

MURSAL FURQAN KUMBHAR

AI Systems Architect, Full-Stack Engineer, and Tech Strategist

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Summary

AI Systems Architect, Research Fellow, and Product Engineer specializing in the end-to-end lifecycle of intelligent applications, from exploratory mathematical modeling to production-grade deployment. With a robust publication record in Machine Learning and Predictive Analytics, I synthesize deep-tech research with advanced Full-Stack Development to build scalable systems that translate complex data into intuitive, human-centric experience. I leverage a rigorous Critical Analysis framework and Design Thinking to ensure that AI solutions, ranging from Computer Vision for agriculture to real-time medical simulations, are technically robust, ethically aligned, and accessible to the masses. Whether engineering high-performance algorithms in Jupyter environments or architecting responsive web ecosystems, my mission remains focused on democratizing emerging technologies and driving global digital transformation through high-impact, evidence-based software.

Experience

Mathlab, SISSA

Trieste, Italy

AI Research Fellow

02/2024 - Present

SISSA is a leading international scientific research institute focused on advanced mathematical modeling and physics.

- **Architected and deployed** complex computational web-servers (ARGOS, ATLAS, and Odyssea) designed for high-fidelity simulations of medical and industrial AI problems.
- **Developed the full-stack infrastructure** for FAST Computing, a SISSA-born startup, enabling the commercialization of advanced mathematical research.
- **Translated theoretical simulations** into accessible web interfaces, bridging the gap between deep-tech research and real-world industrial utility.
- **Optimized backend workflows** to handle large-scale data processing, ensuring high performance for real-time computational modeling.

Alagzoo Softwares

Remote

Automation Test Engineer

03/2023 – 01/2024

Alagzoo Softwares is a software development firm focused on high-quality engineering and robust QA methodologies.

- **Developed and executed comprehensive automation frameworks** to ensure the integrity of complex software systems, significantly reducing manual testing overhead.
- **Engineered automated test scripts** for regression and integration testing, identifying critical bottlenecks before production deployment.
- **Collaborated closely with development teams to implement a "Quality First" culture**, utilizing critical analysis to refine the software development life cycle (SDLC).
- **Optimized bug-tracking workflows**, providing data-driven insights to stakeholders that accelerated the release of high-performance digital products.

e4Solutions

Remote

Software Engineer

02/2022 - 03/2023

e4Solutions is an Australian-based technology consultancy specializing in bespoke software solutions and digital transformation.

- **Architected and maintained** scalable software modules, ensuring high availability and performance for international client requirements.
- **Collaborated within a cross-functional global team** to deliver end-to-end features, utilizing modern frameworks to solve complex business logic challenges.
- **Streamlined code deployment workflows**, focusing on modular architecture to improve maintainability and reduce technical debt across core products.
- **Integrated third-party APIs and services**, enhancing the functionality of client platforms while maintaining strict data security protocols.

Diya Interactive AB

Karachi, Pakistan

Software Engineer

02/2021 - 02/2022

Diya Interactive is a specialized digital product agency building scalable web and mobile solutions for international markets.

- **Led the development** of QriosityNet.com, engineering responsive Web (React) and Mobile (React Native) applications to enhance user engagement.
- **Engineered secure web portals** for major insurance providers like InstaCate and Jubilee, focusing on data integrity and seamless user authentication.
- **Implemented automated testing** and API validation frameworks to reduce deployment errors and ensure the reliability of high-traffic platforms.
- **Collaborated on product roadmaps** to integrate modern front-end features that improved accessibility for diverse user bases.

Diya Interactive AB

Karachi, Pakistan

Backend Intern

12/2020 - 02/2021

Diya Interactive is a specialized digital product agency building scalable web and mobile solutions for international markets.

- **Developed core backend logic** for multiple client platforms, focusing on database efficiency and server-side performance.
- **Designed and built a pilot video-calling platform**, managing real-time data streaming and connectivity protocols.
- **Built a functional ATM simulation demo** to test complex transactional logic and security workflows within a sandbox environment.

Education

Università degli Studi di Roma "La Sapienza"	Rome, Italy
Masters in Computer Science	09/2025
Mehran University of Engineering and Technology	Jamshoro, Pakistan
Bachelors of Engineering, Electrical & Electronics	2016 – 2020

Key Achievements

-  Research Lead – Mathlab, SISSA
- Engineered **High-Performance Computing (HPC)** solutions by architecting the ARGOS and ATLAS web servers, enabling global researchers to conduct complex medical and industrial simulations.
 - Transformed **theoretical mathematical models** into accessible, production-ready digital tools, bridging the gap between academic research and industrial application.
-  Startup Ecosystem Architect – FAST Computing
- Spearheaded the **digital launch for a SISSA-affiliated deep-tech startup**, designing the official web infrastructure and defining the technical roadmap for their online presence.
 - Facilitated the **commercialization of scientific research** by building user-centric interfaces that made complex computational simulations intuitive for non-technical stakeholders.
-  Advanced Web Architect – QriosityNet
- Architected and launched a **cross-platform educational ecosystem (Web & Mobile)**, managing the full development lifecycle to ensure high-performance delivery for a growing user base.
 - Pioneered **digital transformation for traditional sectors** by engineering secure, high-traffic portals for international insurance providers including InstaCate and Jubilee.
-  Technical Innovation – Pilot Systems
- Developed and deployed a **specialized pilot video-conferencing platform** during the backend tenure at Diya Interactive, focusing on low-latency real-time communication protocols.
 - Simulated **financial logic systems through the development** of automated ATM demonstrations, showcasing the ability to handle high-stakes, error-sensitive backend architectures.

