Dr Mujeeb Rahman K.K.
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Highlights

- I am an enthusiastic researcher specializing in machine learning (ML) and artificial intelligence (AI), committed to developing cutting-edge algorithms. My expertise lies in utilizing both conventional and deep learning methodologies to address intricate problems in the field of biomedical engineering.

- Over the past 20 years in the UAE, I have consistently devoted myself to teaching undergraduate students a diverse range of Electronics and biomedical engineering subjects, computer programming, and ML & AI.

- I possess a wealth of knowledge and experience in supervising and directing capstone design projects for undergraduate students. My role involves providing timely and comprehensive guidance, mentorship, and technical support to ensure the effective and punctual completion of each project.

- In addition to my teaching responsibilities, I have demonstrated proficiency in establishing and overseeing state-of-the-art research facilities. This entails conceptualizing ideas for cutting-edge research equipment and facilities, procuring necessary resources in collaboration with suppliers, and providing training to laboratory engineers in the department.

- I conduct thorough research experiments, involving meticulous data collection and preprocessing, rigorous data analysis and interpretation, and the composition of research publications for esteemed high-impact journals and conferences.

- I authored seven Scopus-indexed journal articles, presented at 11 conferences and contributed to three lecture notes and one book chapter.

Research Interests

- Early Screening of ASD using behavioral data, facial dysmorphia, Visualized Eye-tracking Scan path images using ML.
- EEG data acquisition, preprocessing, analysis, segmentation of EEG data based on frequency bands, and relative power of EEG frequency bands.
- CNN based algorithm for detection of lung opacity on chest X-ray images
- Machine Learning-based models for the classification of mental state using ML
- Development of algorithms ECG data analysis and arrhythmia Detection
- Development of low-cost data acquisition systems for real-time applications

Core Competencies & Knowledge

- Extensive hands-on experience in developing classical and deep learning ML models, with a focus on practical applications.

- Proven track record in executing projects related to computer vision and image processing, applying theoretical knowledge to real-world scenarios.
- Demonstrated expertise in sourcing and curating data for ML applications, ensuring relevance and quality.
- Over 15 years of dedicated teaching experience in electrical and electronics engineering courses for undergraduate students, fostering a deep understanding of complex concepts.
- Proficient in installing, configuring, and utilizing data acquisition modules from reputable brands such as National Instruments, Phywe, ADInstruments, and LD Didactic.
- Seasoned in programming languages such as C++ and MATLAB, with over 15 years of hands-on experience, supplemented by five years of expertise with Python and its associated libraries.
- Extensive background in overseeing students' capstone projects encompassing both hardware and software components, including those integrating ML and AI technologies, spanning over 15 years.
- Skilled in crafting engaging classroom presentations, informative posters, comprehensive student lab manuals, and detailed engineering training materials, enhancing the learning experience for students.
- Possess strong computational skills, backed by a solid foundation in engineering mathematics and statistics, enabling effective problem-solving across various domains.

Professional Experience

Senior Lecturer & Researcher **2004 Aug - Current**
College of Engineering & Information Technology Ajman University of Science & Technology, Ajman, UAE.

Job Summary:

Theory taught

- Introduction to BME, Machine learning and its applications in Engineering. Medical Electronics, Biomedical Design, C++ Programming, MATLAB Programming, Electrophysiology, Technical report writing, Medical Image Processing, Medical Instrumentation, Bio-signal processing, Equipment maintenance and Programming with Arduino.

Labs handled

- Medical Electronics lab supervision
- Bio-signal data acquisition and analysis: ECG, EMG, EEG, and EOG.
- Bio-medical Signal Processing using MATLAB. (ECG Acquisition, Processing, Design of Digital filters, ECG analysis algorithms)
- Biomedical Image Processing using MATLAB.
- Introduction to Python and its dependencies.
- Traditional Machine Learning (Classification, Regression, Clustering, Dimensionality reduction, Logistic regression, SVM, Random Forest, Decision Tree, and Naïve Bayes)
- Computer vision-based projects using Deep Neural Networks

Supervision of Capstone Projects

Supervised around 150+ Senior capstone design projects covering electronic circuit design and software applications.

Administrative tasks:

Active role in WSCUC Accreditation (International), CAA (local) and ABET (International) Program Accreditation, Planning and organizing lab activities, directing lab engineers,

maintenance of log-book of records,and inventory management.

