Awais Asghar

3rd Year Undergraduate
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Education

Year	Degree/Certificate	Institute/School	CGPA/%
2022-Present	B. Electrical Engineering	National University of Science and Technology (NUST), Islamabad	3.49/4.0
2020-2022	Class XII, FSc	City College of Science and Commerce, Multan	96.72%
2018-2020	Class X	Ansari Science High School, Multan	96.66%

Research Interests

Embedded System Design, IoT, FPGA, Chip Design, Machine Learning, Deep Learning, AI

Honors And Achievements

- I achieved **3rd position** in the Board of Intermediate and Secondary Education (BISE), Multan, among approximately **70,000 students** in the F.Sc. annual examination of 2022.
- I was honored with an award for delivering a **Python, AI and Chatbots** bootcamp at **Synergy**, in collaboration with Metaverse Deviser, hosted at the National Incubation Center for Aerospace Technologies **(NICAT)**, Islamabad.
- I was awarded a certificate for my outstanding contributions to the **AI** STEAM Summer Camp Program, where I trained students in **Robotics, AI**, and Information Security for one month.

Research Experiences

Chip Design Research Intern:

Supervisor: Dr. Hammad M. Cheema, Project Director, NUST Chip Design Centre • *February 2025 – Present*

- Worked on multiple FPGA-based digital chip design projects involving RTL design, simulation, and hardware implementation using System-Verilog.
- Gained practical experience with C programming, Linux, and RISC-V architecture; currently focused on Computer Architecture and processor design.
- Built a strong foundation in embedded systems and hardware-software co-design through hands-on project work.

Technologies: RISC V, Vivado, Intel Quartus, Verilog, System-Verilog, FPGA, Linux Kernel, DE1-SoC Board.

Embedded Systems Research Intern:

Supervisor: Dr. Usman Zabit, HoD and Associate Professor, ESDAC Lab, NUST • *May 2024 – August 2024*

- Developed and deployed Embedded Linux solutions on FPGA and DE-SoC boards, focusing on hardware-software integration and system optimization.
- Gained hands-on experience with bootloaders, Linux kernel configurations, configured GPIOs, optimized memory management for efficient data handling, and real-time processing for embedded systems.

Technologies: RealVNC, FileZilla, Intel Quartus, Verilog, FPGA Hardware, Linux Kernel, DE1-SoC Board.

Machine Learning Research Intern:

Supervisor: Dr. Muhammad Jameel Malik, Assistant Professor, Deep Learning Lab SINES, NUST • *June 2024 – September 2024*

- During my internship, I gained hands-on experience with AI, Machine Learning, Deep Learning Neural Networks, Convolutional Neural Networks, and Image Processing.
- I utilized CUDA, a computer architecture for GPU programming to train and implement a machine learning model on given data and verified the model's performance using PyTorch.

Technologies: Utilizing PyTorch, Google Colab, CUDA, and TensorFlow for optimizing models; Python for data and image processing.

Machine Learning Internship - Skin Cancer Detection
Supervisor: Dr. Nazia Perwaiz, Assistant Professor, HamsanTech, NSTP • *June 2024 – August 2024*

- Developed multiple dashboards to extract valuable insights from real-life industry data.
- Built a machine learning pipeline for Skin Cancer Detection using a **multi-model** approach, achieving **91% accuracy** and an **AUC of 0.963** for accurately labeling skin cancer with a single RGB image.

Technologies: Utilized Python, Scikit-learn, Pandas, Matplotlib, PyTorch and TensorFlow to streamline the machine learning process from data preparation, feature extraction, and model ensembling incorporating models such as XGBoost, AdaBoost, LGBM Classifier, SVM, and Logistic Regression.

Robotics and AI Tutor
Supervisor: Dr. Wajahat Hussain, Assistant Professor • *August 2024*

- Co-led a Robotics and AI Boot Camp for grade 5 students, teaching robotics with EV3 Lego kits and AI model training. Mentored students in building competition-winning robots, including Sumo Wrestling, Speedo, and Obstacle Avoiding bots. The students later presented their projects to the Prime Minister of Pakistan.

Silicon Photonics Research Intern- LiNb Grating Design
Supervisor: Dr. Robert Halir, Associate Professor, Málaga University • *August 2024 – Present*

- Designed and optimized Silicon directional couplers, LiNb grating couplers, Fiber to chip gratings, focusing lenses, S-Bend Mach-Zehnder Interferometers (MZIs) and multi-mode interference (MMI) devices for silicon photonics applications, achieving an average performance enhancement of 11%.

Technologies: Utilized MATLAB and FEXEN for complex calculations, problem- solving, and plotting various types of data graphs.

Projects Undertaken

Crowd Source Air Quality Monitoring System with ML Integration: • *December 2024*

- Engineered a comprehensive IoT-based air quality monitoring solution that integrates multiple environmental sensors for real-time data collection, achieving **99% accuracy** when compared with **US Embassy** AQI monitoring systems.
- A system utilizing advanced sensors (PMS5003, MQ7, MQ2, MQ135, DHT22, BME280) to measure critical air quality parameters including PM2.5, PM10, CO, temperature, humidity, pressure, and elevation from sea level.
- Implemented Bluetooth-based data transmission and created a custom mobile application with integrated machine learning models for real-time air quality index prediction and analysis, specifically designed for urban and industrial applications in tracking and maintaining healthy air quality standards.

