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Education

Dartmouth College — Hanover, NH
PhD in Computer Science — Aug 2025–Present

- Exploring research directions in human-AI collaboration, interactive system design, and machine learning–driven augmentation of human capabilities

University of Virginia — Charlottesville, VA
Masters in Computer Science with Thesis in HCI, CGPA: 4.00 — Aug 2023–May 2025

- Successful thesis defense in HCI and AI, titled "Exploring Older Adults Perceptions of Personalities of LLM-Powered Conversational Companions" under advisor Dr. Seongkook Heo
- Courses Covered: Human-Computer Interaction (HCI), Machine Learning, LLMs and Generative AI, Engineering Interactive Technologies, Natural Language Processing, Computational Behavioral Modeling, Network Security and Privacy

LUMS, School of Science and Engineering — Lahore, Pakistan
B.S. in Computer Science, Deans' Honour List 2019–2020 — 2019–2023

- Relevant Courses Covered: Data Structures, Probability, Algorithms, Databases, Operating Systems, Network-Centric Computing, Artificial Intelligence, Software Engineering, Advanced Programming, Machine Learning, Speech Processing, Network Security, Human-Computer Interaction, Professional Communication, Principles of Marketing, Principles and Techniques of Data Science, Mathematical Foundations for Machine Learning and Data Science

Publications

Conference on Human Factors in Computing Systems (CHI) — Yokohama, Japan
Late Breaking Work — 2025

- First-author paper accepted to CHI Late-Breaking Work 2025 on Exploring Older Adults' Personality Preferences for LLM-powered Conversational Companions.
- Presented my poster on the research to the premier and most significant international conference in the HCI field.

Experience

University of Michigan and Aga Khan University — Remote
Qualitative Analyst - Center for Global Health and Equity Grant — May 2025–Present

- Conducting qualitative data analysis using open coding techniques to identify thematic patterns from semi-structured interviews on Gender Based Online Violence
- Preparing a peer-reviewed journal article based on findings, currently in progress for submission to Global Qualitative Nursing Research.

Ultimate User Interface Lab — University of Virginia
Research Assistant — May 2024–Aug 2024

- Defended independent Master's thesis under the supervision of Dr. Seongkook Heo on the design and evaluation of LLM-powered voice assistants tailored to the needs of older adults.
- Designed and evaluated LLM-powered voice assistants specifically tailored for older adults, exploring the impact of induced personalities on user experience.
- Led the literature review, ideation, and study design addressing needs of older adults through conversational AI.

- Developed and assembled project hardware, including PCB design, soldering, and full hardware assembly.
- Built and programmed the conversational agent's software, integrating large language models and voice interaction systems.
- Completed the entire project lifecycle from device design to deployment in participants' homes for user evaluation.

Center for Speech and Language Technologies (CSaLT) LUMS
Full-Stack Developer, Research Associate Jan 2023–Jan 2024

- Executed cross-university research with University of Michigan; exploratory mixed methods study analyzing 500+ users Interactive Voice Response (IVR) data.
- Produced actionable data visualizations informing UX enhancements such as re-designed IVR flows.
- Achieved 60% higher user retention and reported 90% error reduction through human-centered engagement redesign.
- Led agile software development of doctor app with field studies, and iterative prototyping reducing response time by 24 hrs. Case study available here.
- Created and deployed a Speaker Identification (SI) system and API for the Urdu Language.
- Conducted a data analysis to evaluate the impacts of Super Abbu, a speech based maternal-health focused platform, and aim to derive key insights which can help improve this service and the usage of language technologies in public health spheres in Pakistan.

The Foundry - Design.Data.Tech Lahore, Pakistan
UI/UX Intern Summer 2021

- Designing an interactive installation experience, to visually present the environmental shifts by collecting, analysing, interpreting and presenting data that encourages meaningful engagement under Dr. Suleman Shahid and Artist Faisal Anwar.
- Managed UX team of 3 through quantitative and qualitative data analysis, UX research, ideation, prototyping, and presentation.

