

# MAYANK RAJ

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## EDUCATION

University of Massachusetts Dartmouth, MA Expected May 2026  
GPA-3.60

### Master of Science in Data Science

**Relevant Coursework:** Artificial Intelligence (CIS-561), Digital Forensics (CIS-542), Network Security & Data Assurance (CIS-547), Advanced Machine Learning (CIS-550), High Performance Scientific Computing (CIS- 520), Advanced Data Mining (CIS-530), Advanced Mathematical Statistics (MTH-522), Database Design (CIS-552), Master's Thesis (DSC- 690) (Ongoing).

Christ University, Bengaluru, India May 2017

### Bachelor of Technology in Mechanical Engineering

## TECHNICAL SKILLS & LANGUAGES

**Programming & Scripting:** Python, R, SQL, Bash

**Frameworks & APIs:** Django, Flask, RESTful APIs

**Machine & Deep Learning:** PyTorch, TensorFlow, Scikit-learn, XGBoost, Keras, PyCaret, FGSM, PGD, CLEVER Scoring, MITRE ATT&CK Framework, Genetic Algorithms, Diffusion & VAE Models

**Data Science & Analytics:** NumPy, Pandas, SciPy, Matplotlib, Seaborn, Plotly, GeoPandas

**NLP & Computer Vision:** NLTK, SpaCy

**Cloud & Deployment:** AWS, Microsoft Azure, IBM Cloud

**Visualization & BI:** Tableau, Power BI, Advanced Excel

**Languages:** English (Fluent), Hindi (Fluent), Spanish (Basic)

## RESEARCH AND PUBLICATIONS

- Raj M, Bastian N.D, Kul G, Fiondella L. "Categorical Robustness Assessment and Model Evaluation for Machine Learning Based Network Intrusion Detection Systems." *To be Submitted to IEEE Access*
- Raj M, Bastian N.D, Kul G, Fiondella L. "Synthetic Network Packet Generation through Statistical Learning and Genetic Algorithms." *To be Submitted to the NDSS Workshop*
- Raj M, Bastian N.D, Kul G, Fiondella L. "MITRE ATT&CK-based Attack Chain Prediction using Hybrid LSTM-Markov Models for Cybersecurity Risk Assessment." *To be Submitted to the NDSS Workshop*

## RESEARCH & TEACHING EXPERIENCE

**Department of Computer & Information Science- University of Massachusetts Dartmouth**

**Research Assistant (Advisor- Dr. Gokhan Kul)** Jan 2025 – Present

**DoD-Funded Project (Grant W911NF-22-2-0160) in collaboration with U.S. Military Academy**

- Designed and evaluated adversarial robustness framework for ML-based Network Intrusion Detection Systems, achieving 93.97% baseline accuracy on 1.2M+ packet ACI-IoT-2023 dataset while exposing critical vulnerabilities to adversarial attacks
- Demonstrated up to 77% model performance degradation under FGSM/PGD attacks using CLEVER score analysis, revealing fundamental security challenges in deep learning-based network security systems
- Developed novel synthetic IoT network packet generator combining statistical learning and genetic algorithms, validated through dual anomaly detection achieving <1.2% anomaly rate.
- Engineered hybrid LSTM-Markov models for MITRE ATT&CK-based attack chain prediction with integrated probabilistic risk scoring framework
- Collaborated with military researchers on national security applications; presented findings at research meetings
- Reviewer at the IEEE MILCOM 2025

**Department of Computer & Information Science- Department of Massachusetts Dartmouth****Graduate Teaching Assistant (CIS-552 Database Design)****Sept 2025 – Present**

- Mentored 50+ graduate students in advanced database systems, focusing on relational algebra, query optimization, and AI-driven architectures.
- Delivered instruction on cutting-edge topics such as vector databases, learned query optimization, ML-based cost estimation, and distributed/NoSQL systems.
- Guided projects & Assignments on ER modeling, schema optimization, indexing strategies, and recovery protocols for high-performance, AI-integrated workflows.
- Bridged teaching and research by integrating emerging database technologies (feature stores, data lakehouses, AI-native consistency models) into coursework.

