Humayun Khan

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Education

2021 – **Bachelor of Engineering** from NED University of Engineering and Technology, Karachi, Pakistan (3.6 out of 4 CGPA).

Work Experience

Current:

1. **Team Lead,** Haptics Human-Robotics and Condition Monitoring Lab, National Centre of Robotics and Automation (NCRA), NED University of Engineering and Technology, Karachi, Pakistan. (May 2023 – Present)

Past:

2. **Research Associate,** Haptics Human-Robotics and Condition Monitoring Lab, National Centre of Robotics and Automation (NCRA), NED University of Engineering and Technology, Karachi, Pakistan. (Aug 2022 – April 2023)
3. **Research Assistant,** Haptics Human-Robotics and Condition Monitoring Lab, National Centre of Robotics and Automation (NCRA), NED University of Engineering and Technology, Karachi, Pakistan. (Dec 2021 – July 2022).
4. **Research Intern,** Haptics Human-Robotics and Condition Monitoring Lab, National Centre of Robotics and Automation (NCRA), NED University of Engineering and Technology, Karachi, Pakistan. (June 2020 – Nov 2021).
5. **Intern,** Libra Engineering Pvt. Ltd., Karachi, Pakistan. (Feb 2020 -Mar 2020)

Software/Hardware Proficiencies:

- **Haptic Technology and Virtual Environments:**
  - CHAI3D, Force Dimension, Open Haptics frameworks
  - Haptic Virtual Environment Development
  - GUI Designing, Interface Optimization
  - Networking and Interface Design
  - STEM Haptics
  - AR VR Haptics

- **Industrial Tele-robotics and Automation:**
  - Industrial Robotic Arms: Denso, Mitsubishi, etc.
  - ORIN2 SDK, WincapsIII for Robotic Control
  - Smart Automation Systems
  - IoT Integration: Arduino (Pro, Mega, Lilypad), ESP boards (ESP32, ESP8266, NodeMCU), STM32, etc.
  - Raspberry Pi, Nvidia Jetson Nano for Embedded Solutions
- **Programming Expertise:**
  - C/C++, C#, Python
  - Arduino IDE and Interfaces: SPI, UART, FTDI, I2C
  - Embedded Programming with Keil µVision
  - MATLAB, Simulink, .NET for Engineering Analysis
- **Embedded Systems and Instrumentation:**
  - Microcontroller programming for customized sensor integration
  - Data processing and analysis for real-time measurements
  - GUI development for user-friendly data visualization
  - Sensor Integration, Data Analysis, GUI Development
- **Robotics and Kinematics:**
  - Gait Control and Kinematic Analysis for Quadruped, Humanoid, and STEM Robots
  - Kinematic modeling and analysis for precise motion planning
  - Expertise in robotic gait control algorithms
- **Other Software Skills:**
  - MS Visual Studio, MS Office for Project Management
  - Unity, Blender for 3D Modeling and Simulation
  - Product Design, IFTTT, Google Sheets API
  - Mathtype, Multisim, Proteus for Simulations
  - DiaLUX for Lighting Design
  - Endnote, AutoCAD, Shopify, Canva for Projects
  - Adobe Suite: XD, Premiere Pro, Lightroom, Photoshop for Visual Design
  - Filmora, Invideo, Zapier, Blynk for Versatile Applications

Language Skills

- **English**
- **Chinese**
- **Sindhi**
- **Urdu**

Certifications

- **Introduction to Virtual Reality** by **University of London** (Coursera) (2023)
- **Bits and Bytes of Computer Networking** by **Google** (Coursera) (2022)
- **Engineering Virtual Program** by **Goldman Sachs, Forage** (2021)
- **Formula SAE-A** On-line competition **by FSAE – A** (AustralAsia) (2020)
- **Lighting Essentials Exam** by **Signify** (2020)
- **HSK-1** (Chinese Language Certificate) by **Confucius Institute**, Pakistan (2018)

Research Publications

JOURNALS

Local/ International

1) **Humayun Khan** and Riaz Uddin, "Preliminary Results of the Optimized Network Interface for Long Distance Haptic Teleoperation", Engineering Proceedings, 32(1), 9. **2023 (MDPI).**

