Zeshan **Khan**

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Summary

Dynamic and dedicated educator with extensive experience in teaching and supervising students in computer science and related fields. Specializing in medical image analysis, I have successfully taught a wide range of courses, including Object-Oriented Programming, Computer Organization, and Web Technologies, while actively engaging in curriculum development and innovative course offerings such as Quantum for Machine Learning. My research endeavors focus on resource-efficient algorithms and machine learning applications, demonstrated through my PhD work and various projects. A committed mentor, I have guided students in extracurricular activities, programming competitions, and final year projects, fostering a collaborative learning environment. I also contribute to academic committees and industry partnerships, ensuring that my students are well-prepared for the challenges of the technology sector. With a strong foundation in both academia and practical applications, I aim to inspire the next generation of technology leaders.

Education

National University of Computer and Emerging Sciences

Karachi, Pakistan

PH.D. IN COMPUTER SCIENCE

Aug. 2017 - June. 2024

During my PhD, I focused on tackling a real-world healthcare challenge through the lens of computer science. My thesis, titled ”Abnormalities and Disease Detection in Gastro-Intestinal Tract Images,” centered on developing advanced machine learning and deep learning techniques to improve diagnostic accuracy in medical imaging—specifically for gastrointestinal (GI) tract abnormalities.
This work was driven by the growing need for faster, more reliable diagnostic tools, especially in areas like endoscopy, where timely detection is critical. I explored a range of cutting-edge methods for identifying and analyzing anomalies in GI images, working with large datasets and real-time processing techniques to improve the effectiveness of detecting conditions.
Beyond algorithm development, I focused on bridging the gap between theory and practice, bringing computational models closer to clinical application. The goal was to create tools that could genuinely support doctors and specialists in diagnosing GI diseases more accurately and efficiently.
Through this research, I not only demonstrated how powerful machine learning can be in enhancing medical imaging but also highlighted the value of collaboration between computer science and healthcare in solving impactful problems.

Capital University of Science and Technology

Islamabad, Pakistan

MS IN COMPUTER SCIENCE

Sep. 2012 - Dec. 2015

For my MS thesis, titled ”An Improved Parenthesization Algorithm for the Matrix Chain Product (IPAMCP),” I worked on improving the efficiency of matrix multiplication—an operation that plays a key role in many computational and scientific applications. While exploring traditional approaches to matrix chain multiplication, I noticed that a lot of redundant computations were slowing things down.
To address this, I designed a smarter algorithm that uses mathematical optimization techniques to decide, on the fly, whether to stick with the standard method or switch to the optimized version I developed. This dynamic approach ensures the most efficient computation path is chosen based on the specific problem at hand.
The result is an algorithm that significantly reduces computational effort and speeds up performance, especially in scenarios involving large or complex matrix operations. Through this work, I gained a deeper appreciation for the power of optimization in algorithm design and how small improvements can have a big impact in real-world applications.

Muhammad Ali Jinnah University

Islamabad, Pakistan

BS IN COMPUTER SCIENCE

Aug. 2007 - Dec. 2012

For my BS final year project, I worked on solving the Longest Common Subsequence (LCS) problem using a dominant point-based algorithm, with a focus on bioinformatics applications—specifically, sequence alignment. I implemented this algorithm and successfully integrated it with ClustalW, a well-known tool used for multiple sequence alignment.
The core idea was to speed up the alignment process by improving the algorithm’s efficiency which was NP hard problem in case of high number of sequences. My approach reduced the time complexity from the $O(n^d)$ by using dynamic programming to $O(n * d)$ using dominant point approach, where d represents the number of sequences of length n. This significantly accelerated the alignment without compromising accuracy.
This project demonstrated how algorithmic innovation can lead to meaningful performance improvements in real-world bioinformatics tasks, and it gave me hands-on experience in combining theoretical computer science with practical biological data analysis.

Pedagogy Courses

Learning to Teach Online

Sydney

The University of New South Wales

August 2020

Completed the Learning to Teach Online course (offered by UNSW Sydney through Coursera), which equipped me with practical strategies for designing and delivering effective digital education. Through this program, I developed skills in creating engaging online content, fostering student collaboration in virtual environments, and implementing fair assessment methods for remote learning. The course also deepened my understanding of educational technology tools, enabling me to adapt teaching methods for more interactive and impactful online instruction.

Teaching Online - Some Opinions and Strategies

Karachi, Pakistan

National University of Computer and Emerging Sciences

December 2020

I had the opportunity to participate in the Teaching Online - Some Opinions and Strategies workshop at the National University of Computer and Emerging Sciences, where I connected with fellow educators to exchange real-world experiences about digital teaching. The sessions felt like a much-needed conversation - we shared struggles, tested new engagement techniques, and explored creative ways to make online classes more interactive. From experimenting with different virtual classroom tools to rethinking how we assess students remotely, the workshop gave me practical ideas I could immediately apply to my own teaching. What I appreciated most was the collaborative spirit - it wasn't just theory, but actual educators problem-solving together to navigate this new era of digital learning.

Teaching PPS in Practice by Dr. ING- Tobias Sprodowski

Islamabad, Pakistan

National University of Computer and Emerging Sciences

September 2023

The 'Teaching PPS in Practice' workshop gave me both the theory and hands-on skills needed to effectively teach Production Planning and Scheduling. Through interactive tutorials and practical programming tasks, I worked through real-world PPS challenges, gaining firsthand experience in applying project management techniques to solve complex scheduling problems. What made this experience particularly valuable was collaborating with management faculty - their insights helped me bridge the gap between technical production frameworks and strategic business thinking, something I now bring to my own teaching approach.

