Muhammad Talha

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Education

University of Alberta — Edmonton, Canada
Master of Science in Engineering Management — *Jan. 2024 – Present*

Lahore University of Management Sciences — Lahore, Pakistan
Bachelor of Science in Computer Science — *Sep. 2019 – Jun 2023*

- **Relevant Courses:** Human-Computer Interaction, Topics in Design and Human-Computer Interaction, Information and Communication Technology for Development, Computer Graphics, Network Security, Software Engineering, and Machine Learning

Research Experience

Undergraduate Research Assistant — Nov 2021 – May 2023
CHISEL, LUMS — *Lahore, Pakistan*

- Worked on **Virtual Reality (VR)-Based Environmental Enrichment in Older Adults with Mild Cognitive Impairment (MCI) and Mild Dementia** to test the effectiveness of the product being developed from the conducted research. I explored more effective ways by reading relevant literature to treat dementia in the elderly and mainly discovered activities that can aid in treating cognitive impairment and dementia.
- Worked on the project **Rawaan**, the first Urdu-based remedial therapy tool for Dyslexia, and helped to improve it before it was released. I checked the product and all of the voice recordings to be incorporated and fixed the issues that emerged.
- Worked on the **Systematic Analysis of Assistive Technology for Elderly People in Low and Middle-Income Countries** to find out the acceptance of assistive technology for Cognitive Health. I worked on the literature review and reviewed 45+ papers from prestigious conferences before selecting 27 articles for a systematic review that focused on assistive technology, the elderly, cognitive health/cognitive enhancement, and developing countries.

Research Projects

Ehsaas: Mental-Health improvement of the Pregnant women in Pakistan — Feb 2023 – May 2023

Advisors: Dr. Maryam Mustafa (LUMS), Mustafa Naseem (University of Michigan, Ann Arbor)

Idea: Investigating the mental health status of pregnant women in Pakistan, including postpartum depression, as well as their use and perceived impact of mental health and pregnancy related applications.

- Identified the problem and conducted semi-structured interviews and surveys to analyze mental health-related issues experienced by pregnant women during and after pregnancy.
- Conducted a literature review of existing research studies especially in the UK and India to gain insights into different approaches to addressing the identified problem, and utilized these insights to develop a novel approach.
- Analyzed interview data using Atlas.ti and conducted affinity mapping to identify patterns, informing the design phase of the project.
- Designed potential solutions based on research findings and audited applications for the first iteration.
- Designed a complete Prototype in Figma after analyzing the related apps and their perceived effects on pregnant women.

RehabVR: Virtual Reality for Rehabilitation — Feb 2023 – May 2023

Advisors: Dr. Suleman Shahid (LUMS), Dr. Ali Jawaid (University of Texas)

Idea: To design and develop a solution for the rehabilitation of neurological disorders such as stroke in peaceful virtual environments, in collaboration with **Pakistan Society for the Rehabilitation of the Disabled (PSRD)**, that improves the cognition of patients using different activities such as exercises and gamification.

- Conducted in-depth analysis of a problem by visiting hospitals and meeting with patients and medical professionals to identify their pain points.
- Conducted a comprehensive literature review to research existing rehabilitation solutions and activities, deriving key insights to support hypothesis.
- Designed a research-based UI for navigating activities and games in Unity3D virtual environments to facilitate exercise performance.

Meditare: Virtual Reality for Well-Being June 2022 – May 2023

Advisors: Dr. Suleman Shahid (LUMS), Dr. Ali Jawaid (University of Texas)

Idea: To design and develop a solution for Mental Health improvement by making peaceful environments that provide meditation and soothing effects using different activities such as breathing exercises.

