

Farhan Ahmad Nafis

B.Sc. in Electrical and Electronic Engineering

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🆔 https://orcid.org/0009-0007-4273-9849 📄 Research Gate (Farhan Ahmad Nafis)

Education

B.Sc. in Electrical and Electronic Engineering *BRAC University* **Transcript** 2020-2024

Relevant Courses: Artificial Intelligence, Neural Networks, Image Processing, Embedded Systems, Signals and Systems, Machine Learning, Statistics

CGPA: 3.64/4.00 (Approximately 3.80 in last four semesters)

Higher Secondary Certificate (HSC) *St. Joseph Higher Secondary School* **Certificate** 2017-2019

Secondary School Certificate (SSC) *St. Joseph Higher Secondary School* **Certificate** 2010-2017

Research Interests

Autonomous systems (UGVs, UAVs, USVs, UUVs), VLM/VLA Models, Computer Vision in autonomous systems, Brain and human-computer-based control systems, Edge, FOG, Federated computing, Human-Robot/Machine interaction (HMI/HRI), deep learning application on resource-constrained devices, reinforcement learning and robot control optimization.

Work Experience

Research Assistant, (*Department of EEE, BRAC University*) 04/2025 - current

- Prepared proposal for a project titled "Secure and Scalable Federated Learning leveraging TinyML and incorporating multi-mode communication protocols"
- Started to research and survey for a study that focuses on AI in Engineering Education

Teaching Assistant, (*Department of EEE, BRAC University*) 01/2025 - 05/2025

- Prepared course materials and took tutorial sessions for students
- Gave regular consultation to students to improve their understanding
- Assigned courses: 1) Electromagnetic waves and fields 2) Electrical Circuits I (DC Circuits and magnetic circuits)

Research Assistant, (*Control and Research Application Center, CARC*) 09/2024 - 03/2025

- Developed obstacle detection system for a project titled 'Brain-Controlled Wheel Chair for quadriplegic patients'
- Worked with EEG headband and acquired brain-signal
- Used filters to remove noise e.g. 50Hz powerline noise, high-frequency noise, low-frequency rumble and ECG, EMG frequencies
- Processed the filtered signal to generate patterns
- Created a control algorithm to control a two-motor (24V, 250W) wheelchair using brain signal and compared P300 and motor imagery (MI) mechanisms
- Created manual control system (Remote) using NoduMCU's communication protocol to drive the wheelchair
- Got familiar with MCU-MCU communication, UART, I2C, BLE, ESPNOW, Parallel computing using ESP (Dual-core) and deployed them into the system
- Collaborated to write a review manuscript on brain-controlled wheelchairs, which is currently under review in a Q1-level journal

Student Tutor, (EEE Dept. BRAC University)

01/2023 - 04/2024

- Prepared materials and instructed the students on three different assigned courses (up to junior/third year engineering level) across four semesters
- Assigned courses: 1) Electromagnetic Waves and Fields 2) Microprocessors/Embedded Systems Design 3) Machine Learning 4) Electrical Circuits II
- Worked closely with the course faculty to improve the quality of instructions for the students
- Provided regular tutorials and consultations to assist the students in addition to the class lectures

Chairperson, (IEEE BRAC University Student Branch)

01/2023 - 12/2023

- Led five IEEE Chapters (IEEE PES, CS, RAS, AESS, and ComSoc) along with the main branch during a one-year tenure
- Organized seminars, webinars, and workshops for the members of IEEE, Department of EEE, and Department of CSE of Brac University
- Organized membership drives for the student branch and hosted events with Industry and Academic professionals

Project Technical Lead, (BracU Starbound Rocketry)

04/2022 - 11/2022

- Project was under Laboratory of Space System Engineering and Technology, *LaSSET* and IEEE Aerospace and Electronic Systems Society BracU SBC, *AESS*
- Developed strategic plans for building and launching a water rocket with bare-metal components
- Designed, simulated, and 3D printed different types of model rockets' body and fins for maximum aerodynamic leverage
- Designed the electronics payload bay and coded the embedded systems that went onboard the designed rockets for data acquisition and payload testing
- Created the necessary documentations and managed codebases for communication and representation purposes

Editor, (IEEE BRAC University Student Branch)

01/2022 - 12/2022

- Prepared event writeups for four chapters (PES, CS, RAS, and AESS) and the main body of IEEE BracU SB.
- Prepared materials to increase student engagement
- Prepared Newsletter(s) for the student branch and the chapters

Major Courses & Certifications

- EEE 472: Artificial Intelligence
 - Informed, uninformed and local and adversarial search algorithms and strategies, constraint satisfaction problems, deterministic and stochastic environments, game algorithms was studied
- EEE 474: Neural Networks
 - Multilayer Perceptron (MLP) upon nonlinear classification context problems and build and train neural networks for practical purposes
- EEE 476: Image Processing
 - Image enhancement, 2D- fourier transform and sampling, high dimensional spectral analysis, filtering, edge detection, de-noising, digital image compression techniques and morphology
 - Convolution, histogram analysis, TensorFlow, Keras, PyTorch frameworks for image classification
- Online Courses - Coursera
- IELTS - (Overall score: 8.0; L8.0, R9.0, W7.0, S8.5)