Outcome Based Education System

Peshawar, Pakistan

National University of Computer and Emerging Sciences

October 2022

I had the chance to attend an eye-opening seminar on Outcome Based Education at NUCES Peshawar in October 2022. What really struck me was how it flipped traditional teaching approaches - instead of focusing on what we teach, we discussed how to design education around what students actually need to succeed. Through interactive sessions, we explored practical ways to align curriculum with industry demands, rethink assessments, and incorporate feedback from all stakeholders. The most valuable part for me was collaborating with other educators to brainstorm how to implement OBE principles in real classroom settings.

Teaching of Teachers: 4MAT Teaching Pedagogy

Peshawar, Pakistan

National University of Computer and Emerging Sciences

November 2021

The 'Teaching of Teachers: 4MAT Pedagogy' workshop revolutionized how I design lessons—it taught me to engage every type of learner, from curious 'Why?' students to practical 'How?' thinkers. Through hands-on activities, I learned to structure classes as a dynamic cycle (experience → theory → practice → creativity) that helps concepts stick. Now, I consciously tailor my teaching to bridge learning styles, whether I'm explaining abstract ideas or designing real-world applications. The best part? Seeing even reluctant learners light up when lessons speak their language.

Workshop on Effective PhD Supervision, Research Ethics, Publications

Islamabad, Pakistan

National University of Computer and Emerging Sciences

November 2024

I recently attended the 'Effective PhD Supervision, Research Ethics, and Publications' workshop, which came at the perfect time as I transition into guiding PhD candidates. The sessions gave me practical tools to navigate the dual role of being both a mentor and ethical gatekeeper - from handling sensitive research dilemmas to structuring supervision meetings that actually move projects forward.

Trainings

CODE: Center of Game Development and Excellence

Islamabad, Pakistan

Unity 3D-based Game Development

May 2016

In early 2016, I immersed myself in a two-month Unity 3D Game Development bootcamp at CODE, where I went from game enthusiast to confident developer. Daily hands-on projects had me building 3D worlds from scratch—rigging character controllers, coding interactive mechanics, and troubleshooting physics quirks.

Pakistani Pattern Recognition Society

Murree, Pakistan

PPRS Autumn School for Deep Learning

October 2018

At the 2018 PPRS Autumn School on Deep Learning, I dove into the fascinating world of AI-powered drones—where cutting-edge computer vision meets real-world flight. For three intensive days, I worked alongside experts implementing neural networks that could 'see' and interpret aerial footage in real-time. Getting hands-on with object detection algorithms that could track movement from UAV cameras, then testing our models in simulated flight scenarios. I understood how to adapt deep learning for the unique challenges of aerial systems, from dealing with changing altitudes to processing visual data mid-flight.

HEC, NCEAC and PASHA

Karachi, Pakistan

Data Analytics and Big Data

August 9, 2018

I had the privilege of attending a dynamic seminar on Data Analytics and Big Data, a collaborative initiative by HEC, NCEAC, and PASHA. The event delved into the transformative power of big data across industries, blending cutting-edge trends—like machine learning and cloud-based analytics—with real-world applications. One key takeaway was the critical role of scalable solutions in managing vast datasets, as well as how data-driven strategies are reshaping business intelligence and public-sector decision-making.

Ghulam Ishaq Khan Institute

KPK, Pakistan

Quantum Technology

July 2023

I got to spend a fascinating day diving into the world of quantum computing at GIKI's workshop. The presenters made mind-bending concepts like quantum superposition actually understandable, showing how this technology could completely transform fields I care about, from cyber security to AI. I got solid fundamentals and this exciting sense that we're on the edge of a major tech revolution. It's one of those learning experiences that keeps popping up in my thoughts whenever I encounter computational challenges now

Skills

Programming Languages	C++, Python, Java, Assembly Language
Web Development	HTML, CSS, JavaScript, PHP, MySQL, .NET, MERN stack
Machine Learning and AI	TensorFlow, Keras, Scikit-learn, Model Optimization
Data Analysis	Data Visualization, Statistical Analysis, Data Mining
Image Processing	Medical Image Analysis, Image Segmentation Techniques
Software Development	Agile Methodologies, Version Control (Git)
Algorithm Design	Design and Analysis of Algorithms, Optimization Techniques
Research Methodologies	Literature Review, Experimental Design, Data Collection and Analysis
Publication	Writing Research Papers, Conference Presentations, Peer Review
Course Development	Curriculum Design, Syllabus Creation, Educational Technology Integration
Student Mentorship	Guidance on Projects, Coaching in Programming Competitions, Extracurricular Activity Support
Instructional Techniques	Active Learning Strategies, Assessment Design, Feedback Mechanisms
Problem-Solving	Critical Thinking, Analytical Skills, Conflict Resolution
Event Coordination	Organizing Conferences, Workshops, and Competitions
Committee Involvement	Participation in Academic and Extracurricular Committees
Collaboration	Working with Industry Partners, Faculty Coordination, Student Engagement

Experience

National University of Computer and Emerging Sciences

Islamabad, Pakistan

Assistant Professor

July. 2024 - Current

- Taught Object-Oriented Programming in C++ and Computer Organization and Assembly Language, ensuring students gained practical coding skills and understanding of low-level hardware interactions.
- Developed and introduced a new course on Quantum Machine Learning, teaching machine learning in a quantum environment, such as IBM Quantum Computer.
- Supervised final year project on Deforestation Trends Prediction using satellite image data, helping students develop a model for environmental monitoring and analysis.
- Guided a project on Tourism Encouragement using 3D Visualization Techniques, enabling students to create immersive virtual tourism experiences.
- Mentored a project on Safe Path Guidance for Tourism, resulting in a system providing real-time safety recommendations for travelers.
- Supervised an MS thesis on Brain Tumor Segmentation, leading to advancements in medical image processing and segmentation techniques.
- Provided mentorship for students' extracurricular activities, fostering personal growth and skills beyond the classroom.
- Coached students in ICPC programming competitions, developing their competitive coding abilities and improving problem-solving skills.
- Contributed to campus and department committees, including roles in the anti-tobacco/drugs committee and the exam retake committee.
- Served as a reviewer for the ICIT 2024 and ICET 2024, evaluating research papers for quality and relevance, and provided valuable feedback to authors.

