

RAJAT BUTOLA (傅能杰)

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EDUCATION

2018/09 – 2023/11 Ph.D., Dept. of Electrical Engineering and Computer Science, National Yang-Ming Chiao Tung University, Hsinchu, Taiwan

Research Area: Application of Machine and Deep Learning in Smart Semiconductor Technologies

- Excelled in integrating AI and data science by analyzing large and complex non-linear dataset of semiconductor devices.
- Design, train, optimize machine/deep learning models and developed algorithms to automate cleaning and integration of datasets from multiple sources using Python.
- Collaborated with professors and researchers to execute research projects in AI domain and published work in reputed Journals as IEEE and Elsevier as first author.

2010/08 – 2012/05 M.S. (Master of Technology), Dept. of Electronics and Communication Engineering, IIIT University, India

Research Area: Digital Image Processing Techniques

Conducted a comprehensive comparative study on Digital Image Processing and enhancement techniques, with a focus on histogram equalization.

- Specialized in transforming digital images to enhance visual information for diverse applications including computer vision, biomedical image analysis etc.

RESEARCH & TEACHING EXPERIENCE

2025/02 – Present **Post-Doctoral Fellow**, Institute of Statistical Science, Academia Sinica, Taipei Taiwan

Key Roles and Accomplishments:

- Developed, optimized and deployed using Docker advanced statistical and machine/deep learning models using Python and R to predict cancer treatment responses from genomics data, enhancing precision medicine strategies.
- Collect, organize, preprocess data including cleaning, normalization, and augmentation techniques to prepare datasets for optimal model training.
- Led the design and implementation of automated bioinformatics pipelines for large-scale datasets from cancer immunotherapy studies and predict individualized treatment responses.
- Applied advanced statistical models and AI algorithms for survival analysis, identifying key biomarkers and gene expression signatures for cancer immunotherapy.
- Authored peer-reviewed publication on cancer genomics, contributing to the scientific community with reproducible research.

2012/07 – 2018/08 **Assistant Professor**, Dept. of Electronics and Communication Engineering, Amity University, India

Key Roles and Accomplishments: Teaching, Research, Curriculum Development and Administration

- Contributed to the development, planning, and implementation of a high-quality curriculum to ensure academic excellence and taught undergraduate and postgraduate courses.
- Assess and monitor student progress, provide constructive feedback and support to 50+ students.
- Organized and participated in technical conferences, seminars, workshops, and faculty development programs to stay updated with the latest developments and contribute to the academic community.
- Engaged in research, publication, consultancy, and training activities, establishing credentials as an academician of international standards.

PUBLICATIONS

A. Journal Articles:

1. S. R. Kola, Y. Li, and **Rajat Butola**, “Statistical Device Simulation and Machine Learning of Process Variation Effects of Vertically Stacked GAA Si Nanosheet CFETs,” IEEE Transactions on Nanotechnology, April 2024.
2. **Rajat Butola** et al. “Compact Model Build upon Dynamic Weighting Artificial Neural Network Approach for Complementary Field Effect Transistors,” IEEE Transactions on Electronic Devices (IEEE-TED), Sept. 2023.
3. **Rajat Butola** et al. “A Comprehensive Technique based on Machine Learning for Device and Circuit Modeling of Gate-All-Around Nanosheet Transistors,” IEEE Open Journal of Nanotechnology (IEEE-OJ-NANO), Oct. 2023.
4. **Rajat Butola** et al. “Application of long short-term memory modeling technique to predict process variation effects of stacked gate-all-around Si nanosheet complementary-field effect transistors,” CEE, Elsevier, Jan. 2023.
5. **Rajat Butola** et al. “Artificial Neural Network-Based Modeling for Estimating the Effects of Various Random Fluctuations on DC/Analog/RF Characteristics of GAA Si Nanosheet FETs,” IEEE-MTT, Nov. 2022.
6. **Rajat Butola** et al. “A Machine Learning Approach to Modeling Intrinsic Parameter Fluctuation of GAA Si Nanosheet MOSFETs,” IEEE Access, vol. 10, July 2022.
7. P. Parashar, C. Akbar, T. S. Rawat, S. Pratik, **Rajat Butola**, S. H. Chen, Y-S Chang, S. Nuannimnoi, and A. S. Lin. “Intelligent Photolithography Corrections Using Dimensionality Reductions” IEEE Photonics Journal, 2019.
8. P. Parashar, C. H. Chen, C. Akbar, S. M. Fu, T. S. Rawat, S. Pratik, **Rajat Butola**, S. H. Chen, A. S. Lin. “Analytics-statistics mixed training and its fitness to semi-supervised manufacturing” PLoS ONE Journal, 2019.
9. **Rajat Butola**, Shinsheng Yuan, and Grace S. Shieh “ImmunoResponse Predictor: a GUI for accurate response prediction to immunotherapy” Bioinformatics and Genomics PeerJ Journal, August, 2025 (Submitted).

