

Nazmus Sahadat

501 Fairview Ave N, Seattle, WA 98109

☎ 901-335-6192 | ✉ m.n.sahadat@gmail.com | 🏠 www.msahadat.com | 📱 nazmus-sahadat

Objective

Driven and proficient machine learning expert with a deep understanding of various disciplines including Deep Learning, Generative Models (such as Generative Adversarial Networks and LLMs), Reinforcement Learning, NLP, Signal Processing, and Statistical Analysis. Demonstrated ability to tackle real-world challenges such as Fraud Detection, Audio Event Classification, and Human-Computer Interaction. Committed to leveraging my expertise and passion for innovation in a research and development role to push the boundaries of machine learning technologies for the betterment of society.

Education

Georgia Institute of Technology, Atlanta, Georgia

PHD IN ELECTRICAL AND COMPUTER ENGINEERING

GPA: 3.81/4.00

Aug. 2014 - May 2019

University of Memphis, Memphis, Tennessee

MS IN ELECTRICAL AND COMPUTER ENGINEERING

GPA: 4.00/4.00

Aug. 2012 - May 2014

Bangladesh University of Engineering and Technology, Dhaka, Bangladesh

BSC IN ELECTRICAL AND ELECTRONIC ENGINEERING

GPA: 3.61/4.00

Dec. 2004 - Oct. 2009

Skills

Machine Learning: Adversarial Networks (GAN), Large Language Model (LLM), Reinforcement Learning (RL), Synthetic Data Generation (Cold Start Problems), NLP, Transformer Based Models, scikit-learn, TensorFlow, PyTorch, Numpy, Keras, Pandas, RF, XGB, LGBM, SVM, LR, KNN, GMM, HMM, Naive bayes, Ensemble Methods, NN, DNN, CNN, Regression, PCA, scipy, librosa.

Signal Processing: Digital filter design (LPF, HPF, Notch, Kalman), ZCR, Spectral feature engineering, Spatial audio features, LPC, MFCC, Speech Signal Processing, Biosignal Processing (EEG, ECG), Statistical data analysis.

Programming: Python, SQL, C, C++.

IDE: PyCharm, Jupyter Notebook, Visual Studio, Eclipse, Qt, IAR systems, TI Code Composer Studio, Atmel Studio, PSoc Programming, Arduino.

Hardware: Embedded system (ADC, UART, USB, SPI, I2C, EEPROM, DMA, BLE, RF), Power management (system level), Sensor Design, Human-Computer Interaction.

Experiences

Buyer Risk Prevention, Amazon.com

Seattle, Washington

APPLIED SCIENTIST II

Aug. 2020 - Present

- Implemented and trained a variety of Machine Learning models including Random Forest (RF), XGBoost (XGB), LightGBM (LGBM), Multilayer Perceptron (MLP), and Adversarial Networks. These models are currently deployed in production environments for assessing payment risk during Amazon transactions. Played a key role in preventing fraud in physical stores and evaluating risk associated with mobile app QR code generation. Additionally, conducted feature selection and engineering to enhance model performance and accuracy.
- Successfully initiated and implemented multiple fraud detection machine learning pipelines, including the deployment of a Universal QR code generation risk across North America and Europe regions. Additionally, spearheaded the implementation of fraud detection mechanisms for Amazon 4-Star in the UK market. Developed and managed a synthetic data generation pipeline to enhance model training and testing processes.

- Pioneered the development of an innovative adversarial network-based framework, currently operational in production, aimed at generating synthetic tabular data. This framework addresses the challenge of the cold start problem, particularly in future launches where insufficient data exists to train Machine Learning models effectively. Additionally, utilized this framework for conducting Fraud MO migration impact analysis and implementing preventive measures.
- Optimized Large Language Models (LLM) to accurately predict missing values within tabular datasets. Conducted fine-tuning processes to enhance the model's performance in handling missing data scenarios effectively. Additionally, implemented text classification techniques to differentiate between human-generated and machine-generated text, contributing to improved text analysis and understanding capabilities.