National University of Computer and Emerging Sciences

Pakistan

Lecturer

Aug. 2017 - June. 2024

- Taught a diverse range of courses with a focus on software engineering topics such as Software Re-Engineering, Formal Methods in Software Engineering, and Design and Analysis of Algorithms. Other courses include Data Structures, Machine Learning, Web Technologies, Web Programming, Database Systems, Computer Networks, Programming Fundamentals, Human-Computer Interaction, Data Science, Information Retrieval, Theory of Automata, and Digital Image Processing.
- Developed a new course on Web Technologies, covering the MERN stack and other modern web development frameworks.
- Supervised numerous final year projects, guiding students to apply theoretical knowledge to practical problems. Some examples include medical applications like ECG Interpretation and AI Doc, a medical assistant, as well as innovative systems like a Cricket Player Ranking System using Google's PageRank Algorithm, an emotion-based music player (Ignite Funded), and a meta-verse multiplayer chess game. Other projects explored fields like traffic vehicle recognition, VR tourism, and facial health monitoring.
- Supervised MS Theses focused on real-world applications of AI and computer vision, such as generating synthetic scenes for military and urban training, analyzing vendor spending, and using computer vision for social distancing and facemask detection to monitor COVID-19 SOPs.
- Member of the Organizing Committee for the International Conference on Emerging Technologies (ICET) 2023.
- Played a key role in organizing the International Conference on Emerging Technologies (ICET) 2023 at NUCES Peshawar Campus, contributing to the planning and execution of the event.
- Served as a reviewer for the ICET 2023, evaluating research papers for quality and relevance, and provided valuable feedback to authors. Additionally, participated as a reviewer for AAAI 2020, one of the leading AI conferences globally.
- Acted as the Faculty Advisor for multiple student societies, including the Webmasters Student Society and the Dramatics and Extracurricular Activities Society (DECS), overseeing student-led initiatives and encouraging active participation in academic and extracurricular events.
- Provided mentorship as the Faculty Co-Head of the Core Committee for Student Societies at NUCES Karachi, guiding various student groups in organizing campus-wide activities and fostering leadership skills.
- Led as the Faculty Advisor for the ACM Student Chapter and Microsoft Student Partner programs at NUCES Peshawar, supporting students in advancing their technical expertise and community outreach.
- Coordinated Final Year Projects (FYPs) at both Karachi and Peshawar Campuses, ensuring the successful completion of innovative student projects across multiple domains, from machine learning to software development.
- Acted as Faculty Coordinator for COLAB at Peshawar Campus, facilitating collaboration between students and faculty on creative and research-driven projects.
- Served as the focal person for NGIRI Ignite at both Karachi and Peshawar Campuses, assisting students in securing funding for innovative ideas and projects under the national-level NGIRI program.
- Coached and mentored students for prestigious programming competitions such as the FPSC and IEEE Xtreme 17, where my teams achieved top 5 rankings in Pakistan and secured positions among the top 100 globally.

Riphah International University

Islamabad, Pakistan

Jr. Lecturer

Nov. 2015 - July. 2017

- Delivered lectures and supervised labs for key computer science courses such as Design and Analysis of Algorithms, Data Structures, and Database Systems, focusing on building a strong theoretical foundation and practical problem-solving skills in students.
- Supervised various final year projects in the domains of software engineering and artificial intelligence, guiding students through innovative projects like an Augmented Reality-based Surgery Simulator and a Code Plagiarism Detection System using the Longest Common Subsequence (LCS) algorithm for structural similarity.
- Organized programming competitions within the campus to encourage students' participation in problem-solving challenges, enhancing their coding and analytical abilities.
- Arranged industry visits to provide students with real-world exposure and mentorship opportunities, helping them bridge the gap between academic learning and industry practices.

Muhammad Ali Jinnah University

Islamabad, Pakistan

Jr. Lecturer

Sep. 2013 - Nov. 2015

- Taught labs for Data Structures, Programming Fundamentals, and Object-Oriented Programming, ensuring students grasped key concepts through practical sessions.
- Played a pivotal role in the committee for designing lab manuals, contributing to the creation of structured and effective lab exercises.
- Served as a member of the organizing committee for the International Conference on Emerging Technologies (ICET 2013) at Muhammad Ali Jinnah University, Islamabad, enhancing the conference's success through careful planning and coordination.
- Actively organized and judged in the EXCEL IN IT CUP (EXCITECUP2013), fostering a competitive spirit and critical thinking among students in technology and programming competitions.

NEO GlobalAB

Islamabad, Pakistan

Web Developer

Jan. 2013 - Sep. 2013

- Developed various web applications using PHP and frameworks like CodeIgniter, delivering robust, user-friendly solutions tailored to client needs.
- Designed and implemented custom web solutions, focusing on scalability, security, and performance optimization.
- Integrated front-end and back-end technologies to build dynamic, interactive websites and applications.
- Collaborated with cross-functional teams to ensure seamless project development, from conceptualization to deployment.
- Managed databases and optimized SQL queries to enhance application efficiency and data handling capabilities.
- Created a flipbook feature, enabling seamless digital publication with interactive flipping effects for improved user engagement.

