

# Tirthajit Baruah

PhD Student, Department of Cyber-Physical Systems  
Indian Institute of Science, Bengaluru

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## Education

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### Indian Institute of Science, Bengaluru

2023–Present

PhD, Cyber-Physical Systems

### Indian Institute of Science Education and Research, Bhopal

2018–2023

Bachelor of Science – Master of Science, Electrical Engineering and Computer Science  
Minor in Data Science and Engineering

CGPA: 8.3/10

## Publications

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1. S. Kumar, S. Sharma, **T. Baruah**, P. Rathore, “*Reliability-Preserving Compression for Deployable 3D Medical Image Segmentation.*” Submitting to the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), Florida, 2026.
2. **T. Baruah**, K. Jamadar, P. Rathore, “*Two-Fold Patch Perturbation for Efficient Self-Supervised Learning in 3D Medical Imaging.*” Accepted at the International Joint Conference on Artificial Intelligence and European Conference on Artificial Intelligence (IJCAI-ECAI), Bremen, 2026. [Link]
3. **T. Baruah**, P. Rathore, “*Translating Classifier Scores into Clinical Impact: Calibrated Risk and Queuing Simulation for AI-Assisted Radiology Worklist Triage.*” Accepted at DAI & AIMedHealth Workshop @ AAAI, Singapore, 2026. [Link]
4. A. Mazumder, C. Garg, **T. Baruah**, P. Rathore, “*DIME: Deterministic Information Maximizing Autoencoder.*” Accepted at DeLTa Workshop @ ICLR, Singapore, 2025. [Link]
5. A. Mazumder, **T. Baruah**, B. Kumar, R. Sharma, V. Pattanaik, P. Rathore, “*Learning Low-Rank Latent Spaces with Simple Deterministic Autoencoder: Theoretical and Empirical Insights.*” IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), Hawaii, 2024. [Link]
6. A. Mazumder, **T. Baruah**, A. Singh, P. Krishna, V. Pattanaik, P. Rathore, “*DeepVAT: A Self-Supervised Technique for Cluster Assessment for Image Datasets.*” ViPrior Workshop @ IEEE/CVF International Conference on Computer Vision (ICCV), Paris, 2023. [Link]
7. H. Wasnik, R. Gandhi, N. Patil, R. Behera, A. Golait, T. Patel, & **T. Baruah**, “*A Comprehensive Review of Molecular Biology and Genetics of Cataract.*” International Journal for Research in Applied Sciences and Biotechnology, 8(2), 11–20. [Link]

## Selected Research Projects

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### Efficient Self-Supervised Learning for 3D Medical Imaging

2025–2026

Supervisor: Dr. Punit Rathore

Department of Cyber-Physical Systems, IISc Bengaluru

- Developed a two-fold patch perturbation strategy for efficient self-supervised learning in 3D medical imaging.
- Studied representation learning under limited-label settings for volumetric medical image analysis.
- Resulted in an IJCAI-ECAI 2026 main conference publication.

### AI-Assisted Radiology Worklist Triage

2025–2026

Supervisor: Dr. Punit Rathore

Department of Cyber-Physical Systems, IISc Bengaluru

- Translated classifier scores into calibrated risk estimates for radiology worklist prioritization.
- Built queuing simulation pipelines to evaluate the workflow-level impact of AI-assisted triage.
- Resulted in a DAI & AIMedHealth Workshop @ AAAI 2026 publication.

## Low-Rank Latent Spaces with Deterministic Autoencoders

Jun 2023 – Jul 2023

Supervisor: Dr. Punit Rathore

Department of Cyber-Physical Systems, IISc Bengaluru (Project Page)

- Formulated a deterministic autoencoder architecture that induces low-rank latent representations.
- Evaluated the architecture on downstream classification, clustering, and generative tasks.
- Compared against baseline and state-of-the-art autoencoders, including VAE and flow-based variants.

## Representation Learning for Electronic Health Records

Aug 2022 – Apr 2023

Supervisor: Dr. Prathosh AP

Department of Electrical Communication Engineering, IISc Bengaluru

- Developed augmentation strategies for electronic health record time-series data.
- Studied self-supervised representation learning for large-scale clinical time-series datasets.
- Worked with MIMIC-III and PhysioNet 2012 datasets.