Skills

AI & Data Engineering	Full-Stack Development	Infrastructure & Automation	Leadership & Strategy
- Python - Machine Learning Systems - Dash - Plotly - Exploratory Data Analysis - Mathematical Modeling - Digital Twins	- React - ES7+ JavaScript - Flask - Django - Sass - Bootstrap	- AWS - Linux (Ubuntu/Debian) - Automation Tenting - Selenium - Git/GitHub - CI/CD Workflows	- Community Building - Design Thinking - Critical Analysis - Project Documentation - Agile Methodologies

Projects

Real-Time Mobile Weed Detection System	01/2026
A lightweight Deep Learning solution designed for real-time invasive plant identification on mobile hardware to assist smallholder farmers.	
- Architected a Computer Vision pipeline using optimized architectures (MobileNet/EfficientNet) to perform real-time inference under significant mobile hardware constraints. - Implemented Transfer Learning methodologies on localized subsets of the PlantCLEF dataset, fine-tuning model weights to achieve high classification accuracy with minimal computational overhead. - Optimized model deployment via TensorFlow Lite/ONNX conversion, ensuring sub-second inference speeds and efficient memory management for "on-the-go" field usage. - Developed exploratory data protocols in Jupyter/VSCode for rigorous preprocessing and augmentation, ensuring model robustness across varying environmental and lighting conditions. Designed for Accessibility: Focused the system architecture on "democratizing AI," transforming complex botanical data into an actionable tool for the agricultural community.	

Projects

Intelligent Health Monitoring & Anxiety Detection System	11/2024
An AI-based diagnostic application developed using Microsoft technologies to detect, diagnose, and suggest treatments for mental health conditions.	
• Architected an end-to-end ML pipeline to analyze behavioral markers and physiological data for real-time anxiety detection. • Integrated cloud-based AI services to provide on-the-go (OTG) diagnostics, bridging the gap between clinical analysis and accessible mobile technology. • Designed a user-centric feedback loop using Design Thinking to ensure empathetic and accurate relief suggestions for users in high-stress environments.	
Predictive Heart Disease Analysis Engine	08/2023
A high-accuracy Machine Learning model designed to predict cardiovascular risks in potential patients based on multi-variate clinical data.	
• Developed a robust classification model achieving a 87.88% accuracy rate using advanced ML techniques and exploratory data analysis in Jupyter environments. • Optimized feature engineering processes to identify key risk indicators, significantly reducing the computational overhead for diagnostic predictions. • Documented technical workflows to ensure model interpretability, allowing for easier integration into clinical decision-support systems.	
Interactive WebChat & Real-time Communication Suite	02/2023
A scalable, live video-conferencing application leveraging the Agora.io SDK for multi-user synchronization.	
• Engineered a high-performance communication interface capable of hosting multiple concurrent users with low-latency audio and video streaming. • Implemented secure real-time protocols to manage data transmission, ensuring a seamless and responsive user experience across web platforms. • Utilized React and modern state management to architect a dynamic UI that handles complex, real-time user interactions.	
Enterprise Automation: High-Volume Certificate Engine	06/2022
A Python-driven automation suite designed to generate customized professional documentation at scale.	
• Developed an automated document generation engine capable of producing hundreds of personalized certificates (PDF/JPEG) with a single-click execution. • Streamlined administrative workflows by eliminating manual data entry, reducing processing time by over 90% for large-scale organizations. • Built a flexible data-mapping architecture that allows for instant customization of names, dates, and branding across various high-fidelity formats.	
Secure Banking Simulation (Django-based ATM)	01/2021
A full-scale backend prototype simulating real-world financial transaction logic and database security.	
• Architected a dynamic relational database to manage real-time transaction history, balance updates, and multi-user authentication. • Engineered robust security protocols to prevent unauthorized access and ensure data integrity within a simulated high-stakes environment. • Utilized the Django framework to build a comprehensive administrative dashboard for monitoring system-wide financial logs and performance metrics.	
Research Publications	
[Book Chapter] Artificial Intelligence and Knowledge Processing	
CRC Press <i>“Improved Decision-Making and Prediction: A Framework for Intelligent Systems.”</i> (2023)	
• Key Contribution: Developed theoretical frameworks for utilizing AI in predictive analytics, focusing on enhancing decision-making accuracy in complex data environments. • Impact: Cited by 14 researchers in the field of knowledge processing and AI-driven prediction.	
[Journal] Artificial General-Internet of Things (AG-IoT) for Robotics	
Systemic Analytics <i>“Integrating AG-IoT for Advanced Robotics of Automation.”</i> (2024)	
• Key Contribution: Explored the intersection of Artificial General Intelligence and IoT to optimize autonomous robotic systems within industrial frameworks.	
[Conference] Heart Disease Prediction using Machine Learning Algorithms	
Smart Gen Computing (IEEE)	
• Key Contribution: Engineered a high-accuracy predictive model for cardiovascular risk assessment. Presented at the International Conference on Smart Generation Computing. • Impact: Cited by 13 peer-reviewed works, establishing a baseline for ML-based diagnostic tools.	
[Book Chapter] Image Denoising using Autoencoders	
Artificial Intelligence & Knowledge Processing	
• Key Contribution: Researched and implemented Deep Learning Autoencoders to improve image clarity and data integrity in computer vision pipelines. (2023)	
[Conference] Soft Computing and Its Engineering Applications	
Springer Nature	
• Key Contribution: Selected for publication in the <i>Revised Selected Papers</i> for icSoftComp 2024, Bangkok, contributing to global discourse on advanced soft computing methodologies. (2025)	
[Conference] Industrial Robotic Claw for Cottage Industries	
ICCME	
• Key Contribution: Designed an automated robotic interface specifically for small-scale industrial applications, aligning with the mission to democratize high-tech for the masses. (2019)	