- Analyzed the problem by examining interviews, surveys, and contextual inquiry conducted for the same project's user research at CHISEL.
- Researched the existing well-being solutions & activities by conducting a literature review and drew insights to support my hypothesis.
- Designed the two environments by taking user research and literature review into account and developed them in Unity3D, where users will do different breathing exercises based on research.
- Transformed the environments into Virtual Reality (VR) using SteamVR and made them interactable for users.
- Added other components such as sound effects, reflections, and shadows to give a peaceful effect to the human mind as per the supervisor's advice.
- Conducted pilot testing with some users to identify issues with user experience and, based on that, resolved issues identified by users.
- Currently working on integrating the three 3D environments and a user interface in Unity to conduct usability testing and find the effectiveness of the study using Neuro-sensors and ECG sensors. *(Blender, Unity, GitHub, GitKraken, Plactic SCM)*

Virtual Reality for Sexual Harassment Awareness Feb 2022 – May 2022

Advisor: Dr. Suleman Shahid (LUMS)

Idea: To spread awareness and train people against harassment using Virtual Reality (VR) in academic institutes such as LUMS. The solution is incredibly successful in identifying sexual harassment of any kind, and more significantly, it creates will in people and victims to take action against harassment.

- Analyzed the problem and conducted user research, storytelling & narrative therapy at CHISEL, which helped to gauge and identify the situation carefully.
- Studied literature related to harassment, psychological factors, use of technology, and VR immersiveness that can affect the solution.
- Designed a solution by using LUMS locations and the most recurrent and overlooked incidents of on-campus harassment, then implemented it in Virtual Reality (VR) in a third-person perspective so that it does not trigger our participants' prior painful experiences and they feel comfortable while using it.
- Conducted usability testing using pre & post-questionnaires and user testing with a 50-50 Female to male participant ratio to evaluate the effectiveness of the study.
- Worked on comparing the effectiveness of the 2D solution and 3D solution to find out the differences in perception & effects on people for both.
- Wrote a final document on the project containing the user research, narrative therapy, research methodologies, findings, and usability testing results.
- Wrote a final report on the project containing user research, research methodologies, findings, and usability testing results. *(Mural, Unity, GitHub)*

AssistTH: Telehealth Mobile Application Sep 2021 – Feb 2022

Advisor: Dr. Suleman Shahid (LUMS)

Idea: To tackle health-related problems by linking patients and physicians and considering numerous factors while optimizing the efficiency of available resources.

- Conducted surveys, interviews, and contextual inquiry at various hospitals to better understand the problem.
- Studied literature to find out the research that has already been done in the world on a similar topic.
- Made low, medium & high-fidelity designs, sketches, scenarios, storyboards, and design alternatives depending upon users' needs & desires and examined their feasibility and effectiveness.
- Identified the best design alternative considering user responses, different scenarios, and available resources to the target audience.
- Conducted design literature reviews and low-fidelity testing with users and improved the design in the second iteration.
- Made high fidelity prototype taking into account the work done in the first iteration and did pilot testing.
- Conducted usability testing using pre & post-questionnaires and user testing for both user groups to finalize the research and product. *(Figma)*

Teaching Experience

Head Teaching Assistant, CS331: Introduction to Artificial Intelligence Jan 2023 – May 2023
LUMS *Lahore, Pakistan*

- The first course in understanding machine intelligence, as well as the fundamentals of learning and intelligent search algorithms.
- As a lead TA, I managed the whole course and its grading and supervised other teaching assistants for assignments, quizzes, and exams.

Head Teaching Assistant, CS200: Introduction to Programming Sep 2022 – Jan 2023
LUMS *Lahore, Pakistan*

- The course is designed to teach Object Oriented Programming in C++ and give hands-on experience to solve difficult problems in Labs and Assignments.
- Managed 2 sections of the course with 130 students in each section. Organized Labs, assignments, quizzes, and exams and conducted weekly tutorials and office hours.
- Managed grading and supervised other Teaching Assistants.

Teaching Assistant, CS100: Computational Problem Solving Jul 2022 – Aug 2022
LUMS *Lahore, Pakistan*

- The first course to teach programming and problem solving using computational concepts using C++ in Labs and Assignments.
- Managed and graded Labs and quizzes and conducted weekly office hours and tutorials for a class of 60 students.