## Calibrating Attention of Students in Classroom

Dec 2021 – Apr 2022

Supervisor: Dr. Haroon R Lone

Department of Electrical Engineering and Computer Science, IISER Bhopal

- Studied sensor-based and vision-based techniques for estimating student attentiveness.
- Deployed a Raspberry Pi and camera-based module for classroom data collection.
- Trained a real-time attentiveness detection model using computer vision techniques.

## Mentoring

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### Kabir S. Jamadar

Aug 2025 – Dec 2025

Current Affiliation: Research Intern, Precog, IIIT Hyderabad

- Mentored work on perturbation strategies for 3D medical self-supervised learning.
- Outcome: IJCAI-ECAI 2026 main conference publication.

### Gokul T. Adethya

Jun 2024 – Jan 2025

Current Affiliation: Master's student, Halicioğlu Data Science Institute, UC San Diego

- Mentored work on medical multi-modal fusion, cross-modal alignment, and test-time adaptation for optical flow.
- Outcome: Summer internship report and research codebase.

## Teaching Experience

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### Department of Cyber-Physical Systems

Jan – May 2025

Teaching Assistant: DA2180, Probabilistic Machine Learning: Theory and Applications

IISc Bengaluru

Course Instructor: Dr. Punit Rathore

- Conducted weekly programming tutorials for topics taught in class.
- Assisted the instructor in formulating and evaluating assignments and exams.

### Department of Data Science and Engineering

Aug – Dec 2022

Teaching Assistant: DSE317/617, Machine Learning

IISER Bhopal

Course Instructor: Dr. Tanmay Basu

- Delivered lectures on supplementary topics of the course.
- Mentored students from the 2020 and 2019 batches throughout the course.
- Assisted the instructor in formulating and evaluating assignments and exams.

### Department of Electrical Engineering & Computer Science

Apr – May 2022

Teaching Assistant: ECS102, Introduction to Programming

IISER Bhopal

- Mentored students from the 2021 batch throughout the course.
- Conducted lab sessions to assist students with assignments and course-related difficulties.

## Professional Service & Technical Leadership

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**Department of Cyber-Physical Systems**

*Mar 2026 – Present*

**Department GPU Cluster Administrator** (*Volunteer Technical Service Role*)

IISc Bengaluru

- Coordinate access and usage of the department GPU cluster for research users.
- Support user onboarding, environment setup, resource-use practices, and troubleshooting.
- Help maintain shared compute infrastructure used for machine learning and AI research.

### Peer Review

- Reviewer, IJCAI-ECAI, 2026.
- Reviewer, DAI & AIMedHealth Workshop @ AAAI, 2026.

### Additional Experience

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**AI and Cyber Physical System for Agriculture @ iHub – AWaDH**

*May – Jul 2021*

**Workshop Participant** Instructor: Dr. Neeraj Goel

IIT Ropar

- Collected agricultural data via sensors and deployed them for AI model training.
- Developed Android app modules for agricultural applications.
- Completed capstone project: “Real-time Pest Detection using MobileNet-SSD & Farm Monitoring.”

### Technical Skills

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- **Programming and ML:** Python, PyTorch, distributed data parallel training, Linux, Git
- **Data and Systems:** medical imaging workflows, electronic health records, time-series data, GPU-based model training
- **Hardware and Prototyping:** ESP32, Arduino, Raspberry Pi, IoT sensors

### Selected Coursework

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- **Machine Learning and Data Science:** Pattern Recognition & Neural Networks, Theory and Applications of Bayesian Learning, AI for Medical Image Analysis, Digital Image Processing
- **Mathematics:** Stochastic Modelling & Applications, Linear Algebra, Probability & Statistics, Calculus
- **Computer Science:** Data Structures and Algorithms, Discrete Mathematics, Internet of Things
- **Biology and Healthcare:** Biomolecules, Cell Biology, Biostatistics, Bioinformatics
- **Electrical and Electronics:** Signals & Systems, Principles of Communication, Electronic Devices, Electromagnetic Theory, Smart Sensing Technologies

### Leadership and Activities

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**Coordinator:** Karate Club, IISER Bhopal

*2018–2021*

**Prefect:** Students Council, Army Public School, Tezpur

*2015–2016*

**Gold Medal:** 4×100m Relay, Inter-IISER Sports Meet

*2022*

**Visharad in Tabla:** Five years of classical tabla training