

Syed Hammad Hussain Shah

Larsgårdsvegen 2, 6009, Ålesund, Norway

☎ +47 4656 4323 | ✉ hammad.shah38@gmail.com | 🏠 hammadshah38.github.io | 🌐 shammadshah

Education

Norwegian University of Science and Technology–(NTNU)

Norway

PHD COMPUTER SCIENCE (THESIS TITLE: ADVANCED INTERACTIVE TECHNOLOGIES FOR GROUP FUNCTIONAL

2020 - 2024

TRAINING IN ELDERCARE: DESIGN AND DEVELOPMENT

- Advisor: Prof. Ibrahim A. Hameed

Sejong University

South Korea

MS COMPUTER SCIENCE (CGPA: 4.42/4.5 , PERCENTAGE: 98.4%)

2018 - 2020

- Advisor: Prof. Jong-Weon Lee

COMSATS University Islamabad (CUI)

Pakistan

BS SOFTWARE ENGINEERING (CGPA: 3.7/4.0, PERCENTAGE: 86.9%)

2013 - 2017

Experience

Project Leader & System Developer

Norway

MØRENOT AQUACULTURE AS, DIGITAL DEPARTMENT

2024 - Present

- Develop Azure Functions in C# (.NET) that act as the ingestion layer for an IoT platform, streaming sensor data from external APIs into TimescaleDB for time-series analysis.
- Design and develop microservice-based REST APIs in C# (.NET), delivering scalable CRUD endpoints for high-volume IoT sensor data and powering AQUACOM—a web-based operations-and-maintenance platform for the aquaculture industry.
- Develop responsive front-end application of AQUACOM using the Aurelia framework with TypeScript, HTML, and CSS.
- Optimize database and query performance by applying indexing, continuous aggregates, an effective chunking strategy, and compression policies, ensuring fast and cost-efficient access to large volumes of IoT time-series data.
- Lead a data-science project encompassing data collection, preprocessing, model development, and evaluation to enable data-driven decision-making and predictive analytics.
- Utilize Microsoft Fabric Data Factory to build data pipelines and Azure ML to orchestrate MLOps and scalable ML workflows.
- Design and maintain GitHub Actions workflows that automate CI/CD pipelines, enabling seamless build, test, and deployment of applications to Azure services.
- Leverage GitKraken to orchestrate Git workflows, auto-generate changelogs and pull-request templates, and improve team collaboration.
- **Skills:** C#, .NET Core, REST APIs, Azure Functions, Timescale, PostgreSQL, Aurelia, TypeScript, HTML, CSS, GitHub, CI/CD pipelines, Data Science, Azure ML, Data Factory, Python, Keras

Doctoral Researcher

Norway

SOCIAL ROBOTS LAB, DEPARTMENT OF ICT AND NATURAL SCIENCES, NORWEGIAN UNIVERSITY OF SCIENCE AND

2020 - 2024

TECHNOLOGY

- Codesigned and developed healthcare technologies based on AI, social robots, and Virtual Reality (VR).
- Data collection, preparation, exploration, statistical analysis and development of machine learning models for healthcare applications.
- Developed deep learning-based human activity recognition framework for healthcare applications.
- Designed data collection methods, conducted user studies, and analyzed data to gain insights into users' perceptions.
- Hands-on experience with Oculus Quest, Hololens 2, and humanoid robots such as Pepper and NAO robot.
- **Skills:** C#, .NET, Unity3D Game Engine, Python, Keras, ROS, NumPy, Pandas, Statistical analysis, User research, User-centered design

Research Assistant

South Korea

MIXED REALITY AND INTERACTION LAB, SEJONG UNIVERSITY

2018 - 2020

- Developed XR (VR, AR, MR) applications focused on sectors of multimedia entertainment and air traffic control.
- Applied user-centered design process involving requirements gathering, software development, and testing for better UX.
- Developed authoring tool for 360° VR entertainment based on salience-based object tracking.
- **Skills:** C#, .NET, Unity3D, Python, OpenCV, UX design, User research, HCI research, User statistics, Data analysis

Full-stack Web Developer

Pakistan

SOFTWARE DEPARTMENT, COMSATS UNIVERSITY ISLAMABAD (CUI)

Jul. 2017 - Nov. 2017

- Designed and developed web applications as full-stack developer involving backend and frontend development.
- Followed agile software development practices for continuous requirements analysis, user feedback, and usability testing.
- **Skills:** Database design and development, C#, .NET, REST APIs, SQL, Entity framework, JavaScript, HTML, CSS, Web Forms, MVC

