# Muhammad Wasay

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## Education

**Namal University** Expected June 2025

*Bachelor of Science in Computer Science* *Mianwali, Pakistan*

- Relevant coursework: Data Structures, Algorithms, Software Engineering, Compiler, Parallel and Distributed Computing, Machine Learning

## Technical Skills

**Programming Languages**: Python, C++, C, JavaScript, CUDA
**Tools & Technologies**: TensorFlow, Scikit-learn, PyTorch, Hugging Face, LangChain, Git, GitHub, MySQL, NumPy, Pandas, Matplotlib, Seaborn, Tkinter, AWS, Jenkins, Github Actions, MPI, OpenMP, React.js, Tailwind CSS, Slurm, OpenStack, Kubernetes, NVIDIA CUDA, Prometheus, Grafana

## Experience

**Pakistan Supercomputing** Oct 2023 - Present

*Student Research Assistant* *Namal University, Mianwali*

- Led a cutting-edge supercomputing project, developing a high-performance computing environment tailored for AI and big data research. Designed and implemented specialized monitoring software for an HPC system based on a GPU-based cluster, achieving a theoretical performance of 1.2 petaflops.
- Optimized system performance through fine-tuning large language models (LLaMA-70B), demonstrating a strong understanding of both hardware and software integration to deliver standard AI research capabilities.
- Supported the supercomputing and parallel programming spring and summer schools, providing in-depth technical knowledge and practical hands-on training to students, helping them build foundational skills in high-performance computing.

**EZ MD Medical** June 2024 - Present

*Junior Software Engineer* *Islamabad*

- As a front-end developer, designed and built user-friendly web portals and mobile applications, focusing on creating intuitive interfaces that improve user experience for clients, vendors, and delivery personnel.
- Led DevOps initiatives, managing and optimizing CI/CD pipelines, automating workflows, and deploying scalable solutions on AWS. This ensured high availability and maximum performance for mission-critical applications.

**Zindigi Prize** 2024 - 2025

*Campus Director* *Namal University, Mianwali*

- Appointed as the Campus Director for the Zindigi Prize program, a prestigious social entrepreneurship initiative, to lead the program at Namal University. Responsible for driving its execution and ensuring successful outcomes.
- Managed and mentored a dynamic team of students, entrepreneurs, mentors, judges, and trainers. Organized and coordinated campus rounds and regional competitions, empowering students to create innovative solutions for country's most pressing issues.
- Promoted social entrepreneurship by fostering a culture of problem-solving and innovation, guiding teams from idea conception to the development of impactful social business models.
- Strengthened leadership, organizational, and communication skills while growing a vast professional network, aligning my technical expertise with the broader goals of community development and innovation.

**DreamBig Semiconductor Inc.** July 2024 - September 2024

*Software Engineering Trainee* *Karachi*

- Developed expertise in kernel programming, working on RDMA and Smart NICs to improve network performance. Worked with GNS3, developed kernel and network drivers, and enhanced system performance through low-level optimization, gaining valuable problem-solving experience.

## Projects

**EdgeGuard: Real-Time AI-Powered Surveillance at the Edge** | *Nvidia Orin, Raspberry Pi, C++, Python, CUDA*

- Led the development of EdgeGuard in collaboration with industry partners (Tkxel), a modular edge computing framework for real-time AI-powered video analytics, designed to enable low-latency surveillance and intelligent analytics directly on edge devices.
- Developed a pipeline that leverages and quantizes existing state-of-the-art AI models, optimizing them for deployment on resource-constrained edge devices without compromising performance. This approach reduces computational resource requirements and boosts scalability.
- Focused on creating an open-source, modular SDK that can be adapted for various surveillance use cases, from transportation hubs to public events, while ensuring seamless integration with RISC-V platforms for scalability and broad adoption in smart city applications.

**RISC-V Heterogeneous HPC Cluster Development** | *SiFive SBC, OpenMPI, OpenMP, C++, Python*

- Developed a fully operational, low-power HPC cluster using the RISC-V StarFive VisionFive2 platform with Intel NUC edge device as head node, optimized for energy and computational efficiency, and scalability, achieving a 55% improvement in processing speed for large matrix computations.
- Integrated Wazuh-based SIEM for real-time security monitoring and federated learning techniques using medical data for decentralized AI model training, enabling privacy-preserving machine learning and collaborative research across multiple institutions.

**Multimodal Network Anomaly Detection System** | *TensorFlow, Scikit-learn, Matplotlib, Pandas*

- Designed and implemented a system for detecting anomalies in multimodal data streams, including system logs and network packets.
- Used machine learning techniques such as classifier algorithms and neural networks to identify unusual patterns.
- Contributed to research on new anomaly detection techniques.

**JPEG Image Compressor** | *NumPy, Pillow, OpenCV, Pandas, Matplotlib, Tkinter*

- Implemented an image compression to reduce the file size of JPEG images while preserving image quality.
- Utilized techniques such as discrete cosine transform and Huffman coding to achieve efficient compression ratios.

**Conway's Game of Life** | *C++, Raylib*

- Created a simulation of Conway's Game of Life using C++ and Raylib for graphical rendering.
- Implemented interactive controls to allow users to modify the grid and observe the evolution of cell patterns in real-time.

## Research

**Design and Development of RISC-V Based Virtual Cluster using QEMU Simulator** | *IEEE Xplore, 2024*

- Developed an open-hardware RISC-V-based high-performance computing (HPC) cluster using the QEMU simulator, consisting of a master node and four slave nodes emulated within the QEMU environment. The research utilized an open-source operating system along with distributed programming tools and a compiler toolchain for benchmarking.

## Awards

**National Tech Expo** | *Heterogeneous Cluster for Edge AI and SIEM Solutions*

- Awarded First Prize for developing a heterogeneous ISA cluster tailored for both academia and industry and Deployed quantized large language models (LLMs) on this resource-constrained RISC-V cluster, demonstrating cutting-edge AI deployment and optimization in limited environments.
- Implemented a Security Information and Event Management (SIEM) solution, ensuring an open hardware and software approach, and providing a cost-effective, high-efficiency AI inference solution that competed national competitors.

**Namal Expo** | *RISC-V Based Cluster*

- Won first place in the inter-university tech expo's RISC-V category by creating a five-node cluster that achieved a 50% performance gain through parallel task distribution across connected devices.

## Certifications

**Machine Learning Specialization** | *Deeplearning.ai*
**AWS Certified Cloud Practitioner** | *Udemy*
**Ethical Hacking** | *NPTEL*