MOIN U. ATIQUE

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Scholar | Linkedin

SUMMARY OF QUALIFICATIONS

- Strong background (9+ years) in Machine Learning, Data analysis and Digital signal processing.
- Skilled in Sensors, Computer Vision, Image and video processing and Large Language Models (LLM).
- Proficient in cloud platforms and infrastructure tools such as Azure, AWS, GitHub, Bitbucket, and Power BI.
- Proficient in Python, MATLAB, TensorFlow, Keras, NumPy, PyTorch, ML kit, SciPy and Matplotlib.
- Specialized in medical data analysis, neuroscience, brain-machine interfacing, biomarker detection, algorithm development, feature extraction, Hardware and software integration and robotic system design.
- A collaborative team player with strong problem-solving skills and R&D experience.

EDUCATION

Ph.D.	Biomedical Engineering (Neuroscience), University of Houston	May 2021
M.S.	Biomedical Physics and Technology, University of Dhaka	June 2015
B.S.	Applied Physics Electronics & Communication Eng., University of Dhaka	June 2013

WORK EXPERIENCE

Data Science Engineer — **Samsung Research America** — **Oct, 2024- Dec, 2024**

- Developed algorithms for stress and arousal detection using non-invasive biomedical signals from wearable devices(earbud). (Python, TensorFlow, PPG, BCG, Wearables)
- Implemented a ML pipeline to classify BCG signal quality based on time and frequency domain features. (Python, BCG)
- Extracted and analyzed biomarkers for tasks with varying stress levels using ML techniques. (Python, TensorFlow)
- Annotated BCG signal quality and validated using in house ML based quality detection system. (Python)

Postdoctoral Associate — **Texas Children's Hospital** — **Sept, 2023- Sept, 2024**

- Developed object and infection location detection models using CNNs on chest X-ray images. (Python, PyRadiomics, Keras, VGG16, RESNET-50, U-Net)
- Designed a system for patient categorization from raw medical notes using Large Language Models, enabling automated labeling. (Python, LLM, NLP)
- Created a patch extraction algorithm to localize points of interest in medical images. (Python, CNN)

Senior Scientist — **Abbott Laboratories** — **Oct, 2022- Mar, 2023**

- Developed gait detection algorithms using IMU (motion) sensors and digital signal processing techniques. (Python, DSP, Azure, AutoML, IMU)
- Collected, labeled, and documented human physical activity using wearable sensors. (IMU, Excel, Python)
- Analyzed patient health and activity from wearable devices. (Apple Watch, Fitbit, and Oura Ring, Python)

Postdoctoral Associate — **Baylor College of Medicine** — **Aug, 2021- Sept, 2022**

- Conducted speech analysis using Praat and machine learning techniques to predict cognitive frailty in patients. (Praat, Python, Speech Processing, NLP, Microphone)
- Investigated the toxic effects of chemotherapy on cancer patients by analyzing physical activity data to identify non-resilient patients. (PAMsys, Frailty Meter, IMU, MATLAB)
- Developed a machine learning approach to predict aggression in children with ADHD by analyzing physical activity data. (Python, DSP, Random Forest, SVM, LDA, PCA, Accelerometer)
- Studied the effectiveness of offloading boots with feedback in accelerating wound healing for diabetic foot ulcer patients. (MOTUS, PAMsys, LegSys, Tele-Frailty)

Research Assistant — **University of Houston** — **Aug, 2016 – May, 2021**

- Detected and characterized reward and grip force-related mirror neurons from the sensorimotor cortex. (Python, MATLAB, Plexon OmniPlex, DSP, Single Unit Activity, EMG)
- Identified reward and action signals from latent space variables (GPFA, FA, PCA). (MATLAB, DSP)
- Tracked and detected hand movements and positions using video and EMG data. (Video, EMG, MATLAB, Python)
- Assisted in neurosurgical procedures to implant microelectrode arrays and headposts on non-human primates, including UTAH array implantation.

- Trained non-human primates to perform psychophysical tasks using the KINARM end-point robot.

