Hassam Khan Wazir

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Experienced in multidisciplinary research with proficiency in robotics software/hardware development, mechatronics, human-robot interaction, AI/ML, vision and audio processing, electrical/electronic engineering, and mechanical design.

Experience

Mechatronics, Controls, and Robotics Lab (MCRL), NYU — **New York, USA**

Research Scientist — **July, 2024 – Present**

- Developed an indoor localization system for the elderly using ambient Wi-Fi and inertial measurement units.
- Trained machine learning models to detect and track physical and breathing exercises, ensuring therapy compliance and proper exercise monitoring.
- Leveraged Large Language Models (LLMs) to facilitate natural language communication with robots, enabling users to provide higher-level instructions and utilizing LLM agents to ensure task completion by the robot.

Research Fellow — **September, 2018 – May, 2024**

- Started ambient assistive technology research at MCRL, focusing on improving quality of life for seniors through the development of AI and ML applications, robotics, mobile devices, and wearable sensors.
- Conducted comprehensive human data collection on breathing and physical exercises with over 100 participants, resulting in the creation of multiple datasets at MCRL. These datasets are being used in ongoing and future research projects at MCRL, facilitating advancements in long-term health monitoring.
- Carried out Institutional Review Board (IRB) application process for data collection involving human subjects.
- Developed audio/vision-based systems employing deep learning to monitor therapy compliance for Lymphedema prevention.
- Designed wearable and vision-based sensors for stroke rehabilitation and therapy compliance monitoring to improve patient outcomes and adherence to therapy.
- Authored and co-authored seven peer-reviewed papers and filed patents, contributing to the academic community.
- Collaborated with 8 PhD students and mentored 20 master's and 11 bachelor's students over several projects.

Graduate Instructor — **September, 2018 – May, 2024**

- Taught laboratory courses introducing students to data acquisition and control boards, system modeling, identification, and control (PID and LQR), as well as measurement techniques for temperature, frequency, electricity, rotation, and harmonics using standard laboratory equipment

LearnOBots — **Islamabad, Pakistan**

Trainee Engineer — **June, 2016 – August, 2016**

- Taught interdisciplinary STEAM (Science, Technology, Engineering, Arts, Mathematics) courses to high school students, enhancing their understanding of complex concepts through interactive learning.

Universiti Teknologi Brunei — **Bandar Seri Begawan, Brunei Darussalam**

Research Assistant — **May, 2014 – November, 2014**

- Conducted extensive research on Unmanned Aerial Vehicles (UAVs), including the development of dynamic models for quadcopter performance analysis and simulation and software implementation of mathematical models.

Technical Skills

Programming Languages: C, C++, Python, MATLAB/Simulink, Assembly, R, C#, SQL

Tools: ROS2, OpenCV, SciPy, Linux, HPC, Solidworks, KiCad, Unity, Unreal, iOS, Android, AR/VR development

Machine Learning and AI Frameworks: PyTorch, Tensorflow/Keras, Scikit-learn, Fast.ai, Hugging Face

Hardware: UR16e, Raspberry Pi, Arduino, PIC, AVR, STM32, ESP32/8266, Propeller, Basic Stamp 2, Zilog Z80

Education

Ph.D. – Mechanical Engineering (Digital Health and Telerehabilitation) — **New York University, 2024**

M.S. – Mechatronics and Robotics (Mobile and Swarm Robotics) — **New York University, 2018**

B.Eng. – Electrical and Communication Engineering (Telecommunication) — **Universiti Teknologi Brunei, 2014**