Research activities

Engaged in the department's research activities, including developing research proposals, conducting experiments, and producing conference and journal publications.

Educational Qualifications

Certificate: Doctor of Philosophy
Thesis title: Early Screening of Autism spectrum Disorder Using Machine Learning Algorithms
Year of Study: 2017 - 2023.
University: Vellore Institute of Technology, Vellore, India.

Certificate: Post Graduate Program in AI & ML Year of Study: 2020 - 2021.
University: The University of Texas at Austin - Red McCombs School of Business.

Certificate:: Master of Technology. (M. Tech). (University Topper and Gold Medalist).
Specialization: Biomedical instrumentation.
Year of Study: 2000 - 2002.
University: Visveswaraiah Technological University (VTU), Belgaum, India.

Certificate: Bachelor of Technology
Specialization: Electronics & Communication Engineering. Year of Graduation: 2000 - March.
Year of Study: 1995 - 1999.
University: Institution of Engineers (India)

Additional degree

Certificate: Bachelor of Technology
Specialization: Electrical Engineering.
University: Institution of Engineers (India)

Electrical Engineering Courses Taught in the last 23 years:

1. Network Theorems
2. Electronic circuits and devices
3. Operational Amplifiers and its applications
4. Pulse and Digital circuits
5. Communication Systems
6. Digital Signal Processing
7. Microprocessor and micro controllers
8. C++ programming
9. Electrical and Electronics Measurements
10. Control systems
11. Electrical Machines
12. Power Electronics and drives

Machine Learning Course Projects Completed

1. Using transfer learning approaches, design an ML model to automatically identify pneumonia by localizing lung opacities on chest radiographs (X-rays).
2. Conduct an online poll and use machine learning to create an inexpensive model that will assist in identifying potential clients with a higher likelihood of obtaining a bank loan.
3. Create an ML model that helps doctors confidently distinguish between malignant and benign breast cancer images (or mammograms) based on independent features.
4. Create your-own product suggestion system for an e-commerce site like Amazon.com.
5. Using Bidirectional LSTMs, create a model to detect whether a sentence (tweet) is sarcastic or not.
6. To design and build a face detection model to accurately locate a face in an image.
7. To design and build a face recognition model to recognize a face image accurately.
8. To classify the images in the SVHN dataset using KNN and Neural Network.
9. Using K means clustering, discovering different segments in existing customers based on their spending patterns and previous interactions with the bank.
10. Using a set of attributes extracted from the silhouette, build a model to categorize a given silhouette as one of four different categories of vehicle.
11. Create a model that forecasts concrete strength based on its attributes.
12. Create an ensemble model to assist the marketing team in identifying potential consumers who are more likely to subscribe to term deposits.

Research Publications

1. K. K. Mujeeb Rahman, "Python based bio-signal processing: mitigation of baseline wandering in pre-recorded electrooculogram," in Signal Processing with Python, IOP Publishing, 2024, pp. 6-1-6-27. DOI: 10.1088/978-0-7503-5929-0ch6. https://iopscience.iop.org/book/edit/978-0-7503-5929-0/chapter/bk978-0-7503-5929-0ch6 [Book chapter]
2. Mujeeb Rahman, M. Nasor, R. Zidan, I. Alsarraj and B. Hasan, "IOT-Based Wireless Patient Monitor Using ESP32 Microcontroller," 2023 24th International Arab Conference on Information Technology (ACIT), Ajman, United Arab Emirates, 2023, pp. 1-6, doi: 10.1109/ACIT58888.2023.10453847. https://ieeexplore.ieee.org/document/10453847 [Conference]
3. Mujeeb Rahman K. K, Mohamed Nasor K, and Praveen Kumar Reddy Yelampalli, Classification of Finger Movements Using Multi-channel EMG and Machine Learning, Advances in Signal Processing and Communication Engineering - ICASPACE 2023, A Springer book series Lecture Notes in Electrical Engineering. https://mgit.ac.in/wp-content/uploads/2022/12/icaspace1.pdf [Lecture notes]
4. Mujeeb Rahman K K, Khawla Ahmed, Tala Moh'd, and Amina Wali Alrahman, A Low-Cost Diabetic Retinopathy Screening Tool Using a Smartphone and Machine Learning Algorithm, Advances in Signal Processing and Communication Engineering - ICASPACE 2023, A Springer book series Lecture Notes in Electrical Engineering. https://mgit.ac.in/wp-content/uploads/2022/12/icaspace1.pdf [Lecture notes]
5. Mujeeb Rahman K. K and Mohamed Nasor K, Classification of Mental State Using a Muse Headband and Machine Learning Algorithm, Advances in Signal Processing and Communication Engineering - ICASPACE 2023, A Springer book series Lecture Notes in Electrical Engineering. https://mgit.ac.in/wp-content/uploads/2022/12/icaspace1.pdf