Research Assistant **University of Dhaka** **2015 – 2016**

- Designed and developed a low-cost, semi-functional prosthetic hand for wrist amputees, incorporating EMG and EOG signals for control. (EMG, EOG, DSP, Hardware Design, Circuit Design, Microcontroller)
- Engineered quadruped robots and implemented mathematical models for movement and trajectory control. (Hardware Design, PCB, Microcontroller)

TECHNICAL SKILLS

- **Languages:** Python, C++, MATLAB, SQL.
- **Cloud Computing:** Microsoft Azure, AWS, Power BI, Bitbucket, Github.
- **Tools, Libraries and Models:** MNE-Python, AutoML, Visual Studio Code, Tensorflow, Keras, Scikit-learn, pandas, NumPy, Matplotlib, PyTorch, U-Net, VGG16, RESNET50.
- **Techniques:** Time-series Data, Brain-Computer Interface (BCI), Human Computer Interaction (HCI), Algorithm Development, Multivariate analysis, Motion Detection, Shape and Pattern Detection, image processing, object detection, Video analysis, Biomarker extraction, Semantic segmentation, Data Annotation.
- **Signal Processing:** DSP, NLP, IMU, EMG, EOG, ECG, EEG, PPG, BCG, Single Unit activity.
- **Sensors:** IMU, Camera, Speaker, Temperature, Electrodes, Wearables (watch, ring, earbud, pendant), Ultrasound, IR.
- **Biomedical and Behavioral Data Analysis:** Human, Non-Human Primates (Monkey).
- **Surgery and Maintenance:** Performed invasive neurosurgery and postoperative care on Primates.
- **Office Application:** Microsoft Excel, PowerPoint, Outlook, SharePoint, PowerBI.
- **Other Tools:** ROS, SPSS, Praat, Proteus, EagleCad, Photoshop, Autocad, AR, Camera.
- **Development Boards:** Arduino, Raspberry Pi.
- **Mechanical Tools and Techniques:** 3D Printer, Lathe Machine, Drill, PCB fabrication.

SELECTED PROJECTS

- **Mirror Neurons Analysis for BCI/HCI**: Identified and characterized mirror neurons in the sensorimotor cortex that represent reward and grip force simultaneously, paving the way for stable Brain-Computer Interfaces (BCI) or Human-Computer Interaction (HCI) systems.
- **Infection detection using Deep Learning models:** ML models are trained on chest X-ray images to detect and localize infection and hardware. U-net model is trained to annotate and segment the lung area and Deep Neural networks (VGG-16, RESNET50) were trained on patches of annotated lung x-ray for infection localization.
- **Physical Activity Biomarker Detection**: Developed algorithms for detecting posture, gait, and balance biomarkers using wearable IMU sensors to enable remote patient monitoring and activity analysis.
- **Speech Impediment Prediction**: Identified speech biomarkers (timing, pitch, loudness) linked to cognitive state, enabling machine learning models to predict cognitive impairment in MCI patients.
- **Adverse Event Detection for Chemotherapy**: Designed machine learning models leveraging continuous physical activity monitoring to predict chemotherapy-related adverse events based on biomarkers.
- **Myoelectric Prosthetic Hand**: Designed and tested a low-cost, semi-functional prosthetic hand for wrist amputees using myoelectric control.
- **Obstacle-Avoiding Quadruped Robot**: Engineered a quadruped robot with an Android-based controller for autonomous obstacle avoidance and trajectory planning.

SELECTED PUBLICATIONS (Scholar)

- **Atique, M.M.U**; Francis, J. T. "Mirror neurons are modulated by grip force and reward expectation in the sensorimotor cortices (S1, M1, PMd, PMv)", Nature Scientific Reports 11, 05 August 2021. **[Journal Impact Factor- 3.8]**
- Cay, G., Sada, Y.H., Dehghan Rouzi, M., **Atique, M.M.U.**, Rodriguez, N., Azarian, M., Finco, M.G., Yellapragada, S. and Najafi, B., 2024. Harnessing physical activity monitoring and digital biomarkers of frailty from pendant based wearables to predict chemotherapy resilience in veterans with cancer. *Nature Scientific Reports*, *14*(1), p.2612. **[Journal Impact Factor- 3.8]**

ADDITIONAL EXPERIENCE AND AWARDS

- GTF (2016-2021).
- ICT ministry Fellowship (2014-2015).