Advanced Development Team, Starkey Hearing Technologies

Eden Prairie, Minnesota

MACHINE LEARNING ENGINEER II

June 2019 - July 2020

- Engineered and deployed a power-efficient machine learning algorithm tailored for integration into hearing aids. Utilized traditional techniques including feature extraction methods such as MFCC and LPC, coupled with advanced algorithms such as Hidden Markov Models (HMM), Gaussian Mixture Models (GMM), Logistic Regression (LR), k-Nearest Neighbors (KNN), and Support Vector Machines (SVM). Specialized in the detection of respiratory sounds such as coughing, sneezing, and related phenomena. This innovative solution significantly contributes to the advancement of healthcare technology by automating the identification and analysis of respiratory events, potentially enabling early detection and diagnosis of respiratory conditions.

GT-Bionics Lab, Georgia Institute of Technology

Atlanta, Georgia

GRADUATE RESEARCH ASSISTANT (PHD)

June. 2014 - June 2019

- Ph.D. focused on the development of the multimodal Tongue Drive System (mTDS), a cutting-edge human-computer interaction system designed for individuals with tetraplegia. Integrated various abilities including speech recognition, tongue, and head motion to enable control over computers, smartphones, wheelchairs, and other devices.
- Engineered firmware for ARM M4, CC251X, and CC254X platforms, facilitating communication among multiple sensors (magnetometers, accelerometer, and gyroscope) to detect user gestures such as tongue and head movements. Implemented wireless interfaces (BLE, RF) to ensure seamless interaction with external devices.
- Designed and implemented a Support Vector Machine (SVM) based algorithm for processing tongue gestures within the wearable unit (ARM, CC2510), along with a Kalman filter-based sensor fusion algorithm for accurate head tracking.
- Developed touchscreen user interfaces (UIs) using Qt for ARM A8 (Beaglebone Black) platforms, enabling the training of tongue commands via machine learning algorithms. Provided users with the flexibility to switch between controlled devices. Conducted human experiments to evaluate interaction efficacy with computers, smartphones, and wheelchairs, including data collection and statistical analysis.
- Contributed to electronic systems and PCB design for wearable units, wheelchair interfaces, and PC interfaces. Involved in debugging and testing processes to ensure system reliability and performance.

Think Tank Team, Samsung Research America

Mountain View, California

EE INTERN

May 2015 - Jul. 2015

- Contributed to PCB design projects involving high-speed communication for the Samsung 360 camera, optimization of OLED display interfaces, and the development of flexible PCB designs for future Samsung touchscreen innovations. Additionally, engaged in various confidential projects, showcasing adaptability and commitment to delivering quality results across diverse assignments.

ESARP Lab, University of Memphis

Memphis, Tennessee

GRADUATE RESEARCH ASSISTANT (MS)

Aug. 2012 - May. 2014

- Completed a Master of Science degree with a thesis focusing on the development of a smart drug delivery system utilizing a chitosan-based carrier. Conducted finite element modeling of the drug delivery system using COMSOL Multiphysics and validated the model through in vitro experiments, followed by statistical analysis of experimental results.
- Designed and developed custom-built EEG and ECG monitoring device known as the NeuroMonitor.

- Designed and implemented an algorithm for biometric identification using a single-lead ECG signal, demonstrating proficiency in signal processing and bioinformatics.
- Invented a novel vertically aligned Carbon Nanotube (CNT) based dry biosensor capable of capturing ECG and EEG signals, showcasing expertise in sensor technology and bioelectronics.