Private Tutor, Computer Science Jun 2021 - Present
Self employed *Lahore, Pakistan*

- Privately taught Computer Science and Programming to 2 O/A levels students of Aitchison College and 2 Undergraduate Students of LUMS for more than a year.

Professional Experience

Associate UX Analyst Apr 2023 – Jun 2023
CureMD Inc. *Lahore, Pakistan*

- Led the initiative to enhance the user experience of EHR, Nightingale, and other portals by redesigning and implementing improvements based on UX analysis and user feedback to increase efficiency for healthcare providers and patients.

Other Projects

Samsara: A Fight To Survive Game *Oct 2022 – Feb 2023*

- A unity based 3D single player game where a player will have to collect coins, health points and kill enemies with sword to clear the stage.
- Worked on making assets in blender and setting up environment in Unity for game development.
- Made the game logic with scripting for complete working and worked on its VR version for immersive experience. *(Unity, Blender, C#)*

choka.com: Tutoring Application Mar 2022 – May 2022

- A web application that connects students and tutors.
- Conducted surveys and interviews to identify user needs and demands for a better application design.
- Designed the application prototype for three actors, students, tutors, and admin in Figma and then developed and successfully deployed it.
- Created test cases for automated testing and manually tested the application for security and accuracy. *(Figma, HTML, CSS, Javascript, Express.js, Firebase, Heroku)*

Forest Health Calculator Mar 2022 – May 2022

- A collaborative project with *NCRA* & *WWF* that aims to calculate forest health using images of trees and by running some calculations using Computer Vision.
- Redesigned the mobile application being used for the project to improve user experience for rangers.

- Tested the application with some users and incorporated their feedback. *(Figma)*

Environment Control System Apr 2022 – May 2022

- A digital system-based project to manage households using different parameters.
- Designed a complete automated environment control for a household that uses different sensors to manage the intensity of lights, wind, and security alarms.
- Developed the design utilizing several logic gates and electronic circuits, resulting in an efficient and reliable system. *(Proteus, Logic Gates)*

Language Detection Classifier Dec 2021 – Feb 2022

- A project to detect different languages using machine learning algorithms.
- Collected over 700 sample recordings of different languages (English, Urdu, Spanish, Punjabi and others).
- Used logistic regression, KNN, Decision Trees, and Random Forests to train the classifier and achieved an accuracy of roughly 70% for all languages and 90% for English and Urdu. *(Python)*

Technical Skills

Languages: Python, C Sharp, C/C++, JavaScript, HTML/CSS, Haskell, Ruby, SQL, Latex
Tools & **Frameworks**: Git, Visual Studio, Visual Studio Code, Figma, Jupyter Notebook, React, Node.js, Express.js, Ruby on Rails, WordPress, MongoDB, Firebase, MySQL, PostgresSQL, Bash, GitKraken, MATLAB, Unity3D, Blender, Trello, Mural, Cloud9, Jira, Figma, Plastic SCM, Proteus, Heroku, Adobe XD, Adobe Photoshop.

Extra-Curricular Activities

realme Pakistan Campus Ambassador for LUMS	Mar 2021 – May 2023
Assistant Director Marketing at INDEX - Design & Innovation Society at LUMS	Sep 2022 – Apr 2023
Director Marketing & Event Head at LUMS Students Mathematics Society	Dec 2020 – May 2022
Assistant Director Events at LUMS Religious Society (LRS)	Sep 2020 – May 2022
Director Events at Your Buddy Community (YBC)	Sep 2020 – May 2021
Event Head at LUMS Literary Society (LLS)	Dec 2019 – Feb 2020
School Head at Project Bunyaad by LUMS Community Service (LCSS)	Aug 2021 – Sep 2021
Coach at Summer Coaching Session by National Outreach Program (NOP) LUMS	Jul 2022 – Aug 2022
Volunteered for LUMS Open Day	Dec 2020
Volunteered for LUMS Career Fair	Mar 2020
Volunteered for SIGMA IV by LSMS	Jan 2020

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