

# Abhishek Kumar Mishra

## Contact

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## Research Area

**Single-cell & Spatial Transcriptomics, Tumor Heterogeneity, Multi-modal omics, AI in Healthcare, Spiking Neural Network, Semiconductor Wafer Defect**

## Education

- Sep 2020 – **Ph.D. in Electrical and Electronics Engineering**, *Drexel University*, Philadelphia, PA  
Sep 2025 Advisors: [Dr. Nagarajan Kandasamy](#), [Dr. Anup Das](#)
- Aug 2018 – **MS (Thesis) in Computer Science**, *University at Buffalo*, Buffalo, NY  
Aug 2020 Advisor: [Dr. David Doermann](#)
- Aug 2011 – **B.Tech in Electronics & Communication Engineering**, *RCCIT*, Kolkata, India  
Jul 2015

## Professional Experience

- Nov 2025 – **Postdoctoral Fellow (Visiting)**, **Cancer Data Science Lab**, *NIH/NCI*, Bethesda, MD, USA  
Present
  - Conduct research in single-cell and spatial transcriptomics to investigate tumor heterogeneity and evolution in liver cancer, leveraging AI/ML-driven analysis of high-dimensional and spatially resolved multi-omics data.
  - Develop scalable computational and statistical frameworks to extract latent biological programs, spatial organization patterns, and tumor–microenvironment communication networks from large multi-modal datasets, with a focus on identifying tumor cells of origin and drivers of heterogeneity.
  - Study tumor evolution in response to immunotherapy using longitudinal single-cell profiling of clinical biopsies and preclinical models, integrating machine learning approaches to uncover molecular determinants of therapeutic response and resistance.
  - Collaborate with interdisciplinary teams of biologists and clinicians to translate computational discoveries into improved strategies for early detection and precision therapeutics in liver cancer.
- Oct 2023 – **Research Machine Learning Engineer**, *AltruMed*, Philadelphia, PA, USA  
Oct 2025
  - Developed a novel architecture: OxyCaps to accurately detect opioid overdose events non-invasively, achieving accuracy of 92% modeled using sleep apnea data.
  - Designed and implemented predictive models to anticipate opioid use events, significantly reducing alert response times for emergency intervention.
  - Led the algorithm development for DOVE, an opioid overdose detection and alert device.
  - The work was published in IJCAI 2024.
- Feb 2022 – **Graduate Data Science Intern**, *Intel Corporation, MPE MDNA Team*, Austin, TX, USA  
Jul 2022
  - Built machine learning models using semiconductor test parametric data to reduce yield loss.
  - Created an end-to-end pipeline for pulling the data, pre-processing, training, and predicting.
  - The work was published in VTS 2023.

- May 2019 – **Research Intern**, *North Park Innovation Ltd*, Buffalo, NY, USA
- Dec 2019 ○ Designed a pipeline for the multi-class classifier to find the cause of the malfunction of the HVAC system.
- Developed an ANN model that surpassed malfunction detection, achieving a score of 81.35% macro precision & 80.21% macro recall.
- Sep 2015 – **Junior Data Scientist**, *Ericsson India Global Pvt. Ltd.*, Mumbai, MH, India
- Aug 2017 ○ Predicted the network key performance indicator (KPI) for the client by developing a classification model based on the historical data for improvement and degradation of the network.
- Implemented a supervised learning model for anomaly detection based on alarms, capturing unusual base station behavior. This reduced alarms by 30% and enabled early fault prediction and proactive decision-making.
- Implemented a logistic regression model to diagnose weak network connections, identifying key features. This approach improved prediction accuracy by 10% compared to the previous year.
- Created interactive Dashboards and visualizations for descriptive analysis.