Publications & Patent

- [1] N. Sahadat, J. Yang, J. Lu, Y. Hao, B. Li, and V. Wallace, "FCTGAN: Enhancing global multi-marketplace fraud models with a novel framework using condition-based synthetic data generation and rapid ignition (oral presentation)," in *2023 Amazon Machine Learning Conference (AMLC)*, pp. 1–6, AMLC, 2023.
- [2] N. Sebkhi, A. Bhavsar, N. Sahadat, J. Baldwin, E. Walling, A. Biniker, M. Hoefnagel, G. Tonuzi, R. Osborne, D. V. Anderson, *et al.*, "Evaluation of a head-tongue controller for power wheelchair driving by people with quadriplegia," *IEEE Transactions on Biomedical Engineering*, vol. 69, no. 4, pp. 1302–1309, 2021.
- [3] F. Kong, M. N. Sahadat, M. Ghovanloo, and G. D. Durgin, "A stand-alone intraoral tongue-controlled computer interface for people with tetraplegia," *IEEE transactions on biomedical circuits and systems*, vol. 13, no. 5, pp. 848–857, 2019.
- [4] N. Sebkhi, N. Sahadat, S. Hersek, A. Bhavsar, S. Siahpoushan, M. Ghovanloo, and O. T. Inan, "A deep neural network-based permanent magnet localization for tongue tracking," *IEEE Sensors Journal*, vol. 19, no. 20, pp. 9324–9331, 2019.
- [5] M. N. Sahadat, N. Sebkhi, D. Anderson, and M. Ghovanloo, "Optimization of tongue gesture processing algorithm for standalone multimodal tongue drive system," *IEEE Sensors Journal*, vol. 19, no. 7, pp. 2704–2712, 2018.
- [6] M. N. Sahadat, E. L. Jacobs, and B. I. Morshed, "Hardware-efficient robust biometric identification from 0.58 second template and 12 features of limb (lead i) ecg signal using logistic regression classifier," in *Engineering in Medicine and Biology Society (EMBC), 2014 36th Annual International Conference of the IEEE*, pp. 1440–1443, IEEE, 2014.
- [7] M. N. Sahadat, S. Dighe, F. Islam, and M. Ghovanloo, "An independent tongue-operated assistive system for both access and mobility," *IEEE Sensors Journal*, vol. 18, no. 22, pp. 9401–9409, 2018.
- [8] M. N. Sahadat, N. Sebkhi, F. Kong, and M. Ghovanloo, "Standalone assistive system to employ multiple remaining abilities in people with tetraplegia," in *2018 IEEE Biomedical Circuits and Systems Conference (BioCAS)*, pp. 1–4, IEEE, 2018.
- [9] F. Kong, M. N. Sahadat, and M. Ghovanloo, "Development and preliminary assessment of an arch-shaped stand-alone intraoral tongue drive system for people with tetraplegia," in *2018 IEEE Biomedical Circuits and Systems Conference (BioCAS)*, pp. 1–4, IEEE, 2018.
- [10] N. Sahadat, N. Sebkhi, and M. Ghovanloo, "Simultaneous multimodal access to wheelchair and computer for people with tetraplegia," in *Proceedings of the 2018 on International Conference on Multimodal Interaction*, pp. 393–399, ACM, 2018.
- [11] M. N. Sahadat, A. Alreja, N. Mikail, and M. Ghovanloo, "Comparing the use of single versus multiple combined abilities in conducting complex computer tasks hands-free," *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. 26, no. 9, pp. 1868–1877, 2018.
- [12] N. Sahadat and M. Ghovanloo, "Efficacy assessment of multimodal tongue drive system (mtds) in comparison to keyboard and mouse (knm)," *Archives of Physical Medicine and Rehabilitation*, vol. 98, no. 12, pp. e163–e164, 2017.
- [13] M. Ghovanloo, M. N. Sahadat, Z. Zhang, F. Kong, and N. Sebkhi, "Tapping into tongue motion to substitute or augment upper limbs," in *Micro-and Nanotechnology Sensors, Systems, and Applications IX*, vol. 10194, pp. 206–217, SPIE, 2017.