B. Conference Articles:

1. **Rajat Butola** et al. “A DNN-Based Compact Modeling Technique for GAA Si NS FETs and Its Application in CMOS Circuit Simulation,” International conferences on the science and technology of devices and materials (SSDM), Japan, 2023.
2. **Rajat Butola** et al. “Estimating the Process Variation Effects of Stacked Gate All Around Si Nanosheet CFETs Using Artificial Neural Network Modeling Framework,” IEEE NANO, Spain, 2022.

3. **Rajat Butola** et al. “Deep Learning Approach to Estimating Work Function Fluctuation of Gate-All-Around Silicon Nanosheet MOSFETs with A Ferroelectric HZO Layer,” IEEE-EDTM, Japan, 2022.
4. **Rajat Butola** et al. “Machine Learning Approach to Characteristic Fluctuation of Bulk FinFETs Induced by Random Interface Traps,” International Symposium on Quality Electronic Design (ISQED), USA, 2022.
5. **Rajat Butola** et al. “Deep Learning Approach to Modeling and Exploring Random Sources of Gate-All-Around Silicon Nanosheet MOSFETs,” IEEE VLSI-TSA, Hsinchu, Taiwan, 2022.

C. Books & Book Chapters:

1. Vanshika Jain, Rashmi Gupta, Neeraj Gupta, Prashant Kumar, **Rajat Butola** “Deep Learning for Image Classification in Semiconductor Inspection,” Book: Machine Learning for Semiconductor Materials, 1st Edition, 2025, CRC Press, ISBN9781003508304.

RESEARCH INTERESTS

- Machine/Deep Learning
- Artificial Intelligence
- Large Language Models
- Image Processing
- Data Modeling
- Bioinformatics
- Predictive Modeling
- Statistical Analysis
- Pattern Recognition
- Molecular Biolo

SKILLS

- Communication Skills
- Technical Paper Writing
- Project Management
- Project-based Learning
- Instructional Skills
- Creative Thinking
- Presentation
- Independent research
- Cultural Competence
- Problem-solving
- Technological Proficiency
- Teamwork & collaboration.
- **CONCEPTUAL KNOWLEDGE:** ML/DL Algorithms, Predictive Modeling, NLP, LLMs, Gen-AI, Decision Analysis, Computer Vision, ANN, CNN, YOLO, SVM, RNN, LSTM, Transformer, BERT.
- **FRAMEWORKS AND TOOLS:** Python, R, Tensorflow, Keras, LangChain, LLaMA, PyTorch, SciKit Learn, OpenCV, Numpy, Pandas.
- **VISUALIZATION TOOLS:** Matplotlib, Seaborn, ggplot, Sigma Plot.

AWARDS & ACHIEVEMENTS

- Best Researcher Award-2023 for the contribution and achievement in innovative research by international research awards on advanced nanomaterials and nanotechnology. [Link](#)
- A regular Reviewer of reputed ELSEVIER Journal “Engineering Applications of Artificial Intelligence”, an international journal of intelligent real-time automation and Reviewer of Natural Language Processing Journal. [Link](#)
- Doctoral scholarship, a five years monthly scholarship provided by the NYCU, Taiwan.
- Master’s scholarship grant, a two years monthly stipend provided by Ministry of Human Resource Department, Government of India to students who qualify GATE exam, one of the toughest exams.

CERTIFICATES

Successfully completed following multiple professional development courses, enhancing technical expertise and deepening understanding in key areas of the field:

- Certified Google Data Analytics Professional by Google. [Link](#)
- “Hands On Natural Language Processing (NLP) using Python” by Udemy. [Link](#)
- “Introduction to Transformers for Large Language Models (LLM)” by The AiEdge”. [Link](#)
- “Neural Networks and Deep Learning” by DeepLearning.AI. [Link](#)
- “NLP with Classification and Vector Spaces” by DeepLearning.AI. [Link](#)
- “Mathematics for Machine Learning: Linear Algebra” by Imperial College London. [Link](#)