Skills

- **Programming:** C# (.NET), Python, TypeScript, Apache Spark
- **Public Libraries:** .NET, Aurelia, Tensorflow/Keras, OpenCV, Pandas, NumPy, Mixed Reality Toolkit
- **Databases:** TimeScale, PostgreSQL, MSSQL, Entity Framework, Relational Database Design
- **CI/CD Tools:** GitHub Actions Workflows, Azure DevOps
- **MLOps:** Azure Machine Learning (Azure ML), MLFlow
- **Cloud Data Integration & Analytics:** Fabric/Azure Data Factory (ADF), Databricks
- **Environments & IDE:** Visual Studio, Unity3D game engine, ROS, Windows, Linux
- **Software Development:** GitKraken, Agile/Scrum Methodology
- **Research:** Statistical Analysis, Qualitative Data Analysis, Writing and Reviewing, Team Collaboration
- **Languages:** English (fluent), Norwegian (basic), Urdu (native)

Projects

AQUACOM

MØRENOT AQUACULTURE AS,
Norway

WEB DEVELOPMENT

- Developed a REST API to implement backend logic and data operations, alongside an Aurelia TypeScript frontend, for AQUACOM—a web-based operations and maintenance platform serving fish farmers in the aquaculture industry.
- **Skills:** REST APIs, C# (.NET), Aurelia (Typescript), HTML, CSS, GitHub

AQUACOM-IoT Infrastructure

MØRENOT AQUACULTURE AS,
Norway

IoT, SERVERLESS COMPUTING & DATABASE/QUERY OPTIMIZATION

- Developed an IoT infrastructure using Azure Functions in C# (.NET) as the ingestion layer, streaming sensor data from fish farms world-wide into TimescaleDB, and built a REST API to expose this data to AQUACOM for time-series analysis and predictive analytics.
- Optimized timescale database and query performance by applying indexing, continuous aggregates, an effective chunking strategy, and compression policies, ensuring fast and cost-efficient access to large volumes of IoT time-series data.
- **Skills:** REST APIs, Azure Functions, C# (.NET), Timescale, PostgreSQL, Github

An Efficient and Lightweight Multiperson Activity Recognition Framework

NTNU, Norway

PYTHON, DEEP LEARNING & ROBOTICS

- Developed an LSTM-based deep learning framework for multiperson activity recognition based on visual data for surveillance and robot-assisted healthcare applications.
- **Skills:** Artificial Intelligence, Deep Learning, Python, Keras, LSTM, OpenCV, NumPy, ROS, User research

Parking Ticket Analysis based on Chicago Parking Tickets Database

Azure Data Science Course, Online

DATA ENGINEERING, DATA SCIENCE, AZURE DATA FACTORY, DATABRICKS & MACHINE LEARNING

- Built ELT data pipeline using ADF, and performed data transformation using Azure Databricks. Later, developed training and inference pipelines for training, deployment and monitoring ML model's performance using Azure ML and MLflow through python scripts.
- **Skills:** Python, SQL, PySpark, Databricks, Azure Data Factory, ELT/ETL pipelines, Azure ML, MLflow

Social VR (Metaverse)-based Collaborative Exergame for Elderly Users

NTNU, Norway

IMMERSIVE TECHNOLOGIES, HUMAN-CENTERED DESIGN & USER RESEARCH

- Codesigned and developed social VR-based exergame supporting rehabilitation of elderly users.
- **Skills:** XR, VR, C#, Unity3D game engine, Human-centered design, UX design

Multi-agent Robot System to Monitor and Enforce COVID-19 Rules in Large Areas

NTNU, Norway

PYTHON, DEEP LEARNING & ROBOTICS

- 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.
- **Skills:** Artificial Intelligence, Deep Learning, Python, Keras, YOLO, OpenCV, NumPy, ROS

Intelligent Holographic Mixed Reality-based System for Health Data Management

NTNU, Norway

IMMERSIVE TECHNOLOGIES, PYTHON, COMPUTER VISION & USER RESEARCH

- Designed and developed a mixed reality-based system that leverages Microsoft HoloLens for work practices in nursing homes.
- **Skills:** XR, VR, C#, Unity3D game engine, HoloLens, Human-centered design, UX design, User research

A Holographic Mixed Reality (MR) system for air traffic control and management

Sejong University, South Korea

IMMERSIVE TECHNOLOGIES, HUMAN-CENTERED DESIGN & USER RESEARCH

- Codesigned and developed holographic MR-based application to improve productivity in tasks performed at air traffic control towers.
- **Skills:** XR, MR, C#, Unity3D game engine, Hololens, Human-centered design, UX design, User research