6. Mujeeb Rahman KK, Nasor M, Imran A. Automatic Screening of Diabetic Retinopathy Using Fundus Images and Machine Learning Algorithms. *Diagnostics*. 2022; 12(9):2262. https://doi.org/10.3390/diagnostics12092262 [Journal]
7. Mujeeb Rahman, K. K. and Subashini, M.M(2022), Identification of autism in children using static facial features and deep neural networks', Brain Sciences 12(1), p.94. https://doi.org/10.3390/brainsci12010094 [Journal]
8. Kanhirakadavath, M. R. and Chandran, M. S. M. (2022), Investigation of Eye-Tracking Scan Path as a Biomarker for Autism Screening Using Machine Learning Algorithms', Diagnostics 12(2), p.518. https://doi.org/10.3390/diagnostics12020518 [Journal]
9. Mujeeb Rahman, K. K. and Monica Subashini, M. (2021), A Deep Neural Network-Based Model for Screening Autism Spectrum Disorder Using the Quantitative Checklist for Autism in Toddlers (QCHAT)', Journal of Autism and Developmental Disorders 52(6), 2732–46. https://doi.org/10.1007/s10803-021-05141-2 [Journal]
10. K. K. Mujeeb Rahman and M. Monica Subashini, "ECG Signal Processing and Analysis for Accurate Features Extraction," 2019 IEEE International Symposium on Signal Processing and Information Technology, pp. 1-5, http://doi/10.1109/ISSPIT47144.2019.9001872 [Conference]
11. G. K. Varotsos, H. E. Nistazakis, K. Aidinis, F. Jaber & K. K. Mujeeb Rahman, "Transdermal subcarrier L-PSK or DBPSK optical wireless links with time diversity, skin attenuation, and spatial jitter," Journal of Modern Optics, vol. 67, https://doi.org/10.1080/09500340.2020.1825848 [Journal]
12. G. K. Varotsos, H. E. Nistazakis, K. Aidinis, G. D. Roumelas, F. Jaber and K. K. M. Rahman, "Modulated Retro-Reflector Transdermal Optical Wireless Communication Systems with Wavelength Diversity over Skin-Induced Attenuation and Pointing Errors," 2019 IEEE International Symposium on Signal Processing and Information Technology (ISSPIT), 2019, pp. 1-5, http://doi/10.1109/ISSPIT47144.2019.9001805 [Conference]
13. George K. Varotsos, Hector E. Nistazakis, Konstantinos Aidinis, Fadi Jaber, Mohd Nasor, and Kanhira Kadavath Mujeeb Rahman, "Error Performance Estimation of Modulated Retroreflective Transdermal Optical Wireless Links with Diversity under Generalized Pointing Errors," telecom, vol. 2, pp. 167-180, 2021, https://doi.org/10.3390/telecom2020011 [Journal]
14. George K. Varotsos, Hector E. Nistazakis, Konstantinos Aidinis, Fadi Jaber, K.K. Mujeeb Rahman., Signal Intensity Estimation in Transdermal Optical Wireless Links with Stochastic Pointing, MDPI, Information and Communication Technologies. https://www.mdpi.com/2227-7080/8/4/60 [Journal]
15. Mujeeb Rahman; M. Nasor, "Development of Bio-shield for Arduino Uno", ASET International Conference Engineering Innovations in Healthcare, Feb 6 -7, 2018, Abu Dhabi, UAE. https://ieeexplore.ieee.org/document/8376901 [Conference]
16. M. Nasor; Mujeeb Rahman "Eye Controlled Mouse Cursor for Physically Disabled Individuals,ASET International Conference Engineering Innovations in Healthcare, Feb 6 -7, 2018, Abu Dhabi, UAE. https://ieeexplore.ieee.org/document/8376907 [Conference]
17. Mujeeb Rahman; M.Nasor, "Low-Cost Bio-Electric signal acquisition system for Biomedical research applications", 4th International Conference on Bio-sensing Technology, 10 – 13 May 2015, Lisbon, Portugal. https://ieeexplore.ieee.org/document/7156478 [Conference]
18. Mujeeb Rahman; M. Nasor, "Multipurpose low-cost Bio-Daq system for real-time Biomedical

applications", IEEE ICTRC Conference, Abu Dhabi, UAE, 17 – 19 May 2015 [Conference]