2) Abdullah Haider Ali, Syed Murtaza Hassan Kazmi, **Humayun Khan**, Hasnain Ali Poonja, Ayaz Shirazi and Riaz Uddin," Motor Parametric Calculations for Robot Locomotion," *Engineering Proceedings*, 20(1), 8, **2022 (MDPI).**

3) Haziq Iqbal, Muhammad Muhamid Ali Khan, Imtisal Ahmed, Huzaifa Yousuf, **Humayun Khan** and Riaz Uddin, "Design Procedure for Motor Selection for Custom-made Multi-axis CNC Machine.," *Engineering Proceedings*, 20(1), 26. **2022 (MDPI).**

4) Ahsan Sami, Marium Irfan, Riaz Uddin**,** Abdullah Haider Ali, **Humayun Khan**, Erij Khan, and Muhammad Sameer, "Oxygen Concentrator Design: Zeolite based Pressure Swing," *Engineering Proceedings*, 20(1), 29. **2022 (MDPI).**

5) Hasnain Ali Poonja, Muhammad Soleman Ali Shah, Riaz Uddin**,** Syed Murtaza Hassan Kazmi, **Humayun Khan**, Abdullah Haider Ali, and Muhammad Ayaz Shirazi, "Walking Algorithm using GAIT Analysis for 17-DOF Humanoid Robot," *Engineering Proceedings*, 20(1), 35. **2022 (MDPI).**

CONFERENCES

6) **Humayun Khan** and Riaz Uddin, "Optimized Network Solution for Bilateral Haptic Teleoperation: Improving Robustness over Long Distances", to be presented at 2nd International Conference on Emerging Trends in Electronic and Telecommunication Engineering (INTERACT 2023), Karachi, Pakistan, **2023**.

7) Syed Murtaza Hassan Kazmi, Abdullah Haider Ali, **Humayun Khan**, Husnain Ali Poonja, Ayaz Shirazi and Riaz Uddin, "Motor parametric calculation for robot locomotion", presented at the 7th International Electrical Engineering Conference (IEEC 2022), Karachi, Pakistan, **2022**.

8) Haziq Iqbal, Muhammad Muhamid Ali Khan, Imtisal Ahmed, Huzaifa Yousuf, **Humayun Khan** and Riaz Uddin, "Design Procedure for Motor Selection for Custom-made Multi-axis CNC Machine" presented at the 7th International Electrical Engineering Conference (IEEC 2022), Karachi, Pakistan, **2022**.

9) Ahsan Sami, Marium Irfan, Muhammad Sameer, Abdullah Haider Ali, **Humayun Khan**, Riaz Uddin and Erij Khan" Oxygen Concentrator Design: Zeolite based Pressure Swing", presented at the 7th International Electrical Engineering Conference (IEEC 2022), Karachi, Pakistan, **2022**.

10) Hasnain Ali Poonja, Muhammad Soleman Ali Shah, Syed Murtaza Hassan Kazmi, Muhammad Ayaz Shirazi, Riaz Uddin and **Humayun Khan**, "Walking Algorithm using GAIT Analysis for 17-DOF Humanoid Robot", presented at the 7th International Electrical Engineering Conference (IEEC 2022), Karachi, Pakistan, **2022**.

11) **Humayun Khan**, Subhan Ahmed, Afsheen Bibi, Muhammad Affan, Sadiq Rasheed and Riaz Uddin, "Revamped Haptic Tele-Operation with Optimized Latency" *presented at the 6th International Electrical Engineering Conference (IEEC 2021)*, Karachi, Pakistan, **2021**.

12) Muhammad Affan, **Humayun Khan**, Subhan Ahmed, Riaz Uddin and Ayaz Sherazi "Haptic-Enabled Virtual Laboratory for Hands-on E-Learning: A Technology for and Beyond the Pandemic Era", *to be*

presented at 4th International Conference on Robotics and Automation in Industry - ICRAI 2021 (IEEE), Rawalpindi, Pakistan, **2021**.