Google Developer Student Clubs LUMS
Lead 2022

- Improved student knowledge on developer products and platforms through hands-on workshops and events. Identify local partners to work with and lead project building activities.
- Google DSC Data Science project, done in Google Collaboratory. Evaluation of the relation between quality of student posts on an online forum, and their final grade.
- Conducted workshops on Git, Github, Google Collaboratory, Python.

The Lakshmi Mittal and Family South Asia Institute, Harvard University Lahore, Pakistan
Junior Ambassador Summer 2018

- Looking Back, Informing the Future: 1947 Partition of British India
- An interdisciplinary research project that looks at the implications of mass dislocations across geographies.
- Conducted and transcribed semi-structured interviews for Harvard's 1947 Partition project, showcasing on-spot improvisation, empathetic communication, and a deep understanding of complex user experiences in diverse contexts.

Projects

Fabric Sensing for On-Body Clothing Input using AR/VR Headset Cameras 2024-25
Interactive Machine Learning for AR/VR

- Designed an on-body input system that allows users to control AR/VR interfaces by interacting with fabric on their clothing.

- Implemented hand landmark detection using **Google Mediapipe** and **SAM2** (segmentation model) for dynamic region-of-interest segmentation on the sleeve.
- Developed a fabric-interaction classifier using **Neuflowv2 optical flow** and trained a **FastViT model** (hybrid vision transformer) to recognize two gestures (drag and hover).
- Find the project presentation with demos here

Hand Me The Music –Wearable Glove for Musical Interaction Spring 2024

Engineering Interactive Technologies

- Designed and developed a wearable glove that enables playing and controlling musical instruments through hand gestures.
- Won prize money and the **Best Project Award** for the course based on technical execution.
- Integrated Inertial Measurement Unit (IMU) sensors and touch sensors to detect hand movements and adjust pitch.
- Designed interactions that allowed seamless switching between drums, piano, guitar, and maracas using only one hand. Find the demo here.
- Conducted system evaluation to assess the glove's functionality, responsiveness, and user experience.

Modeling Infectious Disease Spread Prevention Policies with Cellular Automata Fall 2023

Computational Behavioral Modeling

- Developed a probabilistic cellular automata model to simulate the spread of COVID-19.
- Designed a novel SEIQRD state space to represent Susceptible, Exposed, Infected, Quarantined, Recovered, and Deceased populations. Find an example state grid visualization here.
- Incorporated arbitrary "devices" or novel prevention measures into the model to assess their impact on virus spread.
- Demonstrated the ability of the model to show the effect of introducing new preventive devices and compare the efficacy of different measures.
- Provided a flexible framework for future expansion and adaptation to various preventive strategies or public health interventions.

Transparency in Mobile Health Fall 2023

Human-Computer Interaction

- Designed an interface for a popular mobile health (mHealth) app for improved transparency in privacy and consent. Find the prototype here, and the project details here.
- Conducted a comprehensive literature review on privacy, transparency, and informed consent in mHealth apps.
- Designed and executed a preliminary study to explore the current state of mHealth app consent forms and to understand user experiences and preferences regarding privacy.
- Presented design recommendations for a popular U.S. mHealth app to improve transparency and user comprehension of data usage and privacy.
- Designed and implemented a study to evaluate the impact of the redesigned interface on users' perception of transparency.
- Analyzed the results to address how to improve privacy-preserving features, user comprehension of data usage, and the perception of transparency in mHealth apps.

Visualization for Security Networks Spring 2024

Network Security and Privacy

- Designed visualization tools to transform raw network traffic data into actionable insights, enabling potential effective detection of irregularities and suspicious activities.
- Leveraged the **Vega-Altair framework** to craft dynamic and interactive visualizations, providing intuitive representations that highlight patterns and anomalies. Find the visualizations in the project report here.

Hamari Nur Mobile Application Spring 2023

Information and Communications Technologies for Development Project under Dr. Maryam Mustafa

- Served as UX Researcher, UI/UX Designer, and Illustrator experimenting with sustainable design and behavior change strategies.
- Conducted extensive user research and literature review to understand climate crisis perceptions.
- Created empathetic, aesthetic, hand-drawn illustrations of Nur, a character symbolizing resilience and hope.
- Utilized narrative-driven interfaces and multi-chapter storytelling to depict the climate crisis's impacts.
- Case study can be found here.

