Mohammad Zain

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Education

Aligarh Muslim University (AMU) **Aligarh, India**

Bachelor of Technology, Electronics Engineering; CPI: 9.44/10 *Expected May 2023*

(Rank 1 Holder)

Relevant Test Scores

- Scored **329/340 (163 V, 166 Q)** in the Graduate Record Examinations (GRE).
- Scored **117/120** in the Test of English as a Foreign Language (TOEFL iBT).

Scholastic Achievements

- Awarded the **University Merit Financial Award** Scholarship from Aligarh Muslim University for consistently ranking first in the batch throughout the Bachelor's degree program.
- Awarded the prestigious **Husna Shibli Scholarship** by Aligarh Muslim University for academic excellence in Computer and Electronica Engineering. This scholarship is given to a few selected students of the department who demonstrate outstanding performance in their studies.
- Recipient of **MITACS Globalink Research Intern (GRI) Fellowship** to pursue a 12-week research internship at the Université de Sherbrooke, Canada, in the research group of **Prof. Serge Ecoffey** on the topic "Neuromorphic Electronics for AI at the Edge".
- Among the 11 students out of 300, to receive a **merit scholarship from the University Grants Commission, Govt. of India** for post-secondary education.
- Awarded **Certificate of Merit** from Central Board of Secondary Education, Govt. of India, for securing a perfect grade in High School (10^{th}) examinations.
- Selected as one of **27 recipients (out of 293 applicants)** for the prestigious **Sir Syed Global Scholarship Award**, administered annually by the Sir Syed Education Society of North America.

Publications

1. **M. Zain**, A. H. Ali, S. M. Hamza and S. J. Arif, "**Microcontroller Based Low Cost Seismic Vibration Generating System**," 2022 26th International Conference on System Theory, Control and Computing (ICSTCC), 2022, pp. 485-490.

2. Basnet, M. B., Anas, M., Rizvi, Z. H., Ali, A. H., **Zain, M.**, Cascante, G., Wuttke, F . (2022). **Enhancement of In-Plane Seismic Full Waveform Inversion with CPU and GPU Parallelization.** Applied Sciences, 12(17), 8844. **(Impact Factor: 2.8).**

3. A. H. Ali, **M. Zain**, S. M. Kazim and M. Hasan,"**Energy Efficient FPGA Implementation of a Spiking Neural Network,**" 2022 IEEE 3rd Global Conference for Advancement in Technology (GCAT), 2022, pp. 1-6.

Research Experience

MITACS Globalink Research Intern **May 2022 - Aug 2022**

*3IT, Université de Sherbrooke — Supervisor: **Dr. Yann Beilliard*** **Sherbrooke, Canada**

- Worked on the programming of an SoC-embedded (Zynq-7010) system with Linux to control QSPI DACs for parallel programming of memristors for AI applications.
- Developed a testing protocol to measure and alter memristor resistance using custom voltage waveforms.
- Conducted electrical characterization of memristor devices on silicon and CMOS substrates.

Summer Research Intern **June 2021 - Aug 2021**

*Christian-Albrecht University of Kiel — Supervisor: **Prof. Frank Wuttke*** **Remote Internship**

- Ported CPU code to GPU using CUDA API to develop a GPU-based efficient parallelization algorithm to numerically solve waveform inversion from geophone measurement resulting in a 90-fold performance increase.
- Completed the CPU parallelization of the same code via OpenMP API and obtained up to 4x performance gain.

Research Intern **Feb. 2021 - April 2021**

*Dept. of Electronics Engineering, AMU — Supervisor: **Prof. Syed Javed Arif*** **Aligarh, India**

- Performed literature review on the Construction and Performance of Low-Cost Shake Tables.
- Designed a new algorithm to generate and measure seismic/bridge vibrations utilizing a microcontroller-based experimental setup.

Undergraduate Research Assistant **January 2021**
Dept. of Civil Engineering, AMU — Supervisor: ***Prof. Syed Javed Arif*** **Aligarh, India**

- Conducted experiments on Shake Table to quantify the dynamic response of bridges under seismic excitation.
- Calibrated the Shake Table in the Department of Civil Engineering, AMU using a novel RMF-based method and a portable apparatus.

