



# Syed Hammad Hussain Shah

**Skills:** C#, SQL, Entity Framework, Unity3D, JavaScript, HTML, Python, Keras, ROS, UX design, Human-centered design, User research

**Interests:** Software design and development, HCI research, Programming, Database design, Machine learning

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## Education Background

### ● PhD in Computer Science

Norwegian University of Science and Technology (NTNU), Norway  
Mar. 2020 – Expecting to submit thesis in Apr. 2024. (Grade: A)

### ● Masters in Computer Science

Sejong University, Seoul, South Korea  
Mar. 2018 – Feb. 2020. (CGPA: 4.42/4.5, Percentage: 98.4%)

### ● Bachelor in Software Engineering

COMSATS University Islamabad (CUI), Attock, Pakistan  
Sep. 2013 – Jun. 2017. (CGPA: 3.7/4.0, Percentage: 86.99%)

## Experience

### Doctoral Researcher – NTNU

Mar. 2020 – Present

#### Key responsibilities:

- Codesigned and developed applications of modern interactive technologies such as Virtual Reality (VR) and social robots to investigate their role in eldercare.
- Collected stakeholders' requirements by conducting user research and field studies.
- Designed meaningful user experiences by applying UX design methodologies such as usability testing and user interviews.
- Designed and developed machine learning algorithms for human activity recognition for building intelligence and interactivity in applications for eldercare.
- Hands-on experience with Oculus Quest, Hololens 2, and humanoid robots such as Pepper and NAO robot.
- Designed data collection methods as well as planned and conducted user studies for final testing of user experiences.
- Conducted detailed analysis of data collected in user studies for better insights into user experience and design principles.
- Published and presented research in high ranked international conferences and journals focused on HCI and expert systems.

**Skills:** C#, Unity3D, Python, Keras, Activity Recognition, ROS, NumPy, UX design, User research, User statistics, Data analysis

### University Lecturer – NTNU

Aug. 2021 – Present

#### Key responsibilities:

- Designing and teaching two courses, i.e., [Computer Graphics – IE500217](#) and [Immersive Technologies – IE501914](#), to masters' students as a sole instructor.
- In the course titled 'Computer Graphics', students focus on theoretical concepts related to computer graphics and practically implement these concepts in a web-based project using WebGL, HTML, CSS, and JavaScript.
- In the course titled 'Immersive Technologies', students focus on the history and underlying concepts of VR/AR devices, UX design, and development of VR/AR applications using Unity3D. At the end of course, students deliver a final project which focuses on VR or AR application and UX design principles.

- Supervised bachelor and masters' students in various specializing projects and thesis. Main topics include social robots, mixed reality (MR), augmented reality (AR), and computer vision.

### Research Assistant – Sejong University, South Korea

Mar. 2018 – Feb. 2020

#### Key responsibilities:

- Conducted research on the potential use of immersive technologies i.e., VR and MR, in multimedia entertainment and air traffic control.
- Applied UX design in collaboration with professionals and researchers from various departments including multimedia entertainment and aerospace to understand user needs.
- Codesigned and developed applications tailored to the user needs for better user experience.
- Planned and conducted user interviews and usability testing for understanding users' perspective.
- Developed image processing algorithms for object tracking in 360° videos.
- Designed data collection methods as well as planned and conducted user studies.
- Detailed analysis of data yielded by user studies.
- Published and presented research in high ranked international conferences and journals focused on HCI and expert systems.

**Skills:** C#, Unity3D, Python, OpenCV, UX design, User research, HCI research, User statistics, Data analysis

### Full-stack Web Developer – Comsats University Isl., Pakistan

Jul. 2017 – Nov. 2017

#### Key responsibilities:

- Designed and developed multiple web applications.
- Planned activities and collaborated with concerned departments to understand their practices and needs, implement these requirements in the web system, and perform functional and usability testing.
- Implemented business logic as a backend developer as well as implement UI design as a frontend developer.
- Designed relational databases and implemented them using database management studio.

