Pranjal Choudhury

PhD Student, Department of Physics, IIT Guwahati

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Education

Degree	Institution	CGPA/%	Year
Ph.D. in Physics	IIT Guwahati	10.00	2020 - Present
Integrated M.Sc. in Physics	Tezpur University	8.73	2019
Senior Secondary	AHSEC	87.0%	2014
Secondary	CBSE	10.0	2012

Research Experience

Ph.D. Researcher, IIT Guwahati (Sept 2020 - Present)

My research focuses on developing cost-effective methods for implementing super-resolution optical microscopy in clinical settings. My work primarily involves software development and instrumentation. The key outcomes of my research include:

- Developed a Python-based software for super-resolved image reconstruction in SMLM with minimal system requirements. Also created a Micro-Manager plugin to integrate the Python module for near real-time image reconstruction and visualization.
- Designed an adaptive thresholding method for fluorescence image segmentation and PSF detection.
- Developed a CNN-based approach for accurate PSF detection in high-density emitter environments.
- Developed a cross-correlation-based lateral drift correction algorithm for fluorescence images.

Visiting Ph.D. Student, Imperial College London (May - July 2024)

- Worked on development of a robust hardware-based autofocusing system for focus stabilization in single molecule localization microscopy.

Publications

1. **Deep learning-driven wavefront sensing for grating-array based wavefront sensor**, IEEE Sensors Journal. (2025). DOI
2. **Neural network-assisted localization of clustered PSFs in SMLM**, Journal of Microscopy (2024). DOI
3. **Tuning excitation laser power in STORM for Alexa Fluor 647 dye**, Review of Scientific Instruments (2024). DOI
4. **Adaptive image thresholding and localization of point spread functions with enhanced precision**, Optics and Lasers in Engineering (2024). DOI
5. **Localization and Image Reconstruction in a STORM based Super Resolution Microscope**, Image Processing Online (2024). DOI

Teaching & Mentorship

- Teaching Assistant, Department of Physics, IIT Guwahati: Assisted in courses such as Engineering Optics, Electronics, Computational Physics, and Advanced Physics Laboratory for undergraduate and master's students.
- Mentored undergraduate and junior Ph.D. students in microscopy techniques and image processing.
- Organized scientific talks and outreach programs for SPIE.

Technical Skills

- **Programming:** Python, MATLAB, C, C++, Fortran, Java.
- **Software:** Micro-manager, ImageJ, LabVIEW, Zemax OpticStudio(learning), Mathematica, MS Office.
- **Frameworks:** TensorFlow, Scikit-Learn, Scikit-Image, OpenCV, Napari.
- **Operating Systems:** Windows, Linux.
- **Instruments:** Fluorescence Optical Microscope, Spatial Light Modulator.

Relevant Coursework

M.Sc. Physics: Mathematical Physics, Classical Mechanics, Statistical Mechanics, Quantum Mechanics, Atomic & Molecular Physics, Nuclear & Particle Physics, Condensed Matter Physics.
Ph.D. Coursework: Laser Physics and Nonlinear Optics, Fourier and Guided Wave Optics, Computational Physics.

Leadership & Responsibilities

- Assistant Prefect, Patkai Men's Hostel, Tezpur University. (2017 - 2019).
- Member, Research Scholar's Forum, Department fo Physics, IIT Guwahati. (2023 - 2025)

Awards & Achievements

- INSPIRE Scholarship for Higher Education, DST. (2014-2019)
- Institute Gold Medal, Integrated M.Sc., Tezpur University. (2019)
- CSIR JRF/NET, GATE (PH), JEST , INSPIRE Fellowship. (2020)
- Global Development Hub Fellowship, Imperial College London. (2024)

Professional Memberships

- Student Member, SPIE.
- Student Member, OPTICA.
- Life Member, Physics Association of North East.

References

- Prof. Bosanta Ranjan Boruah
  Department of Physics, Indian Institute of Technology Guwahati
- Prof. Paul M.W. French
  Department of Physics, Imperial College London