AXPROZ

Islamabad, Pakistan

Jr. Software Engineer

June. 2012 - Dec. 2012

- Developed C# web applications and performed back-end development using Microsoft technologies and SQL Server, ensuring high-performance, scalable solutions.
- Built and maintained web bots for automating software testing tasks, improving efficiency and reducing manual effort in testing workflows.
- Collaborated closely with front-end developers to ensure seamless integration of back-end services with user interfaces.
- Implemented robust database management practices, optimized SQL Server queries, and ensured data integrity in web applications.
- Designed APIs and services to support data-driven web applications, adhering to best practices in security and performance optimization.

Funded Projects (Principal Investigator)

Mosquito Type detection using computer vision for Pakistani regions

Rs. 1,374,000

Faculty Research Support Grant: National University of Computer and Emerging Sciences

Fall 2024 - Fall 2025

Mosquito surveillance is a key component towards prevention from the mosquito-based disease outbreaks. The standard way of the identification of the mosquito and the species is the laboratory testing of the mosquito samples. The process takes a lot of time to get enough data for the mosquitos. The time requirements can be mitigated by the engagement of public community in a mosquito surveillance. The public can be used for the capturing of the mosquito images for the later use of image classification. The classification of the mosquitos can lead to the prevention steps from various mosquito-based diseases. The classification of the mosquito can be done using genetic analysis of the mosquito and the physical appearance-based analysis of the mosquito. There is a need for the appearance-based classification system which can be used to identify the type of mosquito by just taking a picture. The objective of this research is identification of the mosquito from its pictures captured using slandered camera. This research is planned to investigate various methodologies available for the mosquito classification using mosquito images. The investigation will result in an improved methodology of mosquito type detection with respect to its severity for the dengue. There are several methods available for the classification of various images. The recent research shows good results in the classification using ensemble learning and the deep learning approaches.

VR Traveller

Rs. 68,234

Ignite: National Technology Fund

Fall 2023

VR-TRAVELLER transports users back in time to experience the Gandhara civilization with unprecedented realism. By selecting specific years or eras, explorers can witness the evolution of this ancient Buddhist kingdom—from its early foundations in 500 BCE to its golden age under the Kushan Empire (30–375 CE). Walk through the bustling streets of Taxila in 300 CE, where Greek-influenced stupas tower over markets filled with merchants from across the Silk Road. Stand beside artisans crafting the iconic "Fasting Buddha" statues in 200 CE, or observe monks transcribing Sanskrit texts in the shadow of the Takht-i-Bahi monastery at its peak. The platform's year-specific environments reveal dynamic changes—see how Buddhist pilgrimage sites expanded after Emperor Kanishka's reign, or watch Gandharan art gradually blend Persian and Hellenistic styles. Every architectural detail, seasonal landscape, and cultural interaction is historically grounded, letting users not just visit, but truly inhabit Gandhara's living history through scientifically validated reconstructions.
This time-window feature transforms passive learning into active historical witnessing—where choosing a year becomes a doorway to understanding cause, effect, and cultural continuity across centuries.

Sentimentos

Rs. 55,000

Ignite: National Technology Fund

Spring 2020

Sentimentos reimagines music discovery by creating emotional harmony between technology and human experience. This innovative app acts like your personal DJ—using your smartphone's camera to gently read your mood by using power of face detection and neural networks, then curating a perfect playlist to match how you feel in that moment. Whether you're unwinding after work or need an energy boost, it seamlessly blends AI-powered emotion recognition with a vast music library, delivering tracks that resonate with your current state. All processing happens right on your device, keeping it private and instant.

Courses Designed

Web Technologies

Pakistan

National University of Computer and Emerging Sciences

Spring 2022

In Spring 2022, I introduced the Web Technologies course in response to valuable insights gathered from the Industrial Advisory Board and the Pakistan Software Export Board (PASHA) survey. These sources highlighted the growing demand for modern web development skills in the industry, particularly within the Pakistani technology market. The course was designed to equip students with the knowledge of contemporary web technologies, making them well-prepared for the evolving job market. This alignment between academic offerings and industry needs ensures that students are learning relevant skills that will enhance their employability in a highly competitive market.

The course covers a range of technologies, from the foundations of web development to advanced web frameworks like .NET, MERN, and Python frameworks. By diving into these frameworks, students gain a comprehensive understanding of both front-end and back-end development, which is crucial for full-stack web development roles. This course bridges the gap between traditional programming skills and the latest advancements in web technologies, addressing the specific skills gaps identified by industry leaders and making students capable of contributing effectively to the global web development landscape.

Quantum for Machine Learning

Pakistan

National University of Computer and Emerging Sciences

Spring 2025

The Quantum for Machine Learning course, set to launch in Spring 2025, was designed in response to growing trends in cutting-edge research, as highlighted by feedback from ACM newsletters and the significant advancements in IBM's quantum computing technology. As the world of quantum computing has started to intersect with machine learning, the potential to solve complex computational problems at an unprecedented scale has gained substantial attention. The course aims to provide students with the theoretical foundations and practical skills necessary to leverage quantum computing in machine learning tasks. Students will explore quantum algorithms and learn to implement machine learning models in a quantum environment, such as IBM Quantum, giving them exposure to this rapidly evolving field.

The decision to offer this course was further fueled by the increasing importance of quantum computing in academic research and industry innovations. Quantum computing's ability to revolutionize areas such as optimization, cryptography, and data analysis aligns with the broader need for advanced computational techniques in artificial intelligence. This course will position students at the forefront of these developments, equipping them with the expertise needed to pursue research and development opportunities in this cutting-edge domain.

Courses Taught

Applied Machine Learning

Pakistan

National University of Computer and Emerging Sciences

2022 - 2023

This course introduces the core concepts of machine learning, including supervised and unsupervised learning, classification, regression, and clustering algorithms. I guide students through the process of building, training, and testing machine learning models using popular frameworks and libraries. We cover the ethical implications of machine learning and its applications in areas such as image recognition, natural language processing, and predictive analytics.

