

SHRAVAN GODSE

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EDUCATION

Indian Institute of Technology, Bombay

Bachelor of Technology (with honors) in Mechanical Engineering

July '18 - Present

Mumbai, India

- CPI (after 6 semesters) : **8.97/10**

- Pursuing a minor in Management from Shailesh J. Mehta School of Management

Arihant Jr. College

Higher Secondary Education

June '16 - June '18

Pune, India

- Secured **90.31%** in Class XII exams (stood **second** in the institute)

- Awarded INSPIRE scholarship by Department of Science and Technology, GoI for performance in **top 1%**

RESEARCH EXPERIENCE

Materials Research Lab

July '20 - Present

Guide: Prof. Ankit Jain | Department of Mechanical Engineering

IIT Bombay

Working as an Undergraduate Research Assistant exploring Machine Learning enabled materials discovery, Density Functional Theory (DFT) and DFT driven thermal conductivity prediction

Multichannel Thermal Transport in type-I Clathrates (Bachelors Thesis I)

Awarded Undergraduate Research Award-1 by IIT Bombay for this project

- Computed temperature dependent lattice thermal conductivity of type-I clathrates $X_8Ga_{16}Ge_{30}$ (X: Sr/Ba), using inhouse ab-initio based anharmonic lattice dynamics code on Spacetime-HPC at IIT Bombay
- Accounted for 3ph scattering, coherent transport channel and boundary+isotope scattering
- Obtained several lattice dynamical properties viz. Dispersions, DoS, Atomic Displacement Parameters, etc.
- Deployed phonon-renormalization and T-dependent PES sampling to account for strong anharmonicity
- Obtained DFT potential energy surface and force-field around Ba/Sr atoms in tetrakaidecahedral cages
- Visualized clathrate crystal structure, bonds, polyhedral cages, phonon mode-eigenvectors in VESTA

Vibrational Spectra of $FAPbBr_3$

May '21 - Present

Guide: Prof. David Egger | Department of Physics

TU Munich

Research Internship at **Theory of Functional Energy Materials** Lab at TU Munich, Germany (WFH)

- Performed convergence and structure relaxation calculations on Si, GaAs, $FAPbBr_3$ using VASP
- Performed Van-der Waals corrections using Tkatchenko-Scheffler method and optB88-vdW functionals
- Obtained phonon dispersion curves of Si, GaAs and $FAPbBr_3$ using Phonopy with finite difference method
- Simulated **infrared and Raman spectra** of $FAPbBr_3$ using Phonopy-Spectroscopy module

Materials Simulation

April '20 - July '20

Guide: Prof. Dipanshu Bansal, Department of Mechanical Engineering

IIT Bombay

Simulated Bandstructure, Density of states and Phonon Dispersions of materials using DFT software

- Reviewed concepts in solid state physics and completed an online course on Density Functional Theory
- Performed SCF calculations for convergences with respect to energy cutoffs and k point sampling
- Obtained bandstructure and phonon dispersion curves for **Al** and **Si** using **Quantum Espresso**
- Obtained the density of states (total and orbital projected) using dos.x and projwfc.x modules in Espresso

INDUSTRY EXPERIENCE

Advance Engineering Intern | Varroc Engineering Pvt. Ltd.

December '19

Guide: Mr. Lohit Dhamija - Manager, Advance Engineering

Pune

Varroc is a global technology powerhouse in manufacturing and supplying automotive components

- Researched various charging strategies for Lithium-ion batteries for Electric Vehicle applications
- Studied and presented Constant Current-Constant Voltage (CC-CV), Multistage, Pulsed and Fuzzy Control based charging of lithium-ion batteries based on literature reviews
- Modelled CC-CV and Multistage charging in Simulink to compare for an optimal charging profile

KEY COURSE PROJECTS

Non-uniform meshed Schrodinger-Poisson | [Report](#)

Autumn '20

Course : Physics of Nanoelectronic Devices

Instructor: Prof. Dipankar Saha, Department of Electrical Engineering

IIT Bombay

- Obtained a **99.64% accuracy** with **1/4th computational resources** upon solving Schrodinger equation using non-uniform mesh for finite quantum well in Python
- Implemented the self-consistent Schrodinger-Poisson equation to obtain carrier densities in AlGaAs and GaAs

BiDet-binarized object detector | [Report](#)

Autumn '20

Course : Deep Learning, Theory and Practice

Instructor: Prof. P. Balamurugan, Department of IEOR

IIT Bombay

- Worked in a team of 4 and used a binarized neural network Bidet by [Wang et;al](#) for object detection
- Experimented on PASCAL-VOC and COCO datasets for training and testing the object detector

Benzene Molecule Simulation | [Report](#)

Autumn '20

Course : Introduction to Ab-initio methods

Instructor: Prof. Sumit Saxena, Department of MEMS

IIT Bombay

- Utilised **Quantum Espresso** to carry out Density Functional Theory calculations on **Benzene molecule**
- Performed self consistent calculations using pw.x module and visualized the **molecular orbitals** of Benzene