## Teaching

- Sep 2020 – **Teaching Assistant**, *Drexel University*, Philadelphia, PA
- Dec 2024 ○ Helped to structure the course and assignments and held office hours, graded homework, tests, and quizzes.
- ECE 613: Neuromorphic computing (Summer 2024)
- Held office hours and graded homework, tests, and quizzes for courses.
- ECES 521: Probability and Random Variables (Winter 2025)
- ECE 200: Digital Logic Design (Summer 2021)
- ECE 350: Introduction to Computer Organization (Fall 2020, Summer 2021, Fall 2022)
- Jan 2020 – **Teaching Assistant**, *University at Buffalo*, Buffalo, NY
- Apr 2020 ○ Held weekly recitations and office hours and graded homework, tests, and quizzes for the course.
- EAS 595LEC: Fundamentals of Artificial Intelligence (Spring 2020)

## Publications

See my [Google Scholar](#) page for recent updates and citation information.

- MICPRO 2026 A Scalable Multi-Modal Attention-Based Framework for Good-Die-in-Bad-Neighborhood Screening in Semiconductor Manufacturing. Mohammad Ershad Shaika, **Abhishek Kumar Mishra**, Nagarajan Kandasamy, Nur A. Toubia (Recently submitted)
- NCE 2026 Efficient Aspect Term Extraction using Spiking Neural Network. **Abhishek Kumar Mishra**, Arya Somasundaram, Anup Das, Nagarajan Kandasamy (Recently submitted)
- MICPRO 2026 Wafer Map Pattern Recognition using Spiking Neural Networks. **Abhishek Kumar Mishra**, Anup Das, Nagarajan Kandasamy (Recently submitted)
- NICE 2026 Fuzzy Encoding-Decoding to Improve Spiking Q-Learning Performance in Autonomous Driving. Aref Ghoreishee, **Abhishek Kumar Mishra**, Lifeng Zhou, John MacLaren Walsh, Anup Das, Nagarajan Kandasamy (Recently accepted)
- DATE 2026 A Reinforcement Learning Framework for Good Die in Bad Neighborhood Analysis. Mohammad Ershad Shaik, **Abhishek Kumar Mishra**, Nagarajan Kandasamy, Nur A. Toubia (Recently accepted)
- AAAI 2026 HypoxSpike: Ternary Spiking Neural Network for Opioid Overdose Detection. Anush Lingamoorthy, **Abhishek Kumar Mishra**, Olumuyiwa Oni, Jacob S Brenner, Nagarajan Kandasamy, Amanda Watson (Recently accepted)

