Abhishek Kumar

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Research Interests

Computational Neuroscience, Neuromorphic Computing, Neural Modeling, Machine Learning, Brain-Inspired Artificial Intelligence, Brain Computer Interface, Neural Network

Education

ABV-Indian Institute of Information Technology and Management Gwalior	Gwalior, MP
MS (Artificial Intelligence and Data Science)	*Aug. 2025 - Present*
University of Delhi	Delhi
Bachelor of Science, Mathematics (H)	*Nov. 2022 - Jun 2025*

Experience/Projects

Winter Research Internship Offer letter — Dec. 2025 - Jan. 2026
Ion channel and Receptor biology lab, KSBS — *Indian Institute of Technology, Delhi*

- Developed neuron simulations using **NEURON** to study ion-channel and spike dynamics.
- Implemented and modified biophysical neuron models using **hoc scripting** and explored ModelDB.
- Applied supervised learning models to molecular datasets for toxicity prediction, aligning with ML-driven drug discovery.

Spiking Neuron Simulations (Python, Brian2 / NEURON) — Dec. 2025 - Present
GitHub — *Self-Directed Practice Repository*

- Maintained a practice repository containing multiple implementations of spiking neuron models under varied conditions.
- Explored neuron behavior across different parameter regimes, input currents, and initial conditions.
- Used visualization of membrane potentials and spike trains to analyze model behavior.

Ultra-Low-Power Edge Intelligence for Real-World Anomaly Detection Using SNN — Ongoing
Spiking Neural Networks, Edge AI, Embedded Systems Project info.

- Creating an event-driven anomaly detection framework to identify irregular patterns that indicate sewage blockages.
- Project currently under development; implementation details and results will be shared upon completion.

Aadiyogi — Dec. 2022 - Jun. 2025
Team Captain — *Deshbandhu College, DU*

- Led the team in regional, state, and national-level yoga competitions and championships.
- Facilitated weekly practice sessions to discuss and master advanced Asanas, Pranayama & Meditation techniques.
- Acted as the primary liaison between team members, coaching staff, and competition officials.

Publications

Abhishek Kumar, "Computational Neuroscience–Inspired Neuromorphic Computing: A Review of Models, Hardware Architectures, and Applications". **(Manuscript under preparation / Abstract accepted)**

Conference and Seminars

MATHSD'25 Certificate — Oct. 2025
Volunteering — *ABV-IIITM Gwalior*

- Volunteered at MATHSD 2025, hosted by ABV-IIITM Gwalior.
- Handled LaTeX typesetting and compilation of the official **Book of Abstracts**.
- Assisted faculty and research teams in documentation and on-site coordination.

- Gained insights on *Neuroscience-Inspired Scientific Machine Learning* through keynote sessions.

Samuchchayam 2025 [Certificate](#)   March 2025
Presented Paper   *Deshbandhu college, DU*
- Awarded first prize in the **'Datamatrix'** paper presentation competition.
- Recognized for excellence in research, analysis, and public speaking at a competitive academic event
- Successfully developed and presented a compelling paper on a data-centric topic to a panel of faculty and peers.

InitMath 2024 [Certificate](#)   March 2024
Mathematics Camp   *Uttarkashi (U.K)*
- Selected for and completed the 'Initiation into Mathematics (InitMath) 2024' training program.
- Participated in an intensive workshop sponsored by the prestigious **National Board for Higher Mathematics (NBHM)**.
- Engaged in a 6-day program focused on foundational concepts in advanced mathematics, organized by **MTTS Trust**.

Training and Certifications

Computational Neuroscience – University of Washington [Certificate](#)   Nov. 2025 - Jan. 2026
- Strengthened understanding of the intersection between Neural biology and computation.
- Instructors: Rajesh P. N. Rao, Adrienne Fairhall

Introduction to Cognitive Psychology and Neuropsychology - University of Cambridge   Jan. 2026 - Present
- Learned theories, models and findings of cognitive functions, including memory, language, attention and perception.
- Instructors: Dr. Giulia Mangiaracina

Linear Algebra for Machine Learning – LDRP Institute of Technology & Research [Certificate](#)   Dec. 2025
- National Short-Term Training Program
- Hands-on experience on PCA, SVD, and image processing.

Achievements & Awards

National Yoga Championship Runner up [Certificate](#)   Sept. 2023
- Championship held in Haridwar and organised by **World Fitness Federation of Yogasana Sports, India**

Certificate of Commendation by Chief Minister of Uttarakhand [Certificate](#)   June 2020
- Award presented to students with outstanding achievements in academics.

Skills & Interests

Languages: Python, MySQL, R

Tools: Power BI, Excel, Mathematica, MATLAB

Frameworks & Libraries: Numpy, Pandas, Matplotlib, Seaborn, Scikitlearn, PyTorch, NEURON, Brian2

Domains: Computational Neuroscience, Machine Learning, Deep Learning, Neural Network

Others: Kaggle, Apache Kafka , Git, GitHub