TECHNICAL ACTIVITIES

Nonlinear Dynamics and Chaos | [Report](#)

Summer '20

Summer of Science, Maths and Physics Club

IIT Bombay

- Applied concepts of Nonlinear Dynamics and Chaos to Economic Supply-Demand models
- Performed extensive study of Nonlinear Dynamics through books by Strogatz, Shone and online resources
- Simulated the Cobweb Model with Adaptive Expectations for nonlinear supply by Cars Homes, 1994 (Journal of Economic Behavior and Organization) using MATLAB and demonstrated Chaotic Behavior

Junior Controls Engineer | [Exofly IIT Bombay](#)

Summer '20

Summer of Science, Maths and Physics Club

IIT Bombay

- Part of **33 member** tech-team in the institute with a vision of developing a **Personal Air Taxi**
- Completed MATLAB Onramp and modelled thermostat and Falcon's flight as a part of Simulink Onramp
- Modelled a **Deca-copter** (UAV with ten rotors) in **Simulink** using custom made blocks

TECHNICAL SKILLS

Languages : Python, MATLAB, C++, HTML*, CSS*

Softwares and Packages : Simulink, NumPy, Matplotlib, Pandas, Keras, Scikit-Learn

Materials Simulation/Querying : Quantum Espresso, VASP, Phonopy ASE, Matminer, Pymatgen

Others : Autocad, L^AT_EX, Adobe-Photoshop*, Inkscape*, MS Office, Blender*

*basic proficiency

SCHOLASTIC ACHIEVEMENTS

- Awarded a merit-based **branch change** based on exemplary academic performance in the first year ['19]
- Secured **All India Rank 1242** among **2 lakh** candidates in **JEE Advanced** for admission to IITs ['18]
- Secured **All India Rank 3433** among **1.1 million** in **JEE Main** entrance exam ['18]
- Amongst **top 1 %** students in **National Standard Examination in Physics** and **National Standard Examination in Astronomy** conducted by Indian Association of Physics Teachers ['18]
- Recipient of the prestigious **Kishore Vaigyanik Protsahan Yojana (KVPY) scholarship**, a national fellowship awarded by Dept. of Science & Technology, Government of India ['18]

KEY COURSES

Mechanical Core Courses	Strength of Materials, Fluid Mechanics, Thermodynamics, Structural Mechanics, Manufacturing Processes, Mechanical Measurements Heat Transfer, Mechanical Design [†] Thermal Design of Electronic Equipment [‡]
Programming & Math Courses	Computer Programming and Utilization, Neural Networks and Deep Learning [†] , Applied Machine Learning in Python [†] , Deep Learning-Theory and Practice, Statistical Machine Learning and Data Mining [‡] , Multivariable Calculus
Physics/others	Quantum Physics and Applications, Density Functional Theory [†] , Physics of Nanoelectronic Devices, Introduction to Ab-initio methods, Lattice Dynamics and Thermal Transport, Neuromorphic Engineering [‡]

[†] Coursera MOOCs [‡] to be completed by Dec 2021

MENTORSHIP ROLES

Department Academic Mentor	<i>July '20 - May '21</i>
<i>Department Academic Mentorship Program</i>	<i>IIT Bombay</i>
<ul style="list-style-type: none">• Part of a 39-member team selected out of 100+ applicants after extensive interviews and peer reviews• Mentoring 6 sophomores in the department to provide academic guidance and general counsel• Functioning as the First Point of Contact, aiding communication between students and faculty	
Summer of Science Mentor	<i>Apr '20 - June '20</i>
<i>Maths and Physics Club</i>	<i>IIT Bombay</i>
<ul style="list-style-type: none">• Mentored students for a study in Controls Theory as a part of Summer of Science by MnP club• Provided them with textbooks and online references to topics pertaining their interests	

VOLUNTEERING

Convener - Krittika, The Astronomy Club	<i>Apr '19 - Apr '20</i>
<i>Institute Technical Council</i>	<i>IIT Bombay</i>
<ul style="list-style-type: none">• As a part of a team of 8, responsible for organizing 20+ technical events like lectures and workshops• Entrusted with responsibility and maintenance of Dobsonian and Alt-azimuth mount telescopes• Conducted over-night sky observation sessions and theoretical astronomy competitions in the campus• Familiarized beginners in astronomy with basic concepts in star-gazing and telescope handling• Designed posters, stickers and other merchandise for the club and increased public outreach	

EXTRACURRICULAR ACTIVITIES

- Finished year long training in Swimming under National Sports Organization (NSO)
- Completed 3 levels of Indian Classical Music (Vocals) and 1 level of Harmonium (Indian Classical)
- Completed School Students Summer Programme by IUCAA, Pune
- Completed Fit in Deutsch 1 (A1 level proficiency in German) conducted by Goethe Institut

REFERENCES

Prof. Ankit Jain
Materials Research Lab
Department of Mechanical Engineering
Indian Institute of Technology, Bombay
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Prof. David Egger
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Technical University of Munich, Germany
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