

Shubhabrata Mukherjee

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Google Scholar: <https://scholar.google.com/citations?user=rA8xSP4AAAAJ&hl=en>

Machine learning and analytics:

Experience using Snowflake with Airflow based new feature implementation for electrical signal data analytics.
Experience using TensorFlow and Pytorch for object detection and biometric privacy research.
Used and trained various pre-trained CNN models with ONNX, Apache MXNet, Pytorch, TensorFlow etc.
Using various classical machine learning techniques of Classification, Regression, and neural network techniques like ANN, CNN, RNN (time series) in industry projects and research.
Experience in various classical unsupervised Learning like PCA, clustering, etc.
Experience using python packages like NumPy, Pandas, scikit-learn, matplotlib, NLTK, etc.
Worked on Multi-optimizer platform with Bayesian optimization, Genetic algorithm, etc.
Developed LSTM based sequential classification for network handover optimization.
Implemented Reinforcement learning-based AI framework for closed-loop NFV optimization.
Experience using R, MySQL, and MATLAB for ML in industry and current doctoral research.

Related Coursework:

Deep learning using Python; Computer Vision; Pattern recognition; Introduction to statistical learning and R;
Principal of big data management; Neural & Adaptive Networks

Networking and Automation skills:

Kubernetes-based end-to-end containerized multi-NFV architecture implementation.
Using NS3 simulator for current LSTM based handover optimization research.
Developed automation for data analytics pipeline for optimization using shell scripting and python.
Perform and report testing activities and bug lists to support product validation for a new build.
Experienced in various traffic simulators like IXIA, Spirent, Mobipass, etc. in industry.

Education:

University of Missouri-Kansas City, USA: Ph.D., Computer network & comm. systems, **exp. Dec 2023.**
University of Missouri-Kansas City, USA: Master of Science, Electrical Engineering, May 2017.
West Bengal University of Technology, India: Bachelor's, Electronics & Communication Eng., 2009.

Professional Experience:

1. SPAN (Sept '22 – Present), Data scientist intern

- Conduct literature analysis, validate findings, and design machine learning models.
- Implement, test, and evaluate new features and products using field measurements.
- Collect, clean, and analyze data sets of electrical consumption and machine predictions
- Analyze, model, and forecast electrical consumption data.
- Research and break down requirements for new products and features.

2. T-Mobile (May '21 – Dec'21), Technology Strategy intern: 5G and AI

• UAV-Aided Infrared Imaging Based Object Detection and Localization

We developed a UAV based streaming infrastructure for live object detection and localization. Ours is one of the initial attempts to measure infrared based object detection and localization performance of the latest YOLOV7-official model. A paper got accepted in IEEE HST conference 2022.

<https://ieee-hst.org/techprog.htm>

- **Autonomous fault management for next-generation networks**

We developed an AI-based multi-phase framework for end-to-end autonomous fault management for 5G and beyond. An optimum combination of classical machine learning and deep learning has been implemented. Submitted a paper at IEEE wireless communications magazine special issue.

<https://www.wayup.com/guide/community/t-mobile-tech-internships/>

3. Intel Corp. (May '20 – Jan'21), Graduate Intern for Network AI

Dynamic and static Closed-loop NFV optimization:

- Multi-objective Bayesian optimization experiments of NFV workload.
- Performance comparison of various optimization like Genetic algorithm, TuRBO, etc.
- Reinforcement learning-based DAaaS (Data analytics as a service) framework implementation.
- End-to-end Kubernetes-based NFV architecture implementation.
- Automation environment development to support optimization tests and benchmarking.

University of Missouri Kansas City (Aug '19 – Current), Graduate assistant

Worked as a graduate research assistant for computer vision at CBIT lab. (Spring 2022)

Instructed lab for "Electronic circuit lab (ECE 331)" (Spring 2021)

Assisted teacher for the graduate class of "Wireless Communication". (Spring 2020)

Assisted teacher for the class of "Intro to wireless networking". (Spring 2020)

Assisted teacher for the class "Internet of Things". (Fall 2019)

Assisted teacher for the class of "Foundation of Software Engineering" (Fall 2019)

Google Inc, Test & Automation Engineer

Project: EPC testing and automation (Contract with Virtusa: Jan '19 – June'19)

Develop test cases for testing MME, SGW & other components of the EPC core network.

Experience in tools like Spirent, Wireshark, TCPdump analysis, etc.

Project: ©Loon by Google X Lab (Contract with Ercom Inc: June '17 – Dec'18)

Testing emulated & real UE, analyzing logs to validate enodeB build and bug fixes.