Technical Skills

Programming: C, C++, Python, MATLAB, Assembly Language (8085)
EDA Tools: DipTrace, Electric, Proteus Design Suite, Pspice, LTSpice
HDL: Verilog

Technologies/Frameworks: CUDA, OpenMP, PyTorch, Arduino, Zynq-7000 SoC
OS: Windows, Ubuntu, PetaLinux
Documentation: LaTeX
Workbench: LabView, Vivado, Vitis

Projects and Internships

Implementation of CSNN on FPGA (Bachelor Thesis) **Aug. 2022 - Present**
Supervisor: ***Prof. Mohd Hasan*** **Aligarh, India**

- Developing a hardware architecture for Convolutional Spiking Neural Networks (CSNN) that optimizes power consumption and classification speed.

Implementation of Spiking Neural Network on Hardware **Aug. 2021 - March. 2022**
Supervisor: ***Prof. Mohd Hasan*** **Aligarh, India**

- Developed efficient hardware accelerators for machine learning applications using Python and Verilog.
- Trained Spiking Neural Network models on the MNIST data set, using PyTorch.
- Achieved an accuracy of 94% in post-implementation simulations of the digital hardware design.

Software Implementation of SAD Algorithm for Motion Estimation **June 2020 - July 2020**
Supervisor: ***Prof. Ekram Khan*** **Aligarh, India**

- Implemented C++ code utilizing OOP concepts to perform block-based motion estimation using SAD criteria for video compression.

Industry Automation Based Virtual Summer Internship Program **Aug. 2021 - Sep. 2021**
National Instruments Innovation Center, ITS Engineering College **Noida, India**

- Performed signal processing, data processing, and data communication using LabVIEW.

Leadership & Extracurriculars

Effi-Cycle, SAEINDIA – Team Green Warriors **AMU**
Faculty Advisors: ***Mr. Nafees Ahmad*** *and* ***Dr. Syed Fahad Anwar*** **Aug. 2019-Sep. 2020**

Vice-Captain & Electronics Team Lead *Feb. 2020 - Sept. 2020*

- Co-led 11 engineering students to design a three-wheel hybrid electric vehicle for SAE India's Effi-Cycle (2020) competition. Team secured a national rank of 2^{nd} in Project Plan and 10^{th} overall.
- Conceptualized, simulated, and executed the installation of advanced driver assistance systems in the vehicle, including Adaptive Headlights, Current Protection System, and Seat Belt Alert System.

Trainee *Aug. 2019-Jan. 2020*

- Trainee in the 13-member AMU team that won 'The Most Appreciated Award' in Effi-Cycle (2019) competition.

Vice-Chair of Robotics and Automation (RAS) Chapter, IEEE Students Branch AMU
Faculty Advisor: ***Dr. Naushad Alam*** **March. 2022**

- Managed and directed several robotics-related workshops, lectures, events, and seminars.

Co-Coordinator IEEE Event Conceptualization
Faculty Advisor: ***Mr. Mohammad Zaid*** **March. 2022**

- Co-led the team and managed, conceptualized, and organized various events for IEEE AMU students branch.

Technical Workshops & Training Programs Attended

Training of Electronic Testing and Measuring Equipment **AMU, Aligarh**

25 June 2021 – 16 July 2021

- Completed a three-week training program on mixed-signal oscilloscopes at The Centre of Advanced Research in Electrified Transportation [CARET], AMU.

Workshop on Maintenance of Electronics Instruments **AMU, Aligarh**

19 July 2021-20 July 2021

- Attended a two-day workshop organized by the Department of Electronics Engineering, Aligarh Muslim University, on 'Repair and Maintenance of a Sophisticated Instrument' (Mixed Signal Oscilloscope LeCroy, 1 GHz, 10 GS/s).

Education – Online Learning Programmes

- FPGA Embedded Design, Verilog | Udemy
- Machine Learning | Coursera
- Neural Networks and Deep Learning | Coursera
- Object-Oriented Data Structures in C++ | Coursera
- Learn CUDA with Docker! | Udemy
- Introduction to Programming with MATLAB | Coursera