Digital Image Processing

Pakistan

National University of Computer and Emerging Sciences

Fall 2023

This course provides an introduction to the techniques and algorithms used for processing digital images. I cover topics such as image transformation, filtering, edge detection, and color analysis. Students learn about image segmentation, feature extraction, and pattern recognition, with practical applications in areas like medical imaging and computer vision. The course includes hands-on labs where students apply image processing techniques using tools like Python.

Data Science

Karachi, Pakistan

National University of Computer and Emerging Sciences

Spring 2020

This course introduces students to the fundamental concepts of data science, including data collection, preprocessing, analysis, and visualization. I cover key machine learning algorithms and statistical methods for extracting insights from data. Students gain experience using tools like Python, R, and Jupyter notebooks to analyze datasets and create predictive models. The course emphasizes hands-on projects where students apply data science techniques to solve real-world problems.

Information Retrieval

Karachi, Pakistan

National University of Computer and Emerging Sciences

Fall 2019

Information Retrieval (IR) focuses on the theory and practice of retrieving information from large datasets, such as search engines. I cover topics such as indexing, ranking algorithms, query processing, and evaluation metrics like precision and recall. The course also delves into advanced topics like natural language processing and semantic search, enabling students to understand how modern search engines and recommendation systems function.

Human-Computer Interaction (HCI)

Pakistan

National University of Computer and Emerging Sciences

2022 - 2023

HCI introduces students to the design and evaluation of user interfaces. I emphasize the importance of user-centered design and usability principles. The course covers topics such as cognitive psychology, interaction design, and prototyping. Students learn to design interfaces that are intuitive and meet the needs of diverse users. The course also includes usability testing and evaluation methodologies.

Formal Methods in Software Engineering

Pakistan

National University of Computer and Emerging Sciences

Spring 2023

Formal methods provide a mathematically rigorous approach to software specification, development, and verification. In this course, I introduce students to formal specification languages and methods such as Z, VDM, and model checking. The focus is on ensuring that software systems meet their requirements through the use of proofs and formal verification techniques. The course equips students with the skills to apply formal methods in high-assurance systems.

Software Re-Engineering

Pakistan

National University of Computer and Emerging Sciences

Spring 2023

This course explores techniques for modifying and improving existing software systems. I teach students how to analyze legacy code, refactor it, and improve its design and maintainability without altering its functionality. Topics include reverse engineering, code restructuring, and the use of automated tools for re-engineering software systems. Students also learn how to plan and manage re-engineering projects effectively.

Web Programming

Pakistan

National University of Computer and Emerging Sciences

2012 - 2023

Web Programming introduces the foundational aspects of web development, starting with an overview of web concepts, multi-layer and multi-tier architectures. Students learn front-end development using HTML, CSS, and JavaScript, followed by back-end development with PHP and MySQL for database management. The course emphasizes the integration of these technologies to build dynamic, data-driven websites.

Web Technologies

Pakistan

National University of Computer and Emerging Sciences

2022 - 2023

Web Technologies explores the broader ecosystem of web development tools and technologies, focusing on advanced web frameworks. Students are introduced to platforms such as .NET, MERN (MongoDB, Express, React, Node.js), and Python-based frameworks like Django and Flask. The course aims to provide a comprehensive understanding of the latest web development trends and how to apply them in real-world projects.

Programming Fundamentals (C++)

Pakistan

National University of Computer and Emerging Sciences

Fall 2017

In this introductory course, students are taught the basics of programming using languages like Python or C++. I focus on essential programming concepts such as variables, data types, control structures, and functions. The course is designed to build a strong foundation in programming logic and problem-solving skills, preparing students for more advanced courses in software development.

Object-Oriented Programming (C++)

Islamabad, Pakistan

National University of Computer and Emerging Sciences

Fall 2024

This course teaches the principles of object-oriented programming (OOP) using C++. I focus on key OOP concepts such as classes, objects, inheritance, polymorphism, encapsulation, and abstraction. Students learn to design modular and reusable code by applying OOP principles to solve complex problems. The course includes hands-on coding assignments and projects where students implement real-world systems using C++.

Data Structures

Pakistan

National University of Computer and Emerging Sciences

2017 - 2024

In this course, students explore various data structures such as arrays, linked lists, stacks, queues, trees, heaps, and graphs. I emphasize the importance of choosing the right data structure to optimize time and space for different types of problems. The course also covers the implementation of these structures and their use in solving complex computational tasks. Students gain hands-on experience in manipulating data for efficient storage, retrieval, and modification.

Design and Analysis of Algorithms

Pakistan

National University of Computer and Emerging Sciences

2017 - 2022

This course delves into the fundamental techniques for designing efficient algorithms and analyzing their performance. It covers a range of algorithmic strategies, including greedy algorithms, divide and conquer, dynamic programming, and backtracking. I focus on teaching students how to evaluate algorithm efficiency in terms of time and space complexity, using Big-O notation. Students also learn how to approach optimization problems and develop algorithms that solve real-world challenges efficiently.

Theory of Automata

Pakistan

National University of Computer and Emerging Sciences

2019 - 2021

Theory of Automata introduces the mathematical foundations of computation. I cover formal languages, grammars, finite automata, Turing machines, and the concepts of computability and decidability. Students learn to design and analyze automata and gain an understanding of the theoretical limits of what can be computed. The course prepares students for more advanced topics in computer science, such as complexity theory and algorithm design.

Database Systems

Pakistan

National University of Computer and Emerging Sciences

2017 - 2024

The Database Systems course provides a comprehensive understanding of data storage, management, and retrieval. I guide students through relational databases, SQL, and NoSQL databases. Topics include query optimization, transaction management, data normalization, and database indexing. Students are also introduced to data modeling techniques and are tasked with building and managing database-driven applications.