Tools (Software and Hardware)

- **Platform and Tools:** Proteus, LTspice, MATLAB, VS Code, Jupyter, ROS 2 (Learning), CoppeliaSim (Learning), Lab Instrumentation, NS-3 (Learning)
- **Data Visualization:** Python, Excel, Google Sheets
- **3D Design and Prototyping:** Solidworks, Autodesk Fusion360, Creaform Slicer
- **PCB Design:** EasyEDA, Altium Designer, Saturn PCB Toolkit, Autodesk Eagle, Fritzing
- **Programming:** Python, Embedded C, C++ (Learning), Git, Github, LaTeX, Markdown
- **ML/AI Frameworks:** TensorFlow, Keras, PyTorch (Learning)
- **Hardware:** Sensors, Actuators, Hardware prototyping, Microcontrollers (Arduino, NodeMCU), Raspberry Pi, Analog and Digital ICs, Soldering

Awards, Recognition, and Volunteering

- Dean's List (second semester) - Brac University
- IEEE R-10 Exemplary Student Student Branch Award (As the Chairperson of IEEE Brac University Student Branch)
- Winner - Idea Competition (Robotics Club of Brac University)
- Completion - Electronic System and PCB Design
- Volunteering, collaborating, and hosting multiple successful seminars and workshops with IEEE BracU SB.
- Performed as Master of Ceremony in numerous inter-department and organizational events.

Projects

- [*Embedded Systems*] Title: ATmega-32 based IoT integrated ATM machine system with real-time monitoring and intrusion detection system
- [*Digital Logic Design*] Title: Digital electronics-based voting system suitable for four candidates
- [*Machine Learning*] Shopping cart product identification system using YOLO algorithm and hardware implementation on NodeMCU platform. Used YOLOv5 and YOLOv8(s and n)-based object detection model and manual annotation.
- [*Artificial Intelligence*] Title: Heart failure prediction using Decision Tree, SVM, and KNN algorithms. Used EDA and CSV-based numerical data for supervised learning.
- [*Artificial Intelligence*] Title: Image Segmentation using MobileNetV2
- [*Neural Networks*] Title: A Bangla language-based medical Chatbot was developed using TensorFlow, Hugging Face, Tokenizers
- [*Image Processing*] Built several popular CNN architectures from scratch CNN blocks in using Keras like AlexNet, VGG16, VGG19, and InceptionV2 to classify four classes of images

Thesis/Final Year Design Project

IoT-based Mobile Healthcare System with Integrated Real-Time ECG Monitoring -Thesis/FYDP
My thesis project focused on low-cost health data acquisition system. My thesis group and I used TinyML so that we can predict any anomaly using the data from the wearable sensors.

Publications

- [[DOI](#)] Title: CNN and Transfer Learning-based Deep Learning Architectures for Alzheimer's Disease Detection from MRI Scan: A Comparative Analysis
- [[DOI](#)] Title: An Efficient IoT-based Fire Detection System using Quantized Deep Learning model on Resource-Constrained Devices
- [[DOI](#)] Title: Voting and Stacking-based Ensemble methods to detect Bengali Spam SMS with proposal for comprehensive dataset
- [[DOI](#)] Title: A Reliable Robotic Solution for Hospital Logistics: Implementation of Intelligent Pathfinding and Control Strategy
- [*Under Review, ICCIT (2025)*] Title: SBloT-ATM: Secure Blockchain-IoT Framework for Next-Generation Automated Teller Machine Security
- [*Under Review, ICCIT (2025)*] Title: FIEdge-CAN: Hierarchical Federated Learning with Edge-TinyML for autonomous Internet of Vehicle security
- [*Under Review, Heliyon*] Title: A Comprehensive Review of Brain-Controlled Wheelchairs: Recent Advancements in EEG, EOG, Hybrid Technologies, and Artifact Removal Techniques for Mobility Control

Presentations

- [*FYDP, 2024*] Title: IoT-based Mobile Healthcare System with Integrated Real-Time ECG Monitoring - Poster
- [*Presented in MIST, 2022*] Title: Heart Disease Detection through ECG Signal Manipulation using Machine Learning and Proprietary Hardware
- [*ICCIT (Conference), 2024*] Title: An Efficient IoT-based Fire Detection System using Quantized Deep Learning model on Resource-Constrained Devices
- [*ECCE (Conference), 2025*] Title: Voting and Stacking-based Ensemble methods to detect Bengali Spam SMS with proposal for comprehensive dataset
- [*ECCE (Conference), 2025*] Title: A Reliable Robotic Solution for Hospital Logistics: Implementation of Intelligent Pathfinding and Control Strategy

Memberships

- [*IEEE*] Membership Number: 96637815
- [*IMechE*] Membership Number: 80744295
- IEEE Computational Intelligence Society (CIS)
- IEEE Vehicular Technology Society (VTS)

Portfolio

- Github Repository - Codebase
- GrabCAD Repository - 3D Models
- IEEE Newsletter - Newsletter
- Final Year Design Project - Presentation

References

- Prof. Dr. AKM Abdul Malek Azad
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