ZEYAD GHULAM

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Summary of Qualifications

- Proven experience in Data Science and Robotics with a focus on enhancing model performance in real-world applications such as assistive robots, autonomous navigation and vision based detection.
- Proven ability to clean, analyze, and derive insights from complex datasets (EMG/ECG/EEG sensor data, medical imaging, time-series) alongside training and optimizing ML models.
- Expertise in computer vision, predictive analytics, and end-to-end ML pipelines. Published research and professional experience in AI-driven robotics systems with a focus on collaboration and innovative problem-solving in ICORR conference.
- Proficient manager of 5 Senior Biomedical Engineering courses and led cross-functional teams in 6 labs, mentored and supported 1000+ students in the past 2 years with technologies, concepts and equipment.

Technical Skills

- **Languages**: Python (TensorFlow, PyTorch, Pandas), SQL, C++, MATLAB
- **ML/Data**: Computer Vision (YOLOv11, Detectron2, SAM2), Scikit-Learn, Predictive Modeling, Data Visualization (Matplotlib, Tableau), LLM Pipeline Design (GPT4, Gemini, Llama)
- **Tools**: Git, ROS, AWS, Docker, Jupyter, LaTeX

Education

Vector Institute	**May 2023 – May 2025**
Masters of Applied Science + Artificial Intelligence, AI and Robotics Engineering	*Guelph, Ontario*
University of Guelph	**Sept 2018 – May 2023**
Bachelor of Engineering, Biomedical Engineering (Co-op)	*Guelph, Ontario*

Relevant Work Experience

BME Lab Coordinator - University of Guelph **Sept 2023 – Present**
Laboratory Coordinator *Guelph, Ontario*

- Training an assistive feeding robot to carry out daily feeding utilizing state of the art computer vision models for facial recognition (using MediaPipe) and food detection and segmentation (using YOLOv9 and SAM)
- Overlooking laboratory component of BME specific courses including Engineering Biomechanics, Signal Processing, Medical Imaging Modalities, Bio-instrumentation Design and Engineering Design IV at the SOE
- Conducting Biomechanics laboratory data collection using VICON motion capture system, EMG sensors, force plates and goniometers
- Supporting students on demand with technical and non-technical concerns as well as with equipment usage to set them up for success

University Health Network - Toronto Rehabilitation Institute **Jan 2021 – Present**
Research Analyst II *Toronto, Ontario*

- Development of PostureCoach which is a light-weight, wearable device that provides caregivers with real-time feedback when they are in a posture that puts them at high risk for back injury
- Designed a GUI that uses Machine Learning algorithms like YOLOv8 and OpenPose to provide real-time pedestrian detection in busy crosswalks in different weather conditions
- Conducted scoping review of 6000+ articles about emergency evacuation guidelines and procedures in the built environment for individuals with functional limitations
- Compiled a catalogue of devices and services that aids in making Canada's national parks to be barrier free

Robotics Institute - Assistive Robotic Manipulator   May 2019 – Jan 2023
Research Analyst III   *Guelph, Ontario*
- Authored detailed documentation for robotics systems about designing novel ROS architectures, ensuring clarity for both technical and non-technical stakeholders
- Designed and delivered training modules on AI model deployment, enabling cross-functional teams to integrate solutions seamlessly
- Monitored and fine-tuned AI models using TensorFlow and OpenCV for real-time robotics applications, improving model efficiency by 15%
- Mentored undergraduate students in designing robotics projects, resulting in a successful prototype demonstration at a national conference

Intellijoint Surgical - Medical Innovation Xchange   Sept 2022 – May 2023
Advanced Research and Algorithms Specialist   *Kitchener, Ontario*
- Development of an X-Ray automated landmark detection algorithm using Machine Learning techniques such as supervised learning and deep learning, resulting in faster pre-operative planning times
- Designed and fabricated a precision testing apparatus for the Intellijoint navigation system using 3D printing technology, resulting in a more efficient and accurate testing process
- Collaborated with product design specialists in the Intellijoint HIP, KNEE and VIEW teams to design and develop innovative medical devices with orthopaedic surgeons in mind

Relevant Projects

ARUCO Marker Detection System | *Python, OpenCV, Unity*   **Aug 2024**
- Designed an ArUco marker angle detection system that measures 6 degrees of freedom of the marker

ZAMAZ UTI Scanner | *SolidWorks, Altium, Ansys, Python*   **Apr 2022**
- Developed a low cost, rapid and accurate UTI detection system based on microfluidic chip technology

FallSense Wearable Fall Detection Device | *C++, MatLab, SolidWorks, ESP32*   **Dec 2021**
- Constructed an inexpensive, wearable device that automatically detects falls without user input, it instantly notified emergency contact with location and it also works even if someone gets hurt or goes unconscious

Awards and Recognition

Dennis Washington Leadership Graduate Scholarship   **Feb 2023**
Finalist   *Horatio Alger Association*
- The only undergraduate student competing against masters and PhD. students for $150,000 CAD scholarship
- Discussed how automation through AI and Machine Learning can aid in restoring peoples' quality of life

Lincoln Alexander Chancellor Scholar   **2018 - 2023**
Recipient   *University of Guelph*
- Outstanding academic ability (99%) and contribution to school and community (1540 hrs volunteering)
- Awarded by Dr. Franco.J.Vaccarino, President and Vice-Chancellor, University of Guelph

Publications

Assistive Feeding Robot for Upper Limb Impairment—Testing and Validation
Published (July 2023) - University of Guelph
- Co-author of a paper about a novel generalized assistive feeding robot system
- The system introduces a novel approach for feeding that prioritized two idea; generalized functionality to encompass multiple feeding tasks and seamless user interaction

Virtual Accessible Bilingual Conference Planning: The Parks Accessibility Conference
Published (Jan 2023) - KITE Research Institute - Toronto Rehabilitation Institute
- Planned and produced a fully accessible bilingual virtual conference about the accessibility of national and provincial parks in Canada

Recommendations for Evacuating Individuals with Disabilities from the Built Environment
Published (Sept 2021) - KITE Research Institute
- Provide a set of resources that can be used to revise existing egressibility guidelines, to create new standards, and to highlight gaps where future work is needed to improve egressibility of the built environment