Computer Networks

Pakistan

National University of Computer and Emerging Sciences

2022 - 2024

This course covers the essential principles of networking, including network architecture, protocols, and communication models like TCP/IP and OSI. I emphasize practical aspects of networking such as routing, switching, IP addressing, and wireless communication. Students also learn about network security, quality of service, and how networks support large-scale internet applications. The course includes lab work with real networking tools and simulators.

Achievements

Employee of the Month

Pakistan

Axproz

September 2012

In September 2012, I was recognized as the Employee of the Month at Axproz for my exceptional performance and contribution to the company's operations. I successfully developed the backend of the company's core application, "ContentProz," which streamlined the management of orders and customer data. This achievement not only enhanced the company's operational efficiency but also demonstrated my ability to deliver high-quality solutions under tight deadlines.

Faculty Coder of the Year

Pakistan

National University of Computer and merging Sciences

2022

In 2022, I was honored with the ”Faculty Coder of the Year” award at the National University of Computer and Emerging Sciences. This recognition was the result of my performance in a speed programming competition, akin to prestigious events such as FPSC, IEEE Extreme, and ICPC. The competition showcased my problem-solving skills, technical expertise, and ability to perform under time constraints.

Chess Champion

Pakistan

Muhammad Ali Jinnah University, Pakistan

2009

In 2009, I won the Inter-Department Chess Championship at Muhammad Ali Jinnah University, demonstrating strategic thinking, focus, and problem-solving abilities. This achievement highlights my ability to analyze complex scenarios and develop winning strategies under competitive conditions.

Runner-up Programming Competition

Pakistan

Muhammad Ali Jinnah University

2010

I secured second place in a university-wide programming competition at Muhammad Ali Jinnah University. This competition, akin to IEEE Extreme and ICPC, tested participants' problem-solving skills, algorithmic knowledge, and programming proficiency under time constraints.

Publications

J1 **Zeshan Khan**, Muhammad Atif Tahir, Real time anatomical landmarks and abnormalities detection in gastrointestinal tract, PeerJ Computer Science, Volume 9, Pages e1685. **(IF=3.8)**

J2 Debesh Jha, **Zeshan Khan**, et al. A comprehensive analysis of classification methods in gastrointestinal endoscopy imaging, Medical image analysis, Volume 7, Pages 102007. **(IF=10.9)**

J3 Debesh Jha, **Zeshan Khan**, et al. Validating polyp and instrument segmentation methods in colonoscopy through Medico 2020 and MedAI 2021 Challenges, Medical image analysis, (2024). **(IF=10.9)**

C01 **Z Khan**, MA Khan, A Wahab, U Musharaf, GADNN: Gender and Age Detector Neural Network, 2023 18th International Conference on Emerging Technologies (ICET), Pages 299-304.

C02 **Zeshan Khan**, Mubashir Yasin, Muhammad Atif Tahir, Abdullah Bin Khalid, Voting Neural Network (VNN) for Endoscopic Image Segmentation, in 2022 International Conference on Emerging Trends in Smart Technologies (ICETST).

C03 **Zeshan Khan**, Mubasher Khan, Mubashir Yasin, Muhammad Hassan, Muhammad Atif Tahir, Medico 2021: Medical Image Augmentation and Segmentation using Combination of Segmentation Neural Networks in Medico 2021.

C04 **Zeshan Khan**, Umar Naseer, Muhammad Atif Tahir, Short Text Classification Using TF-IDF Features and Fast Text Learner in MediaEval 2021 Workshop, MediaEval 2021

C05 **Zeshan Khan**, Muhammad Usman Tariq Alvi, Muhammad Atif Tahir, Shahbaz Memon. Medical Diagnostic by Data Bagging for Various Instances of Neural Network. In 25th International Conference on Pattern Recognition 2020.

C06 **Zeshan Khan** and Muhammad Atif Tahir. Majority voting of heterogeneous classifiers for finding abnormalities in the gastro-intestinal tract. In MediaEval, 2018.

C07 Aiman Siddiqui, Asim Ahmed, Ali Faisal Saleem, **Zeshan Khan Alvi**, Tanvir Alam, Rizwan Qureshi, Attention based covid-19 detection using generative adversarial network in 2021 4th International Conference on Computing & Information Sciences (ICCIS)

C08 Behraj Khan, Tahir Syed, **Zeshan Khan**, Muhammad Rafi, Textual analysis of End User License Agreement for red-flagging potentially malicious software in 2020 International Conference on Electrical, Communication, and Computer Engineering (ICECCE)

C09 M Waqas, **Z Khan**, SU Ahmed, A Raza, MIL-Mixer: A Robust Bag Encoding Strategy for Multiple Instance Learning (MIL) using MLP-Mixer, 2023 18th International Conference on Emerging Technologies (ICET), Pages 22-26.

C10 M. Waqas, **Zeshan Khan**, S. Anjum, M.A. Tahir. Lung-Wise Tuberculosis Analysis and Automatic CT Report Generation with Hybrid Feature and Ensemble Learning. In CLEF2020 Working Notes. CEUR Workshop Proceedings, Thessaloniki, Greece.

C11 S.M.F. Ali, M.T. Khan, S.U. Haider, T. Ahmed, **Zeshan Khan**, M.A. Tahir. Depth-wise Separable Atrous Convolution for Polyps Segmentation in Gastro-Intestinal Tract. In MediaEval, 2020.

