

Armin Eshaghi

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Experienced Mechatronics Engineer/Researcher in the Robotic vision and controls. Skilled in Computer vision, Automation, and Machine learning, with an Master of Applied Science (MAsc) from University of Toronto

Summary of Skills

Computer Vision (CV) – Skilled in **OpenCV** and **SciKit-Learn** Python libraries as well as **tensorFlow** for object detection and classification software. Plus 3 years of experience developing software for vision-based feedback **control systems** for automation of robotic systems

Machine Learning (ML) – Experienced in training and building Machine Learning Models, such as **CNNs/RNNs** with TensorFlow, Keras and PyTorch. Skilled in end-to-end deep learning pipeline

Projects

Automated 3D Image-Based Visual Control System for Micro-Surgery

Sep 2018 – Sep 2021

- Applied computer vision and machine learning to develop 3D image segmentation software for volumetric feature data extraction in embryonic micro-surgery. Improved overall system performance by 100%
- Utilized OpenCV, SciKit-learn, and data clustering methods to develop algorithms for processing optical microscope images. Achieved real time extraction of accurate 3D image data and target coordinates
- Designed a precise vision-based robot controller for automated injection of materials into targeted mouse embryos. Minimized damage by implementing principles of minimally invasive surgery

Optical Tire Slip Angle Sensor

Sep 2017 – Jun 2018

- Utilized computer vision and mechatronics techniques to create a low cost, yet accurate all-in-one slip angle sensing device to improve dynamic performance of a formula SAE car
- Developed image processing algorithms to extract features and compute tire slip angle as the car is going around a track. Used a Raspberry Pi unit to enable on-board data processing

Education

Professional Certificate: Tiny Machine Learning, Harvard University (Online)

Sep 2021 – Present

- Explore uses of deep learning and artificial Intelligence for low power “tiny” resource-constrained devices
- Build end-to-end machine learning pipeline deployed onto embedded devices

Master of Applied Science: Mechanical Engineering, University of Toronto

Sep 2018 – Sep 2021

- **Field:** Robotics and Automation, Applied Computer Vision
- **Thesis:** Automation of Real-Time 3D Image-based Visual Servo Control for Single Cell Surgery

Bachelor of Applied Science: Mechanical Engineering, University of Toronto

Sep 2013 – Jun 2018

- Graduated with a minor in Robotics & a minor in Biomedical Engineering

Professional Experience

Research Assistant (Master of Applied Science) - University of Toronto

Sep 2018 – Dec 2021

- Developed controllers and algorithms to automate lab equipment, including robotic high-speed cameras, manipulators, and motorized imaging systems/microscopes
- Optimized control systems and created efficient workflows to speed up the processes and minimize equipment downtime for the entire research lab

Teaching Assistant - University of Toronto

Sep 2019 – Dec 2021

- Collaborated with a small team to lead design and prototyping workshops to teach robotics
- Assisted students with programming and prototyping an autonomous maze solving rover

Research Student - University Health Network (UHN)

Dec 2017 – May 2018

- Conducted Mesenchymal Stromal Cells (MSCs) research for treatment of arthritis
- Collected experimental results and performed data analysis to find optimal cell culture parameters

Project Coordinator - Vibro-Acoustics Swegon North America

Jun 2016 – Aug 2017

- Worked in liaison with project management, engineering design and sales departments to provide HVAC noise control and vibration isolation solutions to clients
- Reviewed and interpreted project specifications and engineering drawings for a variety of projects, including large-scale projects such as schools and hospitals
- Collaborated with engineers and clients to close the communication gap and improve productivity

Technical Skills

Computer Science

- Computer Vision – OpenCV, SciKit-learn, Pillow, Pixellib
- Machine Learning – TensorFlow (TF), TF Lite, Keras, PyTorch, Deep Learning
- Programming – Python, C, C++, CUDA, Git, pandas

Mechatronics Engineering

- Robotics, Control Systems, Electronics, Rapid Prototyping, Machining
- Solidworks, ANSYS, MATLAB, Arduino, Embedded Systems

Publications

[Automation of Real-Time Three-Dimensional Image-Based Visual Servo Control for Single Cell Surgery](#)

Thesis - ProQuest Dissertations Publishing – 2021

[Automation of single cell surgery in real-time using a vision-based control system](#)

International Journal of Mechatronics and Automation Vol. 8, No. 3 – 2021

[Automated Real Time Image Based Visual Servo Control of Single Cell Surgery](#)

2020 IEEE International Conference on Mechatronics and Automation, IEEE Xplore – 2020