

Dr. Monisha Biswas

(Formerly known as Monisha Ghosh)

Assistant Professor, Electronics & Communication Engineering

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PROFESSIONAL SUMMARY

Dedicated academic and researcher in Electronics and Communication Engineering with 13+ years of teaching experience at MAKAUT-affiliated institution. Expertise in semiconductor device physics, GaN/SiC based IMPATT devices, multi-quantum well (MQW) structures, microwave, millimetre-wave and terahertz technologies, and neuromorphic systems computation. Ph.D. (Tech.) awarded in July 2025 from Kazi Nazrul University. Author of 4 peer-reviewed journal papers, 5+ Springer book chapters, and multiple conference papers. GATE Fellowship holder with a DRDO-funded project in Master degree level.

WORK EXPERIENCE

Assistant Professor | SKFGI, MAKAUT — Dept. of Electronics & Communication Engineering |
2012 – Present

- Deliver B.Tech and M.Tech lectures across core ECE subjects including Analog & Digital Communications, Fiber Optic Communication, Signals & Systems, and Speech Processing.
- Contribute to curriculum development, NBA accreditation documentation, and academic planning committees.
- Act as student coordinator: guiding 100+ students per academic year on academics, placements, internships, and student welfare.
- Organised technical events, conducted admission counselling and orientation sessions.
- Co-ordinator of AI Literacy programme at SKFGI (2026).
- SPOC, FS Prime (East Zone) representing SKFGI (2022).

Laboratory Assistant | Dept. of Applied Optics and Photonics, University of Calcutta (DST-SERC School) | December 2011

- Assisted in experimental setup, calibration, and demonstration of laser and optical systems.
- Supported research scholars in data collection, lab maintenance, and hands-on sessions on advanced photonics applications.

EDUCATION

Ph.D. (Tech.) | Kazi Nazrul University, Asansol, West Bengal | 2025

- Thesis: Studies on Multi-Quantum Well Avalanche Transit Time Sources for Different Industrial Applications in Millimetre-Wave and Terahertz Frequency Regimes.

M.Tech. in Optics and Optoelectronics | University of Calcutta, Kolkata | 2012

- Marks: 74.5%

B.Tech. in Electronics & Communication Engineering | Netaji Subhash Engineering College, WBUT | 2010

- DGPA: 7.96

Diploma in Electronic and Telecommunication Engineering | Central Calcutta Polytechnic, WBSCTE | 2007

- DGPA: 79.5%

Madhyamik Pariksha | Barasat Girls High School, WBBSE | 2002

- DGPA: 70.5%

TECHNICAL SKILLS

Research areas:	IMPATT diodes, MQW devices, GaN, SiC, Ga ₂ O ₃ , Terahertz, Millimetre-wave, Neuromorphic computing, Semiconductor Device physics, Sacred geometry
Software tools:	MATLAB, Python, C Programming
Communication:	Analog & Digital Communications, Fiber Optic Systems, Speech Processing, Signals & Systems

RESEARCH PUBLICATIONS — JOURNAL PAPERS

- Monisha Ghosh, Shilpi Bhattacharyya Deb, Aritra Acharyya, Arindam Biswas, Hiroshi Inokawa, Hiroaki Satoh, Amit Banerjee, Alexey Y. Seteikin, and Ilia G. Samusev, "Edge-Terminated AlGa_N/Ga_N/AlGa_N Multi-Quantum Well Impact Avalanche Transit Time Sources for Terahertz Wave Generation," *Nanomaterials*, vol. 14, no. 10, pp. 873, 2024. DOI: 10.3390/nano14100873. Impact Factor: 4.400 (2024).
- Monisha Ghosh, Arindam Biswas, and Aritra Acharyya, "Terahertz Radiators Based on Si₃C-SiC MQW IMPATT Diodes," *Nanoscience & Nanotechnology-Asia*, vol. 10, no. 4, pp. 501-506, 2020.
- Monisha Ghosh, Somrita Ghosh, Prasit Kumar Bandyopadhyay, Arindam Biswas, A. K. Bhattacharjee, and A. Acharyya, "Noise Performance of 94 GHz Multiple Quantum Well Double-Drift Region IMPATT Sources," *Journal of Active and Passive Electronic Devices*, Old City Publishing, vol. 13, no. 2/3, pp. 195-207, 2018.
- Monisha Ghosh, Somrita Ghosh, and Aritra Acharyya, "Self-Consistent Quantum Drift-Diffusion Model for Multiple Quantum Well IMPATT Diodes," *Journal of Computational Electronics*, Springer, vol. 15, no. 4, pp. 1370-1387, 2017. Impact Factor: 2.100 (2022).

