibility of ice as a Hydrogen carrier* • Developed an algorithm to inculcate quantum effects into classical potential • Grasped the usage of MCCCS Towhee software for Molecular Simulations
COURSE PROJECTS	
Prof Ben Johnson [Nov '24 - Feb '25]	**OSCILLATING OXIDATION OF FORMIC ACID** *Simulation and Analysis of an Electrochemical Process* Repository • Developed a comprehensive mathematical model to simulate electrochemical Formic Acid oxidation, integrating surface coverage dynamics • Employed MATLAB to conduct numerical simulations, visualize results, and derive key insights into the model's behavior, including bifurcation analysis. • Established a novel hysteresis function for modelling the physical process
Prof. Guruswamy and Prof. Kannan [Jan '24 - Apr '24]	**CONCEPTUAL DESIGN OF A TERT-BUTYL ALCOHOL (TBA) PLANT** *Simulation and Theoretical Optimization for Efficient TBA Production* Report • Spearheaded process optimization, evaluating multiple reaction routes, reactor configurations, and separation schemes, including extractive distillation. • Developed a comprehensive plant design incorporating detailed equipment sizing, cost estimation, and environmental impact assessment. • Implemented innovative process solutions including extractive distillation to overcome technical challenges and enhance overall process efficiency.
Prof. Sarika Mehra [Jan '24 - Apr '24]	**GENOMIC ANALYSIS OF M. TUBERCULOSIS STRAINS** *Unveiling Genetic Diversity through Whole Genome Sequencing* Report • Pioneered a genomic investigation of M. tuberculosis strains through whole genome sequencing of a representative sample of 4 clinical isolates. • Employed advanced bioinformatics pipelines including SPAdes and Bowtie2 to reconstruct bacterial genomes and understand strain relatedness.
Prof. Rajdip Bandyopadhyaya [Aug '23 - Nov '23]	**BIOSENSOR FOR PROSTATE CANCER** *Novel Biosensor design for real-time monitoring of Cancer* Report

	• Selected polymer and adhesives guided by meticulous literature study • Pinpointed an optimal biomolecule for prostate cancer after analysing various metabolomic studies, yielding a 400 times more cost-effective biosensor
Prof. A K Suresh [Jan '23 - Apr '23]	**DRY REFORMING OF METHANE**
	Literature Review of novel ways of modelling — *Slide Deck*
	• Grasped the examples of MicroKinetic Modelling & Density Functional Theory • Performed a critical review of the paper to find pros and cons of the approach
Prof. S Mahajani [Nov '22 - Dec '22]	**CARBON DISULPHIDE PRODUCTION**
	Process Plant Simulation to model a real process — *Report*
	• Leveraged DWSim to simulate CS_2 plant, achieving 99.9% end-product purity • Incorporated an H2S-derived S recovery unit, resulting in 30% waste reduction
Prof. Y Shashtri & Prof. M Kannan [Aug '22 - Nov '22]	**EXTRACTION OF CO_2 FROM FLUE GAS**
	Simulation-based optimisation for efficient Carbon Capture — *Report*
	• Developed a mathematical model describing the absorption of CO_2 into amines • Analysed the feasibility of flue gas CO_2 as a feedstock source
Prof. P Sunthar & Prof. V Gundabala [Jan '22 - Apr '22]	**THERMOACOUSTIC COOLING OF THERMAL HOTSPOTS**
	Use of novel cooling technique for cooling laptops — *Report*
	• Devised an approach to lower the cost of cooling by over **170 times** • Improved the energy efficiency by about **23 times** using CFD simulations
Prof. Janani Muralidharan [Jan '22 - Apr '22]	**FLOW PAST NINE CYLINDERS IN SQUARE CONFIGURATION**
	OpenFOAM CFD simulations of an experimental case study — *Case Study*
	• Studied the effect of spacing ratio & Reynolds number on the flow patterns • Analysed the impact of changing the fluid & published case study on FOSSEE
Prof. Guruswamy [Sep '21 - Dec '21]	**COATING FLOW OF LIQUIDS ON A ROTATING DISC**
	Literature review along with experimental observations — *Report*
	• Critiqued over four Research papers in the vicinity of the problem statement • Performed experiments to test **Lubrication Theory** which explains the flow
Prof. S Mehra [Jul '21 - Nov '21]	**ODE-BVP**
	Case Study of Ordinary Differential Equation — *Report*
	• Solved a 2^{nd} order ODE-BVP in MATLAB with varying mesh sizes • Reported effect of mesh size & solving method for optimal solution selection
OTHER PROJECTS	
Data Science Course Project [Sep '21 - Dec '21]	**PREDICTING IPL SCORES**
	Data Science Project with real-life data — *Report*

	• Implemented Explorator analysis & cleaning techniques on IPL scores dataset • Performed descriptive & predictive analysis of data to predict the next scores
Institute Technical Summer Project [Apr '21 - Jul '21]	**NEUROCLONE**
	A Thought-Controlled Humanoid Robot *GitHub Repository*
	• Conducted an extensive literature study relating thoughts to actions • USed PyTorch, Machine Learning and Deep Learning tools to make a neural network that maps EEG signals to electric signals to the command the robot
TECHNICAL SKILLS	
Simulations and post-processing	OpenFOAM, DWSIM, Ansys, Aspen, ROCKY, GROMACS, Towhee MCCCS, DWSim, OpenModelica, ParaView, VMD, High Power Computing systems
Programming	C++, Python, MATLAB, LATEX
Miscellaneous	MS Office Suite, Canva, Github
Leadership and Teaching Experiences	
Department Academic Mentor [Jun '23 -Apr '24]	• Mentored **6** students for their academic success and work-life balance • Conducted course-related help & doubt clearing sessions for **250** students
Class Representative [Aug '21 - Apr '24]	• Elected thrice as the CR for a batch of **80** students based on leadership skills • Devised & managed **15** events in coordination with department student council
Teaching Assistant BB 101 - Biology [Jan '22 - Apr '22]	• Mentored over **20** students in 2 disciplines of Biology over 7 tutorial sessions • Part of proctoring team of TAs to help in smooth conduction of examinations
Conveyor Chemistry Club [Jun '21 - Apr '22]	• Conceptualised **Winter School of Chemistry**: crash courses on niche topics • Forged a **Special Interest Group** for Chemistry Enthusiasts to discuss ideas
EXTRACURRICULAR ACTIVITIES	
Sports	• Ranked **3rd** in district level Inline skating competition
Dramatics	• Completed a two-semester course on Dramatics in the freshmen year at college
Competitions	• Participated in the **Hult Competition** for startup ideation in freshman year • Bagged **Second Positio**n in the PAN India **Light Painting Competition** • Participated in a Consulting competition by **PropertyPistol**
Campaigns	• Campaigned with the **Pranyas Foundation** on "*We always have a choice*"