Tools and Technologies: Arduino IDE, Arduino UNO, C/C++, PMS5003, Python for ML Model Development.

IoT-Based Patient Health Monitoring System: • *November 2024*

- Developed an integrated healthcare monitoring solution that provides comprehensive patient vital sign tracking including body temperature, ECG readings, heart rate, blood oxygen levels, and fall detection, achieving **95% accuracy** in measurements.
- Implemented high-precision medical-grade sensors (AD8232 for ECG, MAX30100 for SpO2 and heart rate) along with motion detection using MPU6050 for fall detection, creating a complete patient safety monitoring solution.

Tools and Technologies: Arduino IDE, Arduino UNO, C/C++, AD8232 ECG Sensor Module, MAX30100 Pulse Oximeter Module, MPU6050 Gyroscope, Temperature Sensor DS18b20, ECG Signal Processing Algorithms.

Induction Motor Fault Detection System Using Signal Processing and ML: • *October 2024*

- Developed a induction motor fault detection system capable of detecting six critical faults: Eccentricity, Motor Overload, Stator Short Circuit, Broken Rotor Bars, Ground/Earth Faults, and Unbalanced Supply Voltage/Current.
- Developed induction motor models using MATLAB Simulink for fault simulation and analysis, incorporating advanced signal processing techniques for time-frequency and spectral analysis of motor fault signatures.

- Implemented and trained machine learning models using MATLAB's Feature Diagnostic Designer, achieving **96% accuracy** in fault classification and early detection, significantly reducing maintenance costs and system downtime.

Tools and Technologies: MATLAB, Simulink, Signal Processing Toolbox, Feature Diagnostic Designer, Machine Learning Toolbox, Deep Learning Toolbox, Power Electronics Add-on, Predictive Maintenance Toolbox, Classification Learner App.

Fully Automated Egg Incubator Using Atmega328p Microcontroller: *• May 2024*

- A fully automated egg incubator with the Atmega328p microcontroller, precisely managing temperature and humidity through DHT11 and DS18B20 sensors, Stepper motors for automated egg turning, a fan, a water and relays.
- The system maintains humidity between 50%-64% during incubation and 65%-76% during hatching, with automated temperature regulation by a bulb and relay for enhanced accuracy.
- Achieved remarkable results with a **100% successful hatching rate** for pigeon eggs within an 18-day incubation period, demonstrating the system's reliability and precision in maintaining ideal incubation conditions.
- **Tools and Technologies:** Proteus, Arduino IDE, Atmega328p Microcontroller, C/C++, Embedded C, Atmel.

UAV with GPS Integration and Automated Flight Controls: *• December 2023*

- Designed and implemented an open-source quadcopter with GPS integration, leveraging a Pixhawk flight controller for precise navigation and control.
- Configured Mission Planner to enable autonomous flight, including automatic takeoff, task execution, and smooth landing. Integrated real-time telemetry to provide live status updates on a laptop or PC, ensuring reliable performance and seamless monitoring.

Tools and Technologies: Vs Code, Pixhawk, Git and GitHub, Misson Planner (Flight planning and monitoring), Arducopter, GPS Module, ArduPilot Firmware, Python and C++.

Relevant Online Coursework

Machine Learning Specialization (3-Course Series)   Deeplearning.ai • 2024

Mastering the supervised learning techniques like regression, classification, and optimization, along with advanced algorithms such as decision trees, boosting, and neural networks. I explored unsupervised learning methods, recommendation systems, the basics of reinforcement learning and applied these concepts to real-world applications.

Deep Learning Specialization (5-Course Series)   Deeplearning.ai • 2024

Gained a deep understanding of neural networks and optimization techniques, and mastered advanced concepts like hyperparameter tuning, regularization, and optimization strategies. I explored CNNs for tasks like image recognition and sequence models (RNNs, LSTMs) for natural language processing and time-series analysis.

Essentials of Python Programming   Udemy • 2023

Achieved comprehensive knowledge in Python programming, from foundational concepts to advanced techniques, covering object-oriented programming and solved the real-world problems.

Tools/Frameworks/Skills

ML & Deep Learning: TensorFlow, Keras, CNNs, Pandas, Matplotlib, PyTorch, NumPy, Scikit-learn, SciPy, OpenCV, ANNs, RNNs

Microcontrollers: ESP 32, Arduino, Atmega 328p, ATmega 16A, Pixhawk, Arducopter,

Programming Languages: C, C++, CUDA, Embedded C, Assembly Language, Python, Verilog, MATLAB, Simulink

Tools & Simulations: Atmel Studio, RealVNC, FileZilla, Intel Quartus, LabView, NI Multisim, Arduino IDE, Proteus, PSpice, Git & GitHub, VS Code, Jupyter Notebook, Power BI, Tableau, Misson Planner, MATLAB, FEXEN, AutoCAD.

Field-Programmable Gate Array (FPGA): DE-SoC1 Board

Other skills: Project Management, Leadership, Strong Communicator, Teamwork, Complex Problem Solving, Fast Learner, Troubleshooting, Report Writing, Communication Skills (verbal/written)

Hobbies/Interests

Passionate about language learning (currently learning German), sports (volleyball, cricket), e-gaming, book reading, and anime.