**School of Marine Science and Technology- University of Massachusetts Dartmouth****Research Technician/Digitizer (Stokesbury Lab)****May 2024 – Aug 2024**

- Participated in oceanographic field expeditions operating specialized seafloor mapping equipment (HabCam, video survey systems) for large-scale scallop population and marine biodiversity assessment.
- Developed automated data processing pipelines analyzing terabytes of seafloor imagery using machine learning and computer vision techniques for species identification and classification.
- Performed quantitative spatial analysis with geospatial tools (GeoPandas, QGIS) to evaluate environmental factors influencing ecosystem health and population dynamics.
- Contributed computational expertise to data-driven fisheries management strategies, demonstrating transferable skills in large-scale image analysis and computer vision applications.

**Graduate Teaching Assistant (CIS-190 Procedural Programming)****Sept 2024 - Dec 2024**

- Led hands-on lab sessions for 30+ undergraduate students in C/C++ programming, debugging techniques, and code optimization.
- Developed and presented instructional materials on data structures, memory management, pointers, and file I/O operations.
- Fostered algorithmic thinking and problem-solving skills through structured exercises and real-world programming challenges.
- Provided individualized mentoring during office hours, guiding students through complex programming concepts and debugging strategies.
- Assisted with assignment design and grading while ensuring adherence to code quality standards and software development best practices.

**WORK EXPERIENCE****Leduc Center for Civic Engagement- University of Massachusetts Dartmouth****Corsair Engage Specialist****Jan 2024 – Apr 2024**

- Managed student administration, overseeing community service participation and records.
- Organized and coordinated community service events to engage students in volunteer activities.
- Maintained and updated the admin page for community service-related initiatives.
- Assisted in planning and promoting campus events to foster student involvement in service projects.
- Collaborated with campus departments and external organizations to enhance student engagement in community outreach.

**Eklavya Estate Private Limited, Bengaluru, India****Data Scientist****Jan 2020 – Apr 2023**

- Architected ETL pipelines processing 500K+ real estate records with 99.7% accuracy through automated validation protocols.

- Developed time series models (ARIMA, LSTM) for housing price prediction across 15+ markets with monthly executive reporting.
- Applied ML techniques (Random Forest, XGBoost) to customer analysis, improving prediction accuracy by 18% and reducing loss ratio by 12%.
- Enhanced trend analysis efficiency by 15% using automated data mining, NLP, and interactive dashboards (Tableau, Power BI).
- Implemented A/B testing and hypothesis testing for pricing strategies, informing \$2M+ annual revenue decisions.

### **Software Engineer**

**Sept2019 – Jan 2020**

- Designed RESTful APIs using Django and Flask to integrate legacy systems with cloud infrastructure, enabling seamless data exchange.
- Architected AWS microservices (EC2, S3, RDS, Lambda) supporting 10K+ concurrent users with load balancing and auto-scaling.
- Containerized applications using Docker and Kubernetes, reducing deployment time by 60% across development, staging, and production.
- Developed secure file transfer dashboard with end-to-end encryption for automated local-to-remote synchronization.

### **Hindustan Aeronautics Limited (HAL), Bengaluru, India**

#### **Internship**

**Apr 2016 – Aug 2016**

- Applied ML algorithms with pneumatic control systems for automated testing of GSLV Mk 3 and PSLV Mk 2 rocket systems.
- Developed ML-powered quality control dashboards for production monitoring of fighter jets (Su-30MKI, Tejas) and combat helicopters (Apache, LCH).
- Gained experience in industrial automation, control systems, and real-time data processing for mission-critical defense applications.

### **TECHNICAL ACHIEVEMENTS**

- Career Essentials specialization in Cybersecurity by Microsoft and LinkedIn
- Specialization in Data Science from John Hopkins University
- Certification in Data Analytics from Google
- Professional Certification in Data Science from IBM
- Certification in Amazon Web Services from Amazon
- Specialization in Python from University of Michigan
- Certification in Deep Learning: Neural Network, AI, ChatGPT
- Certification in Deep Learning and Computer Vision
- Certification in Mathematical Foundations of Machine Learning
- Certification in Artificial Intelligence: Building AI plus LLM and ChatGPT

### **SCHOLAR SERVICES**

- Reviewer- MILCOM 2025

**Aug- 2025**

### **EXTRACURRICULAR ACTIVITIES**

- IEEE Communications Society **Feb 2025 - Present**
- Cybersecurity Computing Club, University of Massachusetts, Dartmouth **Sept 2023 - Present**
- Big Data Club, University of Massachusetts, Dartmouth **Sept 2023 - Present**
- Leduc Center for Civic Engagement, University of Massachusetts, Dartmouth **Sept 2023 - Present**