github.com/StafaH
mustafahdb.com

Mustafa Haiderbhai

(289) 894-2152
mhaid@cs.toronto.edu

Education

Toronto, Canada **University of Toronto** **Fall 2020 - Current**

- Ph.D. in Computer Science *GPA: 4.0/4.0*
  Ph.D. Thesis Topic: Autonomous Surgical Robotics, Manipulation and Tracking of Deformable Objects

Ottawa, Canada **University of Ottawa** **Fall 2014 – Summer 2020**

- M.A.Sc. in Biomedical Engineering, Graduated August 2020 *GPA: 9.8/10 (Dean's Honour List)*
  Masters Thesis: AR C-Arm Development and Synthetic X-rays Using Generative Adversarial Networks
- B.H.Sc. in Health Sciences, Graduated April 2018 *GPA: 9.53/10 (Dean's Honour List)*
  Bachelor Thesis: Integration of Biomechanical Analysis into Augmented Reality Games for Rehabilitation

Experience

Research **MedCVR Lab - SickKids Hospital** **September 2020 – Current**

- Devoloping autonomous robotic systems using the da Vinci Research Kit, working on novel soft-body physics simulator in for robot learning, imitation learning techniques, and robust tracking/manipulation of soft materials using graph networks

Robotics/ML PhD Resident **(Google) X, The Moonshot Factory** **March 2022 - August 2022**

- Research, develop, and improve machine learning approaches for a cutting-edge (*confidential*) robotics project

Teaching Assistant **University of Toronto & Ottawa** **September 2018 – Current**

- Teaching Assistant for CSC108 (Intro to Comp Programming), BME1478 (Coding for Biomedical Engineers) HSS2381 (Statistics), MCG5138 (Graduate Class - Machine Learning/Control Theory), MCG 5138 (Graduate Class - Robotic Surgery), and MCG4150 (Bioinstrumentation)

Research **Metrics Lab - University of Ottawa** **January 2017 – July 2020**

- Pioneered three large projects: pix2xray, Desired Views, and Magic Mirror. Research focuses on computer vision, deep learning through adversarial networks, and real-time augmented reality with interactive elements
- Managed the lab in a leadership position, supervising over 15 undergraduate and graduate students. Presented at multiple conferences and meetings, and communicated with shareholders across the university and hospital.

Research Intern **CARD Lab - Balgrist University Hospital** **June 2019 – August 2019**

- Implemented the Camera Augmented Mobile C-arm device built using a C-arm and multiple cameras to allow for augmented reality image-guided surgical procedures through multi-modal camera fusion.
- Pioneered novel augmented reality rendering algorithms, including point-based rendering, as well as multi-camera multi-modal calibration and image reconstruction.

Projects

- **Autonomous Surgical Robotics (2022):** Deep learning for surgical scene perception and development of RL algorithms for autonomous surgical robotics tasks.
- **Surgical Robotics Simulation (2021):** Robotics simulation environment for reinforcement and imitation learning using C+, Unity, Nvidia PhysX, and PyTorch.
- **pix2xray (2020)**: Deep Learning to generate synthetic X-rays using atypical inputs from cameras and sensors. Simulation environment to generate synthetic X-ray datasets (Python, TensorFlow, C++, OpenGL)
- **CAM-C (2019):** Surgical overlay of X-ray and video using multi-modal camera fusion (C++, OpenGL, OpenCV)
- **Magic Mirror (2017-2018):** Augmented reality medical education tool that overlays medical anatomy on a mirror interface using the Kinect (C++, OpenGL)

Additional Experience and Awards

NSERC Scholarships: Awarded NSERC PhD, Masters, and Undergraduate scholarships to pursue research
Excellence Scholarships: Awarded University of Ottawa Excellence Scholarships and Dean's Honor List

Languages and Technologies

Languages: C++, C, C#, Python, Java, HTML/CSS/JavaScript
Frameworks: PyTorch, TensorFlow, OpenGL, OpenCV, VTK/ITK, Qt
Tools: Git, CMake, Linux, Docker, AWS

Awards

Canada Graduate Scholarship - PhD	2020
Natural Sciences and Engineering Research Council of Canada (NSERC) Masters Scholarship	2019
Ontario Graduate Scholarship (Declined)	2018
University of Ottawa Excellence Scholarship – Masters	2018-2019
University of Ottawa Dean's Honour List	2014-2018
Natural Sciences and Engineering Research Council of Canada (NSERC) Undergraduate Student Research Award	2018
University of Ottawa, Interdisciplinary School of Health Sciences Student Research Day – 1st Place Poster Session	2018
Natural Sciences and Engineering Research Council of Canada (NSERC) Undergraduate Student Research Award	2017
Undergraduate Research Opportunity Program Award - University of Ottawa	2016

Peer Reviewed Publications

Mustafa Haiderbhai, Radian Gondokoryono, Thomas Looi, James Drake, Lueder A. Kahrs. Robust Sim2Real Transfer with the da Vinci Research Kit: A Study On Camera, Lighting, and Physics Domain Randomization. International Conference on Intelligent Robots and Systems (IROS) 2022.

Radian Gondokaryono, **Mustafa Haiderbhai**, Adnan Munawar, Thomas Looi, James Drake, Lueder Alexander Kahrs. A modular ROS-based dVRK teleoperation controller architecture. Hamlyn Symposium on Medical Robotics 2022.

Mustafa Haiderbhai.,Sergio Ledesma, Sing Chun Lee, Phillip Fürnstahl, Nassir Navab, Pascal Fallavollita. pix2xray: Converting RGB images into X-rays using generative adversarial networks. International Journal of Computer Assisted Radiology and Surgery 2020.

Mustafa Haiderbhai, Sergio Ledesma, Nassir Navab, Pascal Fallavollita. Generating X-ray Images from Point Clouds Using Conditional Generative Adversarial Networks. International Conferences of the IEEE Engineering in Medicine and Biology Society (EMBC) 2020.

Mustafa Haiderbhai, Jesus Guerrero-Turrubiates, Vinod Gutta, Pascal Fallavollita. Automatic C-arm Positioning Using Multi-Functional User Interface. The 42nd Canadian Medical and Biological Engineering Conference (CMBEC) 2019.

Jeffrey Lao, Stephanie Chevrier, **Mustafa Haiderbhai**, Shelia Gonzalez-Reyna, Mina Zeroual, Michel Désilets, Pascal Fallavollita. Comparison of a mixed-reality technology to cadavers for gross anatomy learning. The 16th Annual Imaging Network Ontario (ImNO) Symposium 2018.

Fady Said, David Burbidge, **Mustafa Haiderbhai**, Sheila Esmeralda Gonzalez-Reyna, Mina Zeroual, Michel Désilets, Pascal Fallavollita. A mixed-reality user interface for gross anatomy learning. The 16th Annual Imaging Network Ontario (ImNO) Symposium 2018