- PREPRINTS New Spiking Architecture for Multi-Modal Decision-Making in Autonomous Vehicles. Aref Ghoreishee, **Abhishek Kumar Mishra**, John MacLaren Walsh, Lifeng Zhou, Nagarajan Kandasamy (Under review)
- PREPRINTS Improving Performance of Spike-based Deep Q-Learning using Ternary Neurons. Aref Ghoreishee, **Abhishek Kumar Mishra**, John Walsh, Nagarajan Kandasamy, Anup Das (Under review)
- PREPRINTS GLUmos: Noninvasive Glucose Monitoring Using a Wearable Spectroscopy Device. Anush Lingamoorthy, **Abhishek Kumar Mishra**, Tarek Hamid, Claire Kendell, Junpeng Zhao, Jacob Brenner, Nagarajan Kandasamy, Amanda Watson (Under preparation)
- PREPRINTS DOUE: Detection of Opioid Use Events with a Non-Invasive Shoulder-Wearable. Anush Lingamoorthy, **Abhishek Kumar Mishra**, Jacob Brenner, Amanda Watson, Nagarajan Kandasamy (Under preparation)
- PREPRINTS A fully-configurable open-source software-defined digital quantized spiking neural core architecture. Shadi Matinizadeh, Noah Pacik-Nelson, Ioannis Polykretis, Krupa Tishbi, Suman Kumar, M. L. Varshika, Arghavan Mohammadhassani, **Abhishek Kumar Mishra**, Nagarajan Kandasamy, James Shackelford, Eric Gallo, Anup Das
- DFTS 2025 A Multi-Modal Attention-Based Framework for Good Die in Bad Neighborhood Methodology. Mohammad Ershad Shaik, **Abhishek Kumar Mishra**, Nagarajan Kandasamy, Nur A. Touba (**Best Paper Award**)
- DOCTORAL DISSERTATION 2025 Verification of neuromorphic computing hardware using machine learning. **Abhishek Kumar Mishra**
- DSN 2025 Hierarchical Model-Based Approach for Concurrent Testing of Neuromorphic Architecture. Suman Kumar, **Abhishek Kumar Mishra**, Anup Das, Nagarajan Kandasamy
- IJCAI 2024 Drug Overdose Vital-Signs Evaluator using Machine Learning. Anush Lingamoorthy, **Abhishek Kumar Mishra**, Suman Kumar, David Gordon, Jacob Brenner, Nagarajan Kandasamy, Amanda Watson
- PRDC 2024 Model-Based Approach Towards Correctness Checking of Neuromorphic Computing Systems. **Abhishek Kumar Mishra**, Anup Das, Nagarajan Kandasamy
- ITC 2024 Wafer2Spike: Spiking Neural Network for Wafer Map Pattern Classification. **Abhishek Kumar Mishra**, Suman Kumar, Anush Lingamoorthy, Anup Das, Nagarajan Kandasamy
- ICONS 2024 Neuromorphic Computing for the Masses. Shadi Matinizadeh, Arghavan Mohammadhassani, Noah Pacik-Nelson, Ioannis Polykretis, Krupa Tishbi, Suman Kumar, M. L. Varshika, **Abhishek Kumar Mishra**, Nagarajan Kandasamy, James Shackelford, Eric Gallo, Anup Das
- MWSCAS 2024 A Fully-Configurable Digital Spiking Neuromorphic Hardware Design with Variable Quantization and Mixed Precision. Shadi Matinizadeh, Arghavan Mohammadhassani, Noah Pacik-Nelson, Ioannis Polykretis, **Abhishek Kumar Mishra**, James Shackelford, Nagarajan Kandasamy, Eric Gallo, Anup Das
- VTs 2024 WaferCap: Open Classification of Wafer Map Patterns using Deep Capsule Network. **Abhishek Kumar Mishra**, Mohammad Ershad Shaik, Anush Lingamoorthy, Suman Kumar, Anup Das, Nagarajan Kandasamy, Nur A. Touba
- VTs 2023 Predicting the Silent Data Error Prone Devices Using Machine Learning. Mohammad Ershad Shaik, **Abhishek Kumar Mishra**, Yonghyun Kim
- ETS 2023 Online Performance Monitoring of Neuromorphic Computing Systems. **Abhishek Kumar Mishra**, Anup Das, Nagarajan Kandasamy
- ASPDAC 2023 Hardware-Software Co-Design for On-chip Learning in AI Systems. M.L.Varshika, **Abhishek Kumar Mishra**, Nagarajan Kandasamy, Anup Das
- Electronics 2022 Built-In Functional Testing of Analog In-Memory Accelerators for Deep Neural Networks. **Abhishek Kumar Mishra**, Anup Das, Nagarajan Kandasamy

RANLP 2021 Does local pruning offer task-specific models to learn effectively? **Abhishek Kumar Mishra**,  
Mohna Chakraborty

MASTER'S Application of Machine Learning to Cue Analysis for Behavioral Modification **Abhishek Kumar**  
THESIS 2020 **Mishra**