Punjab Police –Women Safety App 2022

Collaboration on the Women Safety Application between CGF UrbanTech Pakistan LUMS and Punjab Safe City Authority

- Undertook ethnographic exploration, interviews, surveys, and usability testing to develop user stories for women's mobility and safety insights in Pakistan involving 100+ participants.
- Drove the UI lifecycle for features – from ideation through wireframing and prototyping new features tailored to women's needs.
- Applied typography principles to enhance the user interface's readability with improved content strategies.
- Secured a development contract with the Punjab Government to redesign Women Safety App for the region.
- Collaborated cross-functionally with stakeholders to strategically ensure UX feasibility and product-market fit.

Caraamad –Safe Mobility for Women App 2022

Miro, Figma

- Conducted extensive research through interviews, surveys and literature reviews about female mobility in Pakistan.
- Designed and tested a High-Fidelity prototype for a data-driven, women-centric carpooling platform for Pakistan. Case study can be found here.

Speaker Identification System with Crime Investigation and Prevention Lab 2021

FastAPI, React, MongoDB, Git

- Designed and implemented a highly effective ML-based Speaker Identification system for English and Urdu languages, achieving superior performance.
- Developed a full-stack web application featuring the transformer based speaker identification system.
- Conducted extensive usability tests to ensure accessibility, accuracy, and minimized false positives for the system.

Super Abbu Data Analysis 2021

MySQL, PHP, Python, R

- Conducted Mixed Methods analysis on data from Super Abbu, a speech based maternal-health focused platform that was launched in Pakistan to help expectant fathers stay informed about pregnancy.
- Derived key insights from the data analysis which will help improve this service and the usage of language technologies in public health spheres in Pakistan.
- Created content-rich dashboards using PHP to display the distributions and summaries of data points in the Chiniot deployment of Super Abbu.

Renfri - Cross-Platform Mobile Application Deployment 2021

React Native, MongoDB, Firebase

- Prepared a mobile application to serve as an online marketplace for students at LUMS where students can sell, rent or exchange hostel use items.
- Included a LUMS only user authentication system.
- Wrote extensive documents for user and design requirements regarding this project.

Kitabees - Online Book Store Management System 2021

React, Node, MongoDB, Express

- Deployed a web application for an online bookstore with a fully functioning database and shopping cart system.
- Compiled a dataset with detailed information about nearly 10,000 distinct books.

Teaching

University of Virginia (UVA)

Human-Computer Interaction (CS 6501) Fall 2024

Instructor: Dr. Seongkook Heo

- Reviewed and provided feedback on weekly HCI paper reading responses.
- Supported student groups through various HCI project cycles, addressing questions and challenges.
- Conducted office hours to answer student queries and offer guidance on course material.
- Managed and moderated the course's Discord server, facilitating communication and collaboration among students.

Advanced Software Development Techniques (CS 3240) Spring–Fall 2024

Instructor: Dr. Mark Sherriff, Dr. Tom Horton

- Sole graduate TA responsible for overseeing and managing 23 undergraduate TAs in a class of 200+ students, ensuring smooth and effective office hour operations.
- Reviewed group evaluation forms to monitor collaboration and ensure group dynamics were functioning effectively.
- Mentored 5 student software engineering project groups developing a website integrated with Google API and Amazon S3 storage.
- Language: Python 3, Framework: Django 4, Build environment: GitHub Actions CI, Source control management: GitHub, and Cloud hosting: Heroku

Usability Engineering Fall 2023

Instructor: Dr. Panagiotis Apostolellis

- Mentored 30+ students in applying UX concepts including perceptual and cognitive psychology to UI design through personalized instruction, and customized tutorials on Git and Heroku.
- Evaluated student projects with comprehensive usability reviews, heuristic analyses, and user testing; ensured projects met industry standards for UI design and UX principles.

LUMS, School of Science and Engineering

Fundamentals of Computer Systems (CS 225) Fall 2022

Instructor: Dr. Basit Shafiq

- Graded assignments using automated grading tools and prepared and checked bi-monthly quizzes.
- Held office hours for students to receive additional support and guidance on course material and programming assignments.
- Invigilated all graded assessments including quizzes and exams.