- [14] B. I. Morshed, M. N. Sahadat, and S. Consul-pacareu, “Patterned carbon nanotube electrode,” Dec. 24 2015. US Patent App. 14/725,885.
- [15] Z. Zhang, S. Ostadabbas, M. N. Sahadat, N. Sebkhi, D. Wu, A. J. Butler, and M. Ghovanloo, “Enhancements of a tongue-operated robotic rehabilitation system,” in *2015 IEEE Biomedical Circuits and Systems Conference (BioCAS)*, pp. 1–4, IEEE, 2015.
- [16] S. Consul-Pacareu, R. Mahajan, M. Sahadat, and B. I. Morshed, “Wearable ambulatory 2-channel eeg neuromonitor platform for real-life engagement monitoring based on brain activities at the prefrontal cortex,” in *4th IAJC/ISAM Joint Intl. Conf., FL*, p. 78, 2014.
- [17] M. N. Sahadat, S. Consul-Pacareu, and B. I. Morshed, “Wireless ambulatory eeg signal capture for hrv and cognitive load study using the neuromonitor platform,” in *2013 6th International IEEE/EMBS Conference on Neural Engineering (NER)*, pp. 497–500, IEEE, 2013.
- [18] R. Mahajan, S. Consul-Pacareu, M. Abusaud, M. N. Sahadat, and B. I. Morshed, “Ambulatory eeg neuromonitor platform for engagement studies of children with development delays,” in *Smart Biomedical and Physiological Sensor Technology X*, vol. 8719, pp. 104–113, SPIE, 2013.

Honors & Awards

2018	BRCRC , Brooks Rehabilitation Collaborative Research Grant: \$100k	Jacksonville, FL
2018	ACM , ICMI Student Travel Support	Boulder, CO
2018	Gatech , BSAGT MC2 Rising Scientist Award	Atlanta, GA
2017	American Congress of Rehabilitation Medicine Conference , Best Poster Award (3rd place)	Atlanta, GA
2016	Gatech , BSAGT MC2 Rising Scientist Award	Atlanta, GA
2014	Gatech , Graduate Research Assistant	Atlanta, GA
2014	IEEE , EMBC Travel Award	Chicago, IL
2012	UofM , Graduate Research Assistant	Memphis, TN
2005	BUET , Undergraduate Merit Scholarship	Dhaka, Bangladesh
2004	Education Board , Higher Secondary School Board Scholarship	Raj., Bangladesh

License & Certifications

2023	Natural Language Processing Specialization , Coursera	KNMNUKF2BM9D
2023	Natural Language Processing with Attention Models , Coursera	M75QLRE46KEB
2023	Natural Language Processing with Sequence Models , Coursera	JPJUBCUWQG7C
2023	Natural Language Processing with Classification and Vector Spaces , Coursera	NBUN4JQ3WMV7
2023	Natural Language Processing with Probabilistic Models , Coursera	XHF6ZSBM2E3E
2021	Generative Adversarial Networks (GANs) Specialization , Coursera	H7GQUNGSY9BL
2019	Deep Learning Specialization , Coursera	C25CRLWDZF9N
2019	Neural Networks and Deep Learning , Coursera	HW79H924FW3R
2019	Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization , Coursera	RFWX88KEQSRP
2019	Structuring Machine Learning Projects , Coursera	8KGEWZAEYEMB
2019	Convolutional Neural Networks , Coursera	CYWY6MHT2Q5C
2019	Sequence Models , Coursera	BK59MAKLB44T
2019	Machine Learning , Coursera	4M3KEARLDDJP

Media & News

- 09/01/2018 <https://mobilitymgmt.com/Articles/2018/09/01/Tongue-Drive-System.aspx?Page=1>
- 11/01/2017 <https://www.ece.gatech.edu/news/598197/gt-bionics-lab-selected-acrm-conference-honors>
- 08/01/2017 <http://blog.snapeda.com/2017/08/01/engineer-spotlight-nazmus-sahadat-from-georgia-institute-of-technology>