Supervised BS Final Year Projects

Fall 2016	**Code Plagiarism detection using structural similarity by LCS algorithm**, Muhammad Ali Jinnah University	*Islamabad, Pakistan*
Spring 2017	**Augmented reality based surgery simulator**, Riphah International University	*Islamabad, Pakistan*
Spring 2017	**E-Ilm-Gah: An android based school management system for teachers, parents and students**, Riphah International University	*Islamabad, Pakistan*
Spring 2017	**MRS: A retail shop that connects different products sellers with the intermediate buyers of those products.**, Riphah International University	*Islamabad, Pakistan*
Spring 2017	**Chat-All: An android-based chat application that connects people just like available chat apps with a new feature of offline (GSM based) chatting in the absence of internet.**, Riphah International University	*Islamabad, Pakistan*
Spring 2017	**Try Attire**, Riphah International University	*Islamabad, Pakistan*
Spring 2018	**Class Feedback by Mood Detection**, National University of Computer and Emerging Sciences	*Karachi, Pakistan*
Spring 2019	**AI Doc: A medical assistant for treatment suggestions from latest literature**, National University of Computer and Emerging Sciences	*Karachi, Pakistan*
Spring 2019	**ECG Interpretation and Rhtym analysis**, National University of Computer and Emerging Sciences	*Karachi, Pakistan*
Spring 2020	**Automated Recruitment Platform from Resume and JD analysis**, National University of Computer and Emerging Sciences	*Karachi, Pakistan*
Spring 2020	**Cricket Player Ranking System using Google PageRank Algorithm**, National University of Computer and Emerging Sciences	*Karachi, Pakistan*
Spring 2020	**Efficient software cost estimation model**, National University of Computer and Emerging Sciences	*Karachi, Pakistan*
Spring 2020	**ReadersHub: A book recommendation system based on user read for NUCES Library**, National University of Computer and Emerging Sciences	*Karachi, Pakistan*
Spring 2020	**Sentimentos: Emotion Based Music Player (Ignite Funded)**, National University of Computer and Emerging Sciences	*Karachi, Pakistan*
Spring 2020	**Fine-grained recognition of road traffic vehicles using YoloV3 on Karachi Roads data**, National University of Computer and Emerging Sciences	*Karachi, Pakistan*
Fall 2020	**Urdu Keyboard: A keyboard on the basis of co-occurrence of URDU Alphabets in Words**, National University of Computer and Emerging Sciences	*Karachi, Pakistan*
Spring 2022	**Polyps segmentation using Voting Neural Network**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*
Spring 2022	**Age and gender detection using CNN with the focus on inference time and detection accuracy**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*
Spring 2022	**Features Based Mobile phone recommendation on reviews data**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*
Spring 2022	**Realtime Face recognition system for smart cities**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*
Spring 2023	**MetaChess: A meta verse multiplayer and single player chess**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*
Fall 2023	**VRTraveler: A history tour with time travel in meta verse (Ignite Funded)**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*
Fall 2023	**Fertilizer recommendation system using ground analysis**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*
Fall 2023	**Tourism destination recommendation system**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*
Fall 2023	**Meta Tennis: A Tennis game in meta verse**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*
Spring 2024	**Virtual reality based stomach surgery simulator for metaverse**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*
Spring 2024	**Diagnostic of the prostate cancer using MRI images**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*
Spring 2024	**Mute Communication: Gesture signals to speech assistant for the def people**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*
Spring 2024	**Skin disease detection using mobile phones**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*

Spring 2024	**Facecare assistant and facial health monitoring**, National University of Computer and Emerging Sciences	*Peshawar, Pakistan*
Spring 2025	**Fire Fighting Car**, National University of Computer and Emerging Sciences	*Islamabad, Pakistan*
Spring 2025	**Gamification of the Tourism**, National University of Computer and Emerging Sciences	*Islamabad, Pakistan*
Spring 2025	**Khudsuno: A two way communication using sign language to voice and vice versa**, National University of Computer and Emerging Sciences	*Islamabad, Pakistan*
Spring 2025	**Green Pakistan: Forestation and deforestation trends identification**, National University of Computer and Emerging Sciences	*Islamabad, Pakistan*

Supervised Master Thesis

Fall 2025	**Empirical Analysis of Standard and Quantum Computing**, National University of Computer and Emerging Sciences	*Islamabad, Pakistan*
Spring 2025	**A Framework and Taxonomy for Development, Operations and Maintenance of Quantum Machine Learning Systems**, National University of Computer and Emerging Sciences	*Islamabad, Pakistan*
Spring 2025	**Brain Tumer Segmentation using 3-Way clustering**, National University of Computer and Emerging Sciences	*Islamabad, Pakistan*
Spring 2021	**3D Synthetic Scene Generation for Military and Urban Trainers**, National University of Computer and Emerging Sciences	*Karachi, Pakistan*
Spring 2021	**Computer Vision based social distancing and facemask detection for monitoring of COVID-19 SOPs** , National University of Computer and Emerging Sciences	*Karachi, Pakistan*
Fall 2019	**Vendor Spend Analysis**, National University of Computer and Emerging Sciences	*Karachi, Pakistan*

Volunteer: Faculty Member

National University of Computer and Emerging Sciences — *Pakistan*

Ignite (Ngiri) Focal Person (National Technology Fund) — *2019-2024*

Guided students in securing National Technology Fund support by aligning project proposals with NGIRI standards, enabling several teams to develop innovative solutions to real-world challenges.

National University of Computer and Emerging Sciences — *Peshawar, Pakistan*

Faculty Coordinator of CoLab — *2022-2024*

Led a peer-driven platform where senior students mentored juniors in emerging technologies, fostering collaboration and hands-on learning beyond the core curriculum to meet industry demands.

National University of Computer and Emerging Sciences — *Pakistan*

Final Year Project Coordinator — *2019-2024*

Oversaw final-year projects, emphasizing real-world applications and collaborating with KP-Tourism to develop innovative solutions like cultural mapping for enhancing tourism in Pakistan.

