



Muhammad Khuzaifa

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Home: Mardan (Pakistan)

EDUCATION AND TRAINING

Bachelor of Science in Electrical Engineering

[12/09/2022 – 06/06/2026]

Pakistan Institute of Engineering and Applied Sciences (PIEAS)

City: Islamabad | Country: Pakistan

WORK EXPERIENCE

National Aerospace Science And Tecnology Park

(Islamabad, Pakistan)

Research & Development Intern

[16/06/2025 – 12/09/2025]

- Developed an end-to-end EEG-based BCI system using electronics, signal processing, modelling, and embedded systems, applying a high-performance and excellence-focused engineering approach.
- Designed a low-noise front-end IC in Altium, created MATLAB preprocessing workflows, and implemented Python-based mental-state classification, improving EEG signal reliability through optimization and system-level engineering.

National Institute of Laser and Optonics (NILOP)

(Islamabad, Pakistan)

Intern (Electronics Lab)

[16/07/2024 – 16/08/2024]

- Worked on high-performance analog and digital electronics for audio and signal-processing systems by designing and optimizing multilayer PCBs, developing a Class-AB amplification stage, and implementing embedded-control circuitry to ensure low-noise, reliable hardware performance.

PROJECTS

Intelligent UAV Swarm for Rapid Disaster Assessment and Environmental Monitoring (Final Year Thesis)

[Present]

- Developed an intelligent UAV swarm system for flood, fire, and disaster assessment by integrating custom drone hardware, onboard AI, decentralized communication, and control algorithms for coordinated multi-UAV operation.
- Designed mini-UAV platforms with custom PCBs for flight control, power management, and sensor integration, and validated swarm architecture, path-planning, task-allocation, and AI-based detection models through simulation to improve situational assessment.

Low-Cost Field-Deployable IoT Weather Station Using ESP32

[27/09/2025 – 05/01/2026]

- Developed a low-cost IoT weather station using ESP32, BMP280, and ESP-IDF with FreeRTOS by designing the full hardware stack and firmware to enable low-power outdoor operation with real-time sensing and reliable Wi-Fi connectivity.

Advanced SPWM Inverter Harmonic Analysis for Power Quality Improvement

[07/02/2025 – 05/06/2025]

- Designed and analyzed an SPWM inverter by implementing control and switching schemes, performing harmonic analysis, and optimizing voltage waveform quality to reduce distortion and improve reliable power-system performance.

Kinematic Control System Design for a 6-DOF Robotic Manipulator

[09/10/2024 – 11/01/2025]

- Designed and implemented the kinematic and motion-planning system for a 6-DOF robotic manipulator by creating forward/inverse kinematic models, building the mechanical structure in SolidWorks, and validating trajectory-generation and control strategies in CoppeliaSim to achieve smooth, collision-free operation.

VGA Graphics Controller on the Spartan-3E FPGA

[10/09/2024 – 04/01/2025]

- Designed and implemented a real-time VGA graphics controller on a Spartan-3E FPGA by developing Verilog-based timing, synchronization, and rendering modules and validating stable 640×480 display output through simulation and hardware testing.

ONLINE COURSES AND CERTIFICATION

Summer Workshop Program on Artificial Intelligence

Summer Thrive Program

Cloud Technologies and Data Analysis (Microsoft Learning)

Advanced Computer Science Fundamentals (Harvard University Online)

The Raspberry Pi Platform and Python Programming (Coursera)

Technical Specialization in Embedded Systems and Applied Robotics (Coursera)

DIGITAL SKILL

- Programming & Modeling: MATLAB, Python, C/C++, LaTeX
- Embedded Systems & FPGA: Verilog HDL, Xilinx ISE, ModelSim, Arduino IDE, STM32CubeIDE, Keil uVision
- Hardware Design & Simulation: Altium Designer, Simulink, Proteus, LTspice, Multisim
- Engineering Design & CAD: SolidWorks, CoppeliaSim, STM32CubeMX
- Data Analysis & Tools: Jupyter Notebook, Google Colab, Visual Studio Code

HONOURS AND AWARDS

- Recognized as the highest position holder in both Secondary School and Higher Secondary School, with 94.4% in Secondary School, and ranked among the top 10 scorers in the competitive ETEA entrance test.
- Received formal recognition for exceptional ability in tackling complex engineering problems, demonstrating strong analytical skills and a consistent, solution-oriented mindset.
- Demonstrated leadership, teamwork, and discipline by leading teams to victory as Winner in the Intra-University Cricket Tournament and achieving 2× Winner / 1× Runner-up positions in Volleyball.

Conferences and Workshops

- IEEE technical seminar on 5G communications attended sessions on emerging wireless technologies and applications.
- “From Microchip Design to Silicon” hands-on workshop on NECOP ICs October 2025.

Publications

- Co-author of an ongoing review paper on thermal management of lithium-ion batteries, currently in progress for journal submission.

VOLUNTEERING

Member, IEEE PIEAS Student

[27/09/2022 – 16/07/2025]

- Contributed to the planning and successful execution of over 5 technical workshops and seminars, actively promoting electrical engineering concepts and professional development to more than 100 peers.

Member, PIEAS Blood Donation Society

[10/10/2024 – 04/09/2025]

- Actively supported and organized successful blood donation drives (3+ events), honing skills in public engagement, event logistics, and community coordination.

Independent Educational Support and Community Mentorship

[07/05/2016 – 05/10/2025]

- Initiated and led an independent educational drive, collecting and providing over 50 study books to 15+ students while serving as a mentor across nine academic years.

Volunteer/Member, VAS Society

[08/10/2022 – 09/06/2023]

- Actively participated in welfare initiatives and successfully co-organized 4+ community and academic support camps, enhancing high-level collaborative and logistical planning skills.