19. Mujeeb Rahman, M. Nasor, "An Algorithm for Arrhythmia Detection", MECBME, 1st Middle East Conference on Biomedical Engineering, 2011, Sharjah, UAE, and Published by IEEE, ISBN: 978-1-4244-6998. https://ieeexplore.ieee.org/document/5752111 [Conference]

Internal Research Grants

Received three research grants, each totaling AED 20,000, from Ajman University as part of their initiative to promote research work.

Awards & Prizes

- Recognized as an "Outstanding Biomedical Faculty Member" at the College of Engineering & IT at Ajman University for the past six years, based on annual faculty evaluations.
- Awarded the "Best Project Supervisor" accolade at the Student Scientific Conference, Ajman University, in 2010, 2014, 2020, 2021, and 2022.
- Secured the "Second Prize" in the Common Design project at IEEE Student Day, 2014, Ajman University, Ajman.
- Regular recipient of an honorarium since 2004 from the Institution of Engineers (India) for supporting IEI's overseas activities in the UAE.
- Achieved the University Topper and Gold Medalist title for the master's degree.
- Received the "Distinguished Journal Reviewer Award" from the Elsevier Journal Biomedical Signal Processing and Control for exemplary contributions spanning from 2020 to 2024, having completed 34 reviews.

Title of the Capstone Projects Supervised (recent years 2020-2023)

1. EEG-Controlled Wheelchair for Differently-Abled People
2. Low-Cost Vital Sign Monitoring Device: Design and Development
3. Smart pH Meter Design for Liquid Food
4. Low-Cost Mobile-Based Imaging Device for Fundus Image Capture and Diabetic Retinopathy Detection using Machine Learning
5. Detection of Internal Bleeding using Endoscopic Images and Machine Learning
6. Hand Gesture Classification using EMG and Machine Learning
7. AI-Based Bank Currency Recognition System for Visually Challenged Individuals using Computer Vision
8. Skin Cancer Classification using Computer Vision
9. Early Glaucoma Screening using Computer Vision
10. Heart Rate Variability Monitoring System Design and Implementation using Arduino
11. Digital Stethoscope and Cardiac Monitor Design and Development using Arduino
12. Vital Sign Monitor Implementation for ECG, BP, SPO2, Body Temperature Measurement - Winner of University Competition's Best Project Award in 2006
13. Device Development for Sleep Apnea Monitoring and Alerting using Arduino
14. Assistive Walking Aid Design for the Blind using Arduino
15. MATLAB Algorithm for Baby Cry Analysis
16. Arduino-Based 12-Lead ECG Monitoring Device
17. Three-Channel Wireless ECG System based on Arduino

Institution Membership

- Member of IEEE, USA.
- Associate Member of Institution of Engineers (India), Kolkata, India, AMIE(I).
- Chartered Engineer, Institution of Engineers (India), Kolkata, C Eng.

Community Services

- I serve as a mentor and project advisor for practicing engineers affiliated with the Institution of Engineers (India) from renowned multinational corporations such as GE - Energy, Philips, Siemens, ABB, and others, who are based in the UAE.
- I have instructed over 200 Diploma Engineers in preparation for the Chartered Engineering certification provided by the Institution of Engineers (India), which collaborates with prominent organizations in the Middle East.
- Additionally, I serve as a University Mentor at BITS-Pilani, India, specifically for their work-integrated engineering degree program in the UAE.
- Delivered 26 technical papers/seminars in India, the United Arab Emirates, and Europe.
- Since 2016, I have been serving as a reviewer for the Elsevier journal Biomedical Signal Processing and Control.
- Provide support to engineering graduates in finding job opportunities and pursuing higher
- studies.

Personal Information

Birthdate:	10th May 1976.
Gender:	Male
Marital Status:	Married.
No. of children:	Three
Nationality:	Indian.