National University of Computer and Emerging Sciences — *Peshawar, Pakistan*

Faculty advisor for Microsoft Student Partner Campus Chapter — *2022-2024*

Facilitated student access to Microsoft programs, guiding teams to global success in the Imagine Cup, including world finals appearances (2021, 2023) and a regional win (2022).

National University of Computer and Emerging Sciences — *Peshawar, Pakistan*

Faculty Advisor of ACM Student Chapter — *2022-2024*

Supported tech talks, programming competitions, and workshops, building a strong computing community and enhancing students' technical skills for careers in software development, data science, and research.

National University of Computer and Emerging Sciences *Karachi, Pakistan*

Faculty Co-Head of the Core Committee for the student societies *2020-2021*

Oversaw planning and execution of student-driven activities, mentoring leaders to develop organizational and leadership skills while fostering a vibrant campus culture aligned with academic and extracurricular goals.

National University of Computer and Emerging Sciences *Karachi, Pakistan*

Faculty Advisor of the Student Society for the Dramatics and Extracurricular Activities (DECS) *2019-2020*

Guided students in dramatics and extracurricular activities, supporting event planning and performances to encourage creativity, self-expression, and cultural enrichment alongside academics.

Excel in It Cup (EXciteCup2013), Mohammad Ali Jinnah University *Islamabad, Pakistan*

Organizer and Judge *2013*

Managed event planning and evaluation for a multidisciplinary competition, assessing projects on innovation and technical proficiency while fostering creativity and problem-solving among participants.

National University of Computer and Emerging Sciences *Karachi, Pakistan*

Faculty Advisor for Webmasters Student Society *2019*

Mentored students in organizing web development events, workshops, and competitions, enhancing practical skills in web technologies and aligning activities with industry trends.

Volunteer: Student

JSPark at Mohammad Ali Jinnah University *Islamabad, Pakistan*

Vice President *2011-2012*

Oversaw programming and extracurricular activities, leading coding competitions, workshops, and technical events that fostered innovation and skill development. Collaborated with faculty and students to align events with academic goals, creating an engaging environment for learning and showcasing talents.

Mohammad Ali Jinnah University, Capital University of Science and Technology *Islamabad, Pakistan*

Teaching Assistant *2010-2014*

Conducted tutorial sessions, provided one-on-one support, and assisted with assignments, problem-solving, and grading. Helped students master algorithms, time complexity, and OOP concepts like encapsulation and inheritance, ensuring a smooth learning experience.

Volunteer: Researcher

Conferences and Journal

Reviewer *2020-2024*

- The Association for the Advancement of Artificial Intelligence (AAAI) 2020
- 21st International Conference on Frontiers of Information Technology (FIT'24)
- International Conference on Emerging Trends in Smart Technologies (ICETST 2020)
- International Conference on IT and Industrial Technologies (ICIT)
- 18th International Conference on Emerging Technologies (ICET 2023)
- 19th International Conference on Emerging Technologies (ICET 2024)
- Frontiers in Oncology

27th International Multitopic Conference (INMIC) 2025 *Riphah International University Islamabad Pakistan*

Member Technical Program Committee (TPC) *2025*

I am responsible for peer-reviewing submitted research papers and contributing to the selection of high-quality content for the conference program.

International Conference on Emerging Technologies (ICET 2013)

Muhammad Ali Jinnah University, Islamabad, Pakistan

Member Organizing Committee

2013

Coordinated logistics, registrations, and team communication for an international conference, contributing to program development and on-site management to support collaboration among researchers and industry professionals.

International Conference on Emerging Technologies (ICET 2023)

National University of Computer and Emerging Sciences, Peshawar, Pakistan

Member Organizing Committee

2023

Managed technical sessions, keynote speakers, and team coordination, facilitating participation from international and local attendees. Played a key role in ensuring the event's success, focusing on cutting-edge technological innovations and knowledge-sharing.

Volunteer: Programmer

National University of Computer and Emerging Sciences

Pakistan

Coach for ICPC (International Collegiate Programming Contest)

2022-2024

Mentored university teams to achieve remarkable results, with three teams ranking in the top 30 nationwide in the first round and performing well in subsequent rounds. Focused on advanced problem-solving, algorithmic thinking, and time management, elevating the university's reputation in competitive programming.

National University of Computer and Emerging Sciences

Peshawar, Pakistan

Coach IEEE Extreme 17

2023

Guided five teams to global success, with all ranking in the top 100 worldwide and securing top 5 positions in Pakistan. Coaching emphasized algorithm design, time management, and strategic thinking, enabling students to excel in this intense 24-hour competition.

National University of Computer and Emerging Sciences

Pakistan

Coach and Problem Setter for Fast Problem Solving Competition

2022-2024

Designed challenging problem sets to test algorithmic and computational skills, sharpening students' critical thinking and preparing them for national and international contests through high standards and rigorous training.

References

1. **Dr. Muhammad Atif Tahir**
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   Professor and DEAN Faculty of Computing
   National University of Computer and Emerging Sciences
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   Relationship: Professor, Head of Department, and Campus Director
3. **Dr. Omar Usman Khan**
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   National University of Computer and Emerging Sciences
   Email: omar.khan@nu.edu.pk
   Contact: +92-334-9087752
   Relationship: Campus Director

4. **Dr. Abdul Aziz**
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   National University of Computer and Emerging Sciences
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   Relationship: Professor and Course Coordinator

5. **Dr. Muhammad Abdul Qadir**
   Professor and DEAN Faculty of Computing
   Capital University of Science and Technology
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   Contact: +92-300-5011600
   Relationship: Ms Thesis Advisor

6. **Dr. Aamer Nadeem**
   Professor of Computer Science
   Capital University of Science and Technology
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