Web-based Student Application Management System

CUI, Pakistan

WEB

- Developed web application 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.
- **Skills:** C#, ASP.NET, HTML, CSS, JavaScript, SQL, NoSQL, Entity Framework

Publications

Journal and Conference

- **Shah, S. H. H.**, Karlsen, A. S. T., Solberg, M., & Hameed, I. A. (2024). Social VR and humanoid social robots for gamified physical exercise: Comparative evaluations by elderly users. *Virtual Reality*, (Springer). (IF: 4.4) – Under Review
- **Shah, S. H. H.**, Karlsen, A. S. T., Solberg, M., & Hameed, I. A. (2024). An efficient and lightweight multiperson activity recognition framework for robot-assisted healthcare applications. *Expert Systems with Applications*, 241, 122482 (Elsevier). (IF: 8.5)
- **Shah, S. H. H.**, Karlsen, A. S. T., Solberg, M., & Hameed, I. A. (2023). A social VR-based collaborative exergame for rehabilitation: codesign, development and user study. *Virtual Reality*, 27(4), 3403-3420 (Springer). (IF: 4.4)
- **Shah, S. H. H.**, Steinnes, O. M. H., Gustafsson, E. G., & Hameed, I. A. (2021). Multi-agent robot system to monitor and enforce physical distancing constraints in large areas to combat covid-19 and future pandemics. *Applied Sciences*, 11(16), 7200. (IF: 2.7)
- **Shah, S. H. H.**, Han, K., & Lee, J. W. (2020). Real-Time Application for Generating Multiple Experiences from 360° Panoramic Video by Tracking Arbitrary Objects and Viewer's Orientations. *Applied Sciences*, 10(7), 2248. (IF: 2.7)
- Han, K., **Shah, S. H. H.**, & Lee, J. W. (2019). Holographic mixed reality system for air traffic control and management. *Applied Sciences*, 9(16), 3370. (IF: 2.7)
- **Shah, S. H. H.**, Hameed, I. A., Karlsen, A. S. T., & Solberg, M. (2022, June). Towards a social vr-based exergame for elderly users: An exploratory study of acceptance, experiences and design principles. In *International conference on human-computer interaction* (pp. 495-504). Cham: Springer International Publishing.
- **Shah, S. H. H.**, Steinnes, O. M., Gustafsson, E. G., & Hameed, I. A. (2021, April). Multi-Agent System Based Mobile Help Desk and Monitoring of Safety Measures to Combat COVID-19 and Future Pandemics. In *2021 International Conference on Artificial Intelligence (ICAI)* (pp. 80-85). IEEE.
- **Shah, S. H. H.**, Longva, B., Hameed, I. A., Solberg, M., & Susanne T. Karlsen, A. (2021). Health Data Management for Nursing Practice: An Intelligent, Holographic Mixed-Reality System. In *HCI International 2021-Posters: 23rd HCI International Conference, HCII 2021, Virtual Event, July 24–29, 2021, Proceedings, Part II 23* (pp. 329-336). Springer International Publishing.
- Aftab, H., **Shah, S. H. H.**, & Habli, I. (2021). Classification of failures in the perception of conversational agents (CAs) and their implications on patient safety.
- **Shah, S. H. H.**, Han, K., & Lee, J. W. (2019). Interaction paradigms for air traffic control and management in mixed reality. In *Virtual, Augmented and Mixed Reality. Applications and Case Studies: 11th International Conference, VAMR 2019, Held as Part of the 21st HCI International Conference, HCII 2019, Orlando, FL, USA, July 26–31, 2019, Proceedings, Part II 21* (pp. 547-556). Springer International Publishing.
- **Shah, S. H. H.**, & Lee, J. W. (2020). Authoring Tool for Generating Multiple Experiences of 360° Virtual Reality. In *Advances in Computer Science and Ubiquitous Computing: CSA-CUTE 2018* (pp. 73-78). Springer. Malaysia.

Honors & Awards

2020-2024 **PhD Fellowship**, Norwegian University of Science and Technology–(NTNU)

Norway

2018-2020 **Fully Funded Scholarship for Masters Studies**, Sejong University

Seoul, South Korea

2017 **Silver Medal awarded for academic excellence and securing second position in bachelor**,
COMSATS University Islamabad (CUI)

Pakistan

References

Available upon request.