Discrete Mathematics (CS 210) Spring 2022

Instructor: Dr. Basit Shafiq and Dr. Imdad Ullah Khan

- Provided tutorials on how to use LaTeX and for guidance for each homework assignment released.
- Held office hours for students to receive additional support and guidance on course material.

Computational Problem Solving (CS 100) Fall 2021

Instructor: Dr. Maryam Mustafa

- Led weekly lab sessions and provided students with a walk-through of that lab assignment.
- Held office hours for students to receive additional support and guidance on course material.
- Assisted in the development and implementation of course materials, including creating and updating programming exercises and lab-work questions.

Awards

University of Virginia (UVA)

Best Poster Award Fall 2024
UVA SEAS Research Symposium

- Presented my poster and delivered a talk about my thesis at the UVA Research Symposium 2024, receiving recognition for **Outstanding Research and Presentation**.

Link Lab Flash Talks Nominee Fall 2023
Research Poster Presentation

- Selected to present my research on Accessibility at the Link Lab Student Flash Talks.
- Delivered an elevator pitch, gave a presentation, and participated in a poster session, engaging with Link Lab members and partners to foster interdisciplinary collaboration and discussions.

Honorable Mention Engineering is Beautiful Fall 2024
Art Competition

- Recognized for creating artwork visually representing my research, illustrating older adults interacting with AI.

LUMS, School of Science and Engineering

Winner LUMS RoboWars Competition Fall 2019
Electrical Engineering Project

- Developed a high-performing robot that outperformed all participants from my batch, securing first place.
- Programmed Arduino and integrated IMU and sensors for robot design and control.
- Designed custom CAD models and PCB layouts for the robot's hardware.

Founder and President Anime and Manga at LUMS 2019–2021
Student Led Society

- Built a platform for students to explore and appreciate anime and hand-drawn animation.
- Interviewed and assembled a team, delegated roles, and oversaw team operations.
- Drafted the platform's constitution and secured necessary approvals.
- Launched a monthly magazine featuring student work and industry insights.
- Organized sponsored competitions to encourage student participation and creativity.

Creativity Award 2021
LUMS Annual Society Awards

- Led the society to win the Creativity Award at the LUMS Annual Society Awards, competing against 60+ societies in its first year of establishment.

Deans Honor List 2019–2020
Academic Placement

- Dean's Honor List (2019-20) for achieving a GPA within the top academic percentile.

Skills

- **Languages:** Python, Django, JavaScript, C/C++, SQL, HTML5/CSS3, PHP, Haskell, LaTeX, MySQL, MATLAB
- **Frameworks:** React, Node.js, Express.js, FastAPI, MongoDB, Material-UI
- **Technical Tools:** Autodesk Fusion (3D Modeling), Bambu Studio (3D printing), KiCAD (computer-aided design), Figma, Git, Heroku, Wireshark, Jupyter Notebook, Google Colab, Postman, Trello, STATA, Firebase, Docker
- **Research Tools:** Zotero, Overleaf, Krita (Graphic Design), Canva, Miro, ATLAS.ti

Course Certifications

Responsible Conduct of Research & Scholarship 2025
University of Michigan, PEERRS

- Completed the PEERRS course covering ethical standards and best practices in research.

Human Subject Research Protections 2025
University of Michigan, PEERRS

- Completed the PEERRS course focused on ethical principles and regulations for research involving human participants.

IRB-SBS Researcher Basic Course 2024
CITI Program, University of Virginia

- Training in ethical and regulatory standards for human research, with a focus on social-behavioral studies.

Introduction to CSS3 2020
University of Michigan - Coursera

- Gained further knowledge in modern CSS techniques for web design and styling.

Introduction to HTML5 2020
University of Michigan - Coursera

- Acquired further skills in structuring and building web pages using HTML5.

From Big Bang to Dark Energy 2020
Univeristy of Tokyo - Coursera

- Learned insights into cosmology, the birth of elements and Higgs Boson, dark energy, inflation, and the possible fates of our Universe.