

Muhammad Shayan Nazeer

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EDUCATION:

University of Massachusetts, Amherst

Doctor of Philosophy (Ph.D.)

Sept 2023 – present
Amherst, MA, USA

Major: Electrical and Computer Engineering

Advisor: Dr. Muhammad Taqi Raza (📧)

National University of Sciences and Technology (NUST)

Bachelor of Electrical Engineering (Gold Medalist)

Sept 2019 – Jun 2023
Islamabad, Pakistan

Focus Area: Embedded systems, Hardware Security, wireless communication.

Final Year Project: Created an extensive Python library, implementing the state-of-the-art logic locking techniques, empowering users to implement hardware security techniques on verilog hardware designs effortlessly.

Advisors: Dr. Muhammad Shafique (📧), Dr. Rehan Ahmed (📧)

EXPERIENCE:

University of Massachusetts Amherst

Graduate Research Assistant

Sept 2023 – present
Amherst, MA, USA

- Developed a distributed 5G core testbed on the [POWDER](#) platform by the University of Utah.
- Separated user and control planes within the testbed for enhanced experimentation and comprehensive insights.
- Testing developed testbed under various test cases by deploying simulated UEs (User Equipment) to evaluate distributed 5G core.

EEG Research Lab SEECS

Research Assistant

Sept 2022 – Jul 2023
Islamabad, Pakistan

Project Title: "A Brain-Computer Interface (BCI) Enabled Motion Intent Recognition System for Assistive Robotics."

- Won a research grant of PKR 1 million for the project from my university.
- Trained and developed an EEG classifier using parallel CNNs and RNNs to predict the intention of left, right, up, and down movements with the accuracy of 89%.
- Integrated a robotic arm to be controlled using prediction from EEG classifier.

RADWI Pvt. Ltd.

Home Automation Engineer (Internship)

Apr 2021 – Oct 2021
Islamabad, Pakistan

- Designed and developed various home automation devices including smart switches and automated lights.
- Prototyped complete working system for IoT-enabled electronic door lock.
- Developed a specialized PCB for each device using Altium Designer.
- Integrated smart home devices with AWS IoT core to allow for connectivity through smart phones over the internet.

The products I developed can be found [here](#) on the company's website.

TECHNICAL SKILLS:

Programming Languages: C, C++, Python, JavaScript

Engineering Tools: MATLAB, Proteus, Altium Designer, Quartus, Mbed Studio, Arduino

Hardware Description Language: Verilog HDL

Research: Literature Review, Writing Project Proposals, Project Documentation

Honors and Awards:

- 2017 **INTEL ISEF**, Finalist, National Level
- 2018 **National Physics Talent Conquest**, selected among top 50 students all over Pakistan
- 2022 **IEEE Instrumentation and Measurement Competition**, Runner up
- 2022 **CSAW Logic Locking Conquest**, Runner up, Global level (Organized by New York University)
- 2023 **NUST High Achiever's Award**, Gold Medal.
- 2023 **Rectors Gold Medal**, best final year project in the batch.

PROJECTS:

MIPS Simulator With Tomasulo's Algorithm Implementation:

- Developed a MIPS simulator integrating Tomasulo's algorithm for dynamic instruction scheduling and execution, using Python.
- Additionally, crafted an intuitive GUI to provide a visual representation of the simulation process, demonstrating a holistic approach to system design and user experience enhancement.

Time Synchronization at 5G Edge:

- Explored time synchronization for 5G IoT devices using Nordic semiconductor NB IoT board (nrf9160).
- Implemented NTP protocol to time sync two 5G IoT boards.

FPGA Implementation of Bresenham Circle Drawing Algorithm:

Bresenham circle drawing algorithm is a lightweight algorithm to draw a circle on the computer screen.

- Implemented Bresenham's circle drawing algorithm in Verilog to draw circles of variable radii.
- Utilized University of Toronto's [VGA adapter](#) to display output on LCD using DE1-SoC FPGA.

Li-Fi:

- The audio data was transmitted via a light source, and on the receiving end, a light sensor equipped with an amplifier and a noise cancellation circuit was utilized to play the audio through a speaker.

Spoken Digit Recognition:

- Designed and implemented a robust model for spoken number recognition utilizing Mel-Frequency Cepstrum in MATLAB.
- Integrated MATLAB with a microphone to capture and store numerical data from speech, creating an efficient feature vector for accurate identification of numbers in audio clips.

Gender Bias Detection Among Search Engines (Google vs Bing vs DuckDuckGo):

- Created dataset (images) of 10 different gender-neutral words from 3 mentioned search engines.
- Using a deep learning model, images were classified into male, female, and neutral classes.
- Then I statistically estimated the gender bias among search engines using percentage of classified images for each gender-neutral word.

IoT-based Indoor Climate Monitoring System:

- Successfully interfaced DHT22 and MQ135 sensors with an ESP32 microcontroller, creating a robust system for real-time detection and monitoring of temperature, humidity, and air quality.
- Developed a customized web interface to display sensor parameters and facilitate comparison with recommended values, showcasing a hands-on proficiency in sensor integration and web-based data visualization.