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## Academic Service

### Reviewer

- ACM Transactions on Computer-Human Interaction 2026
- TMLR 2026
- AAI 2026
- ICLR 2026
- ICML 2025
- The Web Conference 2025
- AISTATS 2025, 2026
- Engineering Applications of Artificial Intelligence, Elsevier 2025
- NeurIPS 2024
- IJCAI 2024
- IEEE J. Biomedical and Health Informatics 2024, 2025
- ACM Transactions on Computing for Healthcare 2025
- IEEE Transactions on Computers 2024
- IJCNN 2024
- ACM Transactions on Embedded Computing Systems 2022, 2024
- Procedia Computer Science Journal 2023
- Design Automation Conference 2022, 2023
- ICCAD 2021, 2022, 2023
- ASPDAC 2022
- DATE 2021, 2022, 2025
- Cases Journal 2021
- Computing Frontiers 2021
- NEUNET Journal 2020
- IEEE CONECCT 2020

### Membership

- IEEE, IJCAI, ACM, AAI, Frontiers, OpenReview, Microsoft CMT, Elsevier, ResearchGate

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## Awards & Achievements

- Poster Presentation **IBM IEEE CAS/EDS – AI Compute Symposium, Oct 2022.** Selected to present the "IBM IEEE CAS/EDS – AI Compute Symposium 2022" poster.
- Poster Presentation **National Defense Industry Association's Naval Nuclear Submarine and Aircraft Carrier Suppliers Conference, Dec 2024.** Won the poster session at the conference, receiving a USD 2,000 award in recognition of the achievement for the work: Energy efficient and robust path to autonomous decision-making for robotics using spiking neural network.
- Grant Funding **VentureWell E-Team Propel Funding, May 2-3, 2024.** Procured student-led innovation fund (USD 20,000) for the development of the DOVE device capable of overdose detection. Attended the workshop at The Keenan Center for Entrepreneurship at Ohio State University to learn topics like business model development, and customer discovery.
- Open-source contributor Contributed to snntorch, a widely used open-source library with 1.4K+ GitHub stars, supporting advancements in spiking neural networks.
- Judge & Mentor Served as a judge and mentor at the 22nd Annual Philadelphia AMP Research Symposium, evaluating student research presentations and providing constructive feedback.
- Editorial & Manager Served as Editorial Manager for Engineering Applications of Artificial Intelligence (Elsevier) in 2025, overseeing the online submission and peer-review tracking system.
- Best Paper Award Received the Best Paper Award at DFTS 2025, along with a €1,000 honorarium.

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## Skills

- Languages Python, C++, SQL, R, Matlab
- Tools/IDE Jupyter, Visual Studio, Sublime, Tableau, Anaconda, AWS, Google Cloud Platform
- Libraries & Frameworks Scanpy, anndata, NumPy, Pandas, scikit-learn, Matplotlib, Tensorflow, Keras, Pytorch, snnTorch, Dash, Scipy, Plotly, SpaCy, NLTK, VADER, TextBlob, Gensim, Beautiful Soup, Regex, Bokeh, Folium, Hadoop, MapReduce, Spark

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## Current Research Projects

- Doing research in single-cell and spatial transcriptomics, focusing on AI/ML-driven analysis of high-dimensional and spatially resolved omics data.
- Analyzing real-world physiological biomarkers across multiple opioid use disorder patients to classify opioid and non-opioid events using machine learning.
- Developing a Machine Learning framework for real-time monitoring of neuromorphic program execution using model-based redundancy. This software-based monitor detects discrepancies between hardware neuron behavior and predictions, reducing hardware overhead and minimizing intrusion on applications.

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## References

- **Dr. Lichun Ma** – Supervisor, NIH/NCI. Email: lichun.ma@nih.gov
- **Dr. Nagarajan Kandasamy** – Professor (Advisor), Drexel University. Email: nk78@drexel.edu
- **Dr. Anup Das** – Associate Professor (Co-advisor), Drexel University. Email: ad3639@drexel.edu
- **Dr. Amanda Watson** – Assistant Professor, University of Virginia. Email: aawatson@virginia.edu
- **Mohammad Ershad shaik** - DFT & Product Development Engineer, Tesla, Email: moshai@tesla.com
- More references will be available upon request.