Research Interests

- Haptics and Teleoperation
- Haptic Virtual Environments and METAVERSE
- Smart Industrial Automation
- Industrial Tele-robotics
- Wearable Haptics
- Control Systems and Automation
- Robot Dynamics and Controls
- Sensors, Smart Energy and Mechatronic Systems
- Electrical Power Systems Control

Referee to Reputed Journals and Conferences (Direct / Indirect)

- IEEE Haptic Symposium 2022
- IEEE Transaction on Instrumentation and Measurement (Joint reviewer with Dr. Riaz Uddin)
- IEEE Euro Haptics 2022
- International Conference on Robotics Automation in Industry (ICRAI)
- International Electrical Engineering Conference (IEEC)

Teaching Assignments

- Instructor "Haptics and STEM Robotics" at CEDAR College in February 2023.
- Lead Trainer "Haptics and Robotics" in the Workshop "Current Trends in Haptics, Human-Robotics and Healthcare Innovations" organized by HHRCM Lab in January 2023.
- Lead Trainer "Immersive Haptics" in the Workshop "Immersive Haptics, Tele-robotics and Innovations" organized by HHRCM Lab in October 2022.
- Lead Trainer "Robotronics, Haptics and STEM'' at Intensive Tech camp, organized by Humanities department NEDUET under the funding of USAID ACCESS Micro-Scholarship Program in June 2022.
- Instructor "Robotics and STEM" at CREDO College in October-December 2021.
- Teaching Assistant under Dr. Riaz Uddin (June 2020-Present).

Supervisor for Final Year Design Project (FYDP)

- External Supervisor for the FYDP "Design of a Gait Control Algorithm for Humanoid Robot", **2023** (in progress).
- External Supervisor for the FYDP "Design of a Gait control algorithm for a Quadruped Robot", **2023** (in progress).
- External Supervisor for the FYDP "Design and development of CPAP/BiPAP respiratory assistive device", **2023** (in progress).
- External Supervisor for the FYDP "Design of a Network Jitter regulator for advance Tele-robotic System", **2023** (in progress).

- External Supervisor for the FYDP "To Study and Analyze the Dynamic features of prosthetic hand gloves using a stable Network for Tele-handshaking Setup", **2022**.
- External Supervisor for the FYDP "Design and Development of a Quadruped Robot for Disaster Management", **2022**.
- External Supervisor for the FYDP "Design of Low Cost, Medical, Portable Oxygen Concentrator", **2022**.
- External Supervisor for the FYDP "Design and Development of Human Sized Humanoid Robot for Social Interaction", **2022**.

Research Projects

- Generalized Haptic Teleoperation and Computer Networking.
- Haptic Virtual Environments development.
- Industrial Tele-robotics and Automation.
- Haptics and STEM.
- Smart Industrial Automation
- Industrial Robotic teleoperation
- AR, VR and STEM Haptics

Invited Speaker/Judge/Organizer

- "Organizer" at the 2nd Sindh Higher Education Commission Research and Technology Showcase along with Dr. Riaz Uddin as ''Chief Organizer" in May 2023.
- Invited "Presenter" (HHRCM-NCRA NEDUET) at "Vice Chancellors' Forum" held on 19th 20th March, 2023 at Islamabad Mariott hotel by HEC Pakistan.
- Invited Talk on ''Haptics, Robotronics and Current Trends in Technology'' at Pakistan US Alumni Network (PUAN) Country Project on Digital Skills and STEM in July 2022.
- Invited ''Judge'' in Robotics Project Exhibition Competition at MPERC 2022.
- "Organizer" at the first Sindh Higher Education Commission Research and Technology Showcase along with Dr. Riaz Uddin as ''Chief Organizer" in May 2022.

Honors/Awards

- **Intercontinental Teleoperator:** Intercontinental (Asia-Europe) Haptic Teleoperation performed between HHRCM Lab-NCRA NEDUET **Karachi-Pakistan** and IGS group, University of Innsbruck, **Innsbruck-Austria** on 10th November 2022. (Dr. Riaz Uddin served as Client-Side Teleoperator at IGS Group, University of Innsbruck).

References

- **Dr. Riaz Uddin**, PI Haptic Human-Robotics and Condition Monitoring Lab-NCRA, Associate Professor, NED University of Engineering and Technology (email: riazuddin@neduet.edu.pk).
- **Nabeel Fayyaz**, Lecturer, NED University of Engineering and Technology (email: nabeelfayyaz@neduet.edu.pk).