Automating test environment, modifying and upgrade python / shell-based tools for analysis.

Sprint Corp., Network Implementation Engineer (Contract with Yoh LLC: Aug '16 – May'17)

Responsible for Integration & testing various Nokia & Airspan Mini Macro & UE Relay products.

End-to-end system testing, Software Upgrade, OAM, troubleshooting & performance testing.

Past work experiences in India:

- Ericsson Global services Ltd.: Assurance Engineer (Full-time, India, Nov 2011 – Dec 2013)
- Nokia Siemens Networks: Transmission Engineer (Full-time, India, May 2010 - Nov 2011)
- Birla VXL technologies Ltd.: Graduate Engineer trainee (Full-time, India, June 2009 – May 2010)

Academic Research Projects:

1. Privacy preserving biometrics using deep neural networks

In our **CBIT** (Computational Intelligence and Bio-Identification Technologies) lab, currently we are using deep neural networks for preserving biometric privacy. This project is funded by TrippleBlind©. This project is also a part of NSF CBL initiative. Submitted a journal on biometric privacy preserving at IEEE Transactions on Information Forensics and Security.

<http://nsfcbi.org/2022/06/m8-m-c-secure-inner-product-for-privacy-preserving-pattern-matching-2/>

2. UAV based handover optimization in heterogeneous network scenario using deep learning

A traditional signal-based handover may not ensure the best user experience in terms of throughput, packet loss, or latency. We are developing a deep learning-based handover technique using coordinated feedback from the associated UAVs. We have used LSTM based sequential classification to choose the optimum time to handover for various types of users based on their unique QoS requirements.

<https://github.com/shubha07m/Coordinated-handover-optimization-using-deep-learning>

3. Load balancing algorithm development for optimizing heterogeneous network using ML

Proper prediction of network performance is crucial for various application-specific requirements. Mobile devices frequently send various data for monitoring & optimization which can be used in a device-assisted ML for instant processing and making data-driven decisions.

<https://github.com/shubha07m/Load-balancing-algorithm-development-for-optimizing-heterogeneous-network-using-machine-learning>

4. Facial-Expressions-recognition-using-Machine-Learning

Our primary goal is to identify when a human is talking and when remains silent by classification of facial expression. We would also plan to identify the nature of dialog from the expression.

<https://github.com/shubha07m/Facial-Expressions-recognition-using-Machine-Learning>

5. Object classification and object localization

The problem is to Identify the type/class of an Image & Localization of the identified object in the image. We have implementing YOLOv3 and Mask R-CNN to compare the efficiency and using Keras as the ML library for our task. <https://github.com/night2wolf/CS490-FinalProject>

6. Development of ultra-reliable communication techniques for MCPTT (Master's thesis project):

We developed the techniques to achieve a 99.999% reliability for the 5G MCPTT communication. A paper was presented on the research performed at **IEEE WTS 2017 conference, Chicago.**

<http://ieeexplore.ieee.org/document/7943546/>

7. Twitter data analysis:

Developed a system to store, analyze, and visualize Twitter's tweets using Python, Apache Spark, Scala, Spark SQL, IBM Bluemix.

https://github.com/shubha07m/Twitter-analysis_shubh

Awards & Achievements:

1. A paper has been presented in IEEE HST 2022 conference. (2022 Fall)
2. Submitted internal invention disclosure based on the UAV-based object detection research done at T-Mobile Internship (2021 Fall).
3. Volunteered as a judge in T-Mobile Artificial Intelligence Ops Hacksgiving. (2021 Fall) <https://t-mobileaimlopshacksgiving2021.splashthat.com>
4. The Autonomous fault management project done at T-Mobile featured in WayUp. (2021 Summer)
5. Submitted two internal invention disclosures based on the work and research done in NFV optimization at Intel Internship (2021 Spring).
6. Published journal paper on spatial network performance prediction for Special issue of ETRI journal. (2020) (<https://doi.org/10.4218/etrij.2020-0188>)
7. Doctoral NR Award from UMKC SCE. (2019 - current)
8. Presented the work on "Load balancing heterogeneous network using deep learning" in NSF, CBL seminar meeting (2019)
9. Successful implementation of test platform of Ercom testbed in project Loon (2018).
10. IEEE conference paper on 5G ultra-reliable low latency communication (2017) (<http://ieeexplore.ieee.org/document/7943546/>)
11. Dean's International Scholar Award from UMKC Dean's office. (2015)
12. "Kudos! For being Alive" award from MS Head, Bharti Airtel, LTE Operations (2014).