**Skills:** Web development, Database design and development, C#, .NET core, REST APIs, SQL, Entity framework, NoSQL, JavaScript, HTML, CSS, Web Forms, MVC

## Projects

**Codesigned and developed a social VR (metaverse)-based collaborative exergame** for the rehabilitation of elderly users. Followed a human-centered design process comprised of several iterations with the therapists and elderly users to design and develop the exergame over six months. Investigated various design principles to make the application more ergonomic. Performed a 5-weeks user study for final testing to understand the user experience with the developed application.

**Skills:** C#, Unity3D, VR, Human-centered design, UX design

## Projects

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**Designed and developed an efficient and lightweight multiperson activity recognition framework for robot-assisted healthcare applications.** Initially, invited users and collected video data involving physical rehabilitation activities for training deep learning algorithms. Then developed a LSTM-based deep learning framework for activity recognition. Finally, developed a ROS-based application to deploy the framework on a social robot named 'Pepper'. Then conducted a user study to understand the user experience with developed social robot application.

**Skills:** Python, Keras, LSTM, OpenCV, NumPy, ROS, User research

**Multi-agent robot system to monitor and enforce COVID-19 rules in large areas.** Developed a multi-agent system based on multiple CCTV cameras and robots that monitor and enforce physical distancing constraints in large areas to combat COVID-19. This system detects violations of the COVID-19 rule, i.e., physical distancing, with the help of person detection and distance estimation in real-time video data from CCTV cameras, and enforce the rules by sending robot to that place.

**Skills:** Python, Keras, YOLO, OpenCV, NumPy, ROS

Designed and developed an **Intelligent Holographic Mixed-Reality System for Health Data Management in Nursing Practice** that leverages Microsoft HoloLens for work practices of healthcare work in nursing homes. Supported by computer vision, this system provides automatic data retrieval, in addition to interactive data visualization and mid-air data entry mechanism. Using face recognition through the HoloLens' visual sensors, the system recognizes individual patients, and automatically retrieves relevant health data and supports data entry.

**Skills:** C#, Unity3D, HoloLens, User-centered design, User research

**A holographic Mixed Reality (MR) system for air traffic control and management.** Applied UX design process with the air traffic controllers to understand user needs and practices followed in air traffic management. Developed the application from scratch based on the users' feedback about the user interface, interaction design, and usability. Conducted a user study including user interviews and usability testing to understand the user experience with the MR interfaces for air traffic control and management.

**Skills:** C#, Unity3D, HoloLens, User-centered design, User research

**Authoring tool for generating multiple experiences from a 360° video by tracking arbitrary objects and the viewer's orientations.** Developed this tool to support the generation of multiple VR experiences of a 360° video through either a user's experience of watching a 360° video in VR or by tracking an object in the 360° video. Designed and developed this tool in collaboration with a company focused on multimedia applications and 360° content generation.

**Skills:** C#, Unity3D, Python, OpenCV, Object tracking, User research

**Web portal for student application management** that allows university students to submit applications online, which go through an online verification process by the concerned departments, i.e., exams, finance, etc., reaching a final decision. Collaborated with all stakeholders to understand the application procedure, and define functional and non-functional requirements. Implemented frontend and backend as well as designed a relational database.

**Skills:** C#, ASP.NET, HTML, CSS, JavaScript, NoSQL, Entity Framework

**Smart parking application** for managing parking plazas and online booking of parking slots at desired parking plazas. Developed a web application to add and manage multiple parking plazas in it, and an Android application for the users to search nearest available parking space and make booking before arrival. Designed a relational database to store the data related to each parking plaza and user. Developed a REST API to access and perform CRUD operations in a centralized database.

**Skills:** C#, ASP.NET, REST API, SQL, Database Design, Java

## Honors and Awards

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Awarded with the 'Silver Medal' for academic excellence, consistency in performance, and securing a second position at the end of bachelor studies.

Secured fully funded scholarship for masters studies (2018-2020).

Published research work in high-ranked international conferences and journals. Attended and presented work in multiple international conferences held in different countries such as United States of America, South Korea, Malaysia, Singapore, Pakistan, Norway, and Sweden.

[Google Scholar Profile](#)

## References

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Available upon request