

Muhammad Farhan

[Website](#)

Address: Chungi No. 6 Gulgasht, Multan

LinkedIn: <https://www.linkedin.com/in/farhan-zafrani/>

Gmail: mfarhanzafrani@gmail.com

Phone: (+92) 312-9317210

RESEARCH INTEREST

My research interests lie in computational solid mechanics and AI-driven structural analysis. Currently, I work as an AI and Automation Engineer at SOCO Engineers, focusing on node-based shape and thickness optimization, CAE workflow automation, and material data handling for automotive applications. I am particularly interested in higher-order beam theory and AI-based methods for real-time crash simulation and efficient structural design.

PROFESSIONAL EXPERIENCE

AI & Automation Engineer – SOCO Engineers; Gulgasht, Multan

Dec. 2023 – Present

- Spearheaded end-to-end automation of simulation preprocessing and post-processing workflows for BMW Group projects, reducing manual engineering time by 30%.
- Maintained and optimized high-performance C++ and Python codebases for topology optimization, ensuring scalability and numerical stability in large-scale simulations
- Led development of four key AI-driven engineering tools, including:
 - Automated meshing pipeline reducing meshing time by 40%
 - Data extraction tool generating structured simulation databases from noisy test output files
 - FEA analysis framework using Graph Neural Networks (GNNs) to predict stress distributions with up to 80% accuracy compared to FEM

Research Assistant – Human System Lab; NUST, Islamabad, PK

Sept. 2022 – Sept. 2023

- Co-designed and fabricated a fully functional soft robotic glove for upper-limb stroke rehabilitation, integrating real-time EMG signal acquisition and AI-based gesture classification
- Implemented complete software-hardware integration using Raspberry Pi 4, enabling live EMG signal processing, gesture recognition, and pneumatic actuation
- Conducted usability testing and statistical validation using Fitts's Law, improving user interface responsiveness and classification reliability by ~18%

Machine Learning Intern – Human System Lab; NUST, Islamabad

Jun. 2022 – Sept. 2022

- Developed a real-time EMG data pipeline for hand gesture recognition using ensemble learning algorithms (XGBoost, AdaBoost)
- Designed a custom data acquisition protocol for Trigno Delsys systems and synchronized EMG capture for dynamic hand movements
- Programmed interactive rehab games controlled via ML-based hand gesture predictions to improve patient engagement and therapy outcomes

EDUCATION

National University of Sciences and Technology NUST – Islamabad, PK

Sept. 2019 – Jun. 2023

School of Mechanical and Manufacturing Engineering - Bachelor of Mechanical Engineering

GPA: 3.42/4.00

Concentrations: Computational Sciences and Engineering & Robotics and Automation

Honors: Inter NUST Volleyball Champion (2019); Winner in Cart design Challenge (2019); inter NUST Volleyball Champion (2021); FYP Mid Defense Winner (2022); High Achiever 2023

PUBLICATIONS

An sEMG-Driven Multiple DOFs Interactive [Games Based Rehabilitation Protocol](#) for Stroke Patients: Assessing Real-Time User Performance Feedback – Ammar Shahzad, Muhammad Mustafa Khan, **Muhammad Farhan**, Hamza Suhaib Qarni, Asim Waris, and O. Gilani

Status: Under-Review

Journal: Heliyon

Development of an Embedded System Based [sEMG Driven Standalone Upper Limb Rehabilitation](#) Training System: A Human-Computer Interaction – Muhammad Mustafa Khan, **Muhammad Farhan**, Ammar Shahzad, Hamza Suhaib Qarni, Mobeen Hameed, Asim Waris, and O. Gilani

Status: Not Approved

Conference: 3rd IEEE International Conference on Digital Futures and Transformative Technologies (ICoDT2)

PROJECTS

Design and Fabrication of Soft Robotics Glove for the Rehabilitation of Stroke Patients using EMG data and Pattern Recognition Techniques – Final Year Project

Jun. 2022 – Jun. 2023

Fabricated a right hand [Soft Robotic Glove](#) to assist the Stroke Patients in their Rehabilitation.

- Fabricated a soft robotic glove for stroke rehabilitation, achieving 92% accuracy in hand gesture prediction.
- Controlled the actuator using the Raspberry PI 4 that was programmed using Python based on Machine Learning algorithms.
- Designed actuators using CAD and simulated them in ANSYS for optimal pressure requirements.

VOLUNTEERING

Bazm-e-Paigham, Islamabad – Student Counsellor

Mar. 2022 – Aug. 2022

- Participated in the "Make the Diamond Shine" Career Campaign to inspire students about their future goals and academic growth through interactive sessions and guidance.
- Collaborated in a 2-week outreach to 4 indigenous schools in Islamabad, engaging over 400 students in group sessions focused on effective study techniques, personal development, and responsible citizenship.

The Blood Heros Campaign – Volunteer

Sept. 2022 – Jun. 2023

- Organized city-wide awareness campaigns and blood donation drives under the guidance of medical professionals to support thalassemia patients and address critical blood supply needs.

SKILLS

Mechanical Software | SolidWorks, Creo, MATLAB & Simulink

CAE Software | BETA Ansa, BETA Meta, GNS Animator, LS-Dyna, OptiStruct, Abaqus, Nastran

Programming Languages & Tools | Python, C++, SQL, LaTeX, Markdown, Linux, Arduino, Raspberry Pi 4

Python Packages | Pydantic, FastAPI, SQLAlchemy, subprocess, sys, re, os, pathlib, NumPy, Pandas, SciPy,

Machine Learning Frameworks | TensorFlow, Keras, PyTorch, Hugging Face Transformers, Scikit-learn, Statsmodels

Design Software | Adobe Photoshop, Adobe Illustrator, Inkscape

INTERESTS/MISCELLANEOUS

- **Google professional Certificate in Advanced Data Analytics**
- **Specialization in Deep Learning** from Coursera (deeplearning.ai)
- **Mathematics for Machine Learning and Data Science** from Coursera (deeplearning.ai)
- Proficient with Bloomberg Terminal and Microsoft Office: Excel, Word, Notion, PowerPoint
- College Captain (awarded Most Valuable Player), Volleyball, Basketball, and Cricket

REFERENCES

Supervisor:

Name: Dr. Muhammad Asim Waris

Phone No: (+92) 3445662330

Email: asim.waris@smme.nust.edu.pk

Dr. Muhammad Asim Waris is an Assistant Professor at the Aerospace department SMME, NUST. He was my supervisor for the bachelor's (BE) final year project, and currently, I was working with him as a research assistant on a research project at the Human System Lab, SMME, NUST.

Course Teacher:

Name: Dr. Ibraheem Haneef

Phone No: (+92) 3314288863

Email: ibraheem.haneef@smme.nust.edu.pk

Dr. Ibraheem Haneef is a Professor at the Aerospace department SMME, NUST. He has taught me Project Management and also coordinated me in my final year project. I took a workshop of Practical Reinforcement Learning under his supervision.