

NEIL GHUGARE

Education

The Ohio State University **08-2022 – Present**
Bachelor of Science in Physics and Astronomy & Astrophysics *Columbus, Ohio*

- Minors: German and Honors Mathematics.
- Honors: University Honors program.

Goethe-Institut Dresden **05-2024 – 06-2024**
Intensive German Language Program *Dresden, Germany*

- Achieved CEFR B2 proficiency through 75+ hours of intensive coursework.
- Navigated complex linguistic and cultural environments across multiple German cities, demonstrating high adaptability.
- Developed advanced technical and conversational fluency through daily immersion with native speakers.

Experience

The Ohio State University **01-2023 – Present**
Undergraduate Research Assistant *Columbus, Ohio*

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- Theoretical Astrophysics (Drs. Thompson, Prasanna, and Coleman): Collaborating with a multi-disciplinary research group to investigate proto-neutron star (PNS) wind dynamics and spin-down using Athena++ and high-performance computing (HPC) clusters.
- Condensed Matter Physics (Dr. ChunNing Lau): Developed automated data pipelines to assist in characterization of graphene, reducing manual analysis time and increasing classification precision.

The Ohio State University **09-2023 – 09-2024**
Student Assistant - Grader *Columbus, Ohio*

- Evaluated rigorous, proof-based mathematics assignments, ensuring logical consistency and technical accuracy.
- Composed comprehensive answer keys, accounting for and validating multiple distinct approaches to complex problems.

Involvement & Service

The Ohio State University **08-2025 – Present**
Student Mentor *Columbus, Ohio*

- Facilitated academic success for students in the intermediate mechanics sequence by clarifying complex classical mechanics concepts and discussing problem-solving strategies.
- Conducted bi-weekly, one-on-one meetings and structured study groups to provide group support.
- Supported professional development initiatives, including participating in an “Ask a Mentor” panel and leading resume workshop tables for underclassmen.

Notable Involvement: Society of Physics Students (SPS), AI Club, Astronomical Society.

Certifications

Goethe Zertifikat B2 **06-2024**
• Successfully demonstrated reading, listening, speaking, and writing abilities at the CEFR B2 level for German.

Wolfram Language & Mathematica Level 1 Certification **04-2023**
• Demonstrated proficiency in using the Wolfram Mathematica software, including the use of notebooks.
• Demonstrated proficiency in using the Wolfram Language, including data analysis, visualization, the neural net framework, and more.

OpenEDG PCEP Certified Entry-Level Python Programmer **07-2022**
• Demonstrated proficiency in entry-level python programming skills and basic OOP principles.

Technical Skills

Programming Languages: Python, C++, Java, MATLAB, and Mathematica. Familiar with C, FORTRAN, and more.

Frameworks & Libraries: TensorFlow, Scikit-Learn, CUDA, Jupyter, Conda/PyPI/Venv, and Athena++.

Tools & Platforms: LaTeX, Git, Gradle/Maven, and HPC practices (SLURM, OpenMPI, etc.).

Language Skills: English, German, and understands Marathi.

Projects

Magnetar Wind Simulations in Athena++

Ongoing

- Utilized the MHD code Athena++ and HPC clusters to simulate PNS winds and formation.
- Designed generalized command-line analysis codes to create animations and profile plots, utilizing numerical techniques like Newton-Raphson inversion and interpolation.
- Project supported by the OSU Undergraduate Research Apprenticeship Program 2025, to be presented in two research forums in Spring 2026.

ISS Docking Port Locator and Distance Regressor AI

02-2025

- Designed a multi-headed convolutional neural network on top of MobileNetV3 Small to perform simultaneous coordinate regression and distance estimation of the ISS docking port, securing 3rd place out of 26 teams in the 25-hour 2025 HackAI competition.
- Constructed a 3D visualization of the model's predicted path of the SpaceX Dragon capsule to the ISS.

Graphene Layer Identification AI

07-2023

- Implemented Tensorflow neural networks, Scikit-Learn unsupervised clustering methods, and image pre-processing pipelines to identify graphene samples on an Si/SiO₂ substrate.
- Project supported by the OSU Physics Summer Research Program 2023 and presented in a poster session.

Awards

Physics Senior Award 2026: 1 of 12 students recognized for high achievement among senior level undergraduate physics & engineering physics majors.