BOOK CHAPTERS

- Monisha Biswas, "A review on gallium oxide (Ga₂O₃) phototransistors for neuromorphic computing," in *Next-Generation High-Speed Electronics and Optoelectronics*, Springer, Lecture Notes in Electrical Engineering, vol. 1511, ch. 15, 2026. DOI: 10.1007/978-981-95-4415-8_15.
- Monisha Ghosh, Arindam Biswas, "Material Systems for Realizing Heterojunction IMPATT Sources for Generating Terahertz Waves," Ch. 15 in *Advanced Materials for Future Terahertz Devices, Circuits and Systems*, Springer, 2021. DOI: 10.1007/978-981-33-4489-1_15.
- Monisha Ghosh, Arindam Biswas, "Applications of Si₃C-SiC Heterostructures in High-Frequency Electronics up to the Terahertz Spectrum," Ch. 16 in *Generation, Detection and Processing of Terahertz Signals*, Springer, 2021.
- Monisha Ghosh, Aritra Acharyya, Arindam Biswas, "Cutting-Edge Technologies for Terahertz Wave Generation: A Brief History from Inception to Present State-of-the-Art," Ch. 11 in *Generation, Detection and Processing of Terahertz Signals*, Springer, 2021.
- Monisha Ghosh, Aritra Acharyya, Arindam Biswas, "On Some Modern Simulation Techniques for Studying THz ATT Sources," Ch. 13 in *Generation, Detection and Processing of Terahertz Signals*, Springer, 2021.

CONFERENCE PAPERS

- Monisha Ghosh, Aritra Acharyya, "Multiple Quantum Well IMPATT Sources based on Si/3C-SiC Heterostructures Operating at Millimeter-Wave and Terahertz Frequency Bands," 2018 IEEE Electron Device Kolkata Conference (EDKCON), Kolkata, India, November 2018.
- Monisha Ghosh, Somrita Ghosh, Aritra Acharyya, Arindam Biswas, "Terahertz Spectroscopy: Advancing Non-contact Analysis in Mining Operations," NSED2024, ISBN: 978-81-971087-6-1.
- Monisha Ghosh, Somrita Ghosh, Aritra Acharyya, and A. Biswas, "Terahertz Spectroscopy: Advancing Non-contact Analysis in Mining Operations," Proceedings of ICPMMM2024.

INDEPENDENT RESEARCH PROJECTS & COMPUTATIONAL STUDIES

Gallium Oxide (Ga₂O₃) Phototransistors for Neuromorphic Computing

- Conducted an in-depth review of gallium oxide (Ga₂O₃) based phototransistors as emerging candidates for neuromorphic computing hardware systems.
- Investigated the material properties of beta-Ga₂O₃, its wide bandgap characteristics, and suitability for high-speed, low-power neuromorphic device architectures.
- Explored the intersection of wide-bandgap semiconductor physics, AI hardware, and neuroscience — contributing to the growing field of brain-inspired computing.
- Published as Chapter 15 in Next-Generation High-Speed Electronics and Optoelectronics, Springer Lecture Notes in Electrical Engineering, vol. 1511, 2026. DOI: 10.1007/978-981-95-4415-8_15.

Neural Network Design from First Principles

- Built neural network models using NumPy without high-level frameworks
- Implemented forward and backward propagation to understand learning dynamics
- Strengthened foundational understanding of deep learning architectures

Neuromorphic Device Modeling (IMPATT-Inspired Neuron Simulation)

- Modeled avalanche transit-time (IMPATT) device dynamics as neuron-like spiking systems.
- Simulated oscillatory and spike-based responses using Python.
- Explored connections between semiconductor physics and neuromorphic computing.

Cymatics and Wave-Based Pattern Simulation

- Developed simulations of wave equations to generate cymatic patterns.
- Visualized frequency-driven geometrical structures using Matplotlib.
- Investigated links between wave physics, geometry, and neural representations.

Sound Frequency and Brainwave Interaction Study

- Generated and analyzed frequency signals (including Solfeggio tones).
- Explored potential brainwave entrainment and resonance behaviour.
- Contributed to interdisciplinary research in neuro-acoustics.

Kuramoto-Based Oscillator Network Modeling (Ongoing)

- Simulating synchronization in coupled oscillator systems using the Kuramoto model.
- Applying concepts to THz IMPATT oscillator networks and brain-inspired systems.
- Investigating collective dynamics for neuromorphic hardware applications.

Sensor Data Simulation and Visualization (AI Literacy Initiative)

- Created synthetic sensor datasets and visualized patterns using scatter plots.
- Designed educational modules for introductory AI learning and literacy programme.

AWARDS & ACHIEVEMENTS

- GATE Fellowship, August 2010 – July 2012.
- M.Tech Final Year Project Supported by DRDO funding.

PROFESSIONAL ACTIVITIES

- Reviewer, Springer Nature (2025)
- Reviewer, ICRAC (2025)
- Reviewer, ADSC (2025)
- SPOC, FS Prime, East Zone — Representative from SKFGI (2022)

ADDITIONAL INFORMATION

- **Languages:** English, Bengali, Hindi
- **Interests:** Art therapy, Sacred geometry art

REFERENCES

- **Dr. Aritra Acharyya** — Assistant Professor, Dept. of ECE, Kalyani Government Engineering College.
Tel: +91 9836357184.
Email: ari_besu@yahoo.co.in
- **Dr. Arindam Biswas** — Associate Professor & Head, Dept. of Mining Engineering and Dept. of Computer science and Engineering, Kazi Nazrul University. Tel: +91 9932311710.
Email: mailarindambiswas@yahoo.co.in