Khoa Tran

Contact Information

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Education

MASc., Electrical & Computer Engineering Sept 2021 – Aug 2023
Carleton University | Ottawa, ON, Canada

- Thesis: *Classification of Motion-Mode Ultrasound Images Obtained Using Wearable Ultrasonic Sensor for Automated Lung Monitoring*.
- Entered MASc studies through Carleton's Accelerated Pathway, only available to outstanding students with demonstrated academic excellence and aptitude for research.
- Nominated for the University Senate Medal, awarded for outstanding graduate research work.
- CGPA: 11.8/12.

B.Eng., Biomedical & Electrical Engineering Sept 2016 – Apr 2021
Carleton University | Ottawa, ON, Canada

- Capstone Project: *Arterial Diameter Estimation Using Ultrasound*.
- Graduated with High Distinction (highest distinction) and Senate Medal for outstanding academic achievement.
- CGPA: 11.6/12.

Research Experience

Biomedical Ultrasound Research Assistant May 2021 – Aug 2023
Carleton University | Ottawa, ON, Canada

- Collaborated with clinical doctors, biomedical engineers, and PhD candidates to develop computer vision, signal/image processing, and machine learning methods for wearable ultrasonic sensor applications using Python, Jupyter Notebooks, and MATLAB.
  - Researched image complexity and texture features for machine learning classification of lung disease in motion-mode ultrasound.
  - Researched signal decomposition algorithms for arterial wall tracking in motion-mode ultrasound.
- Iteratively designed, constructed, and evaluated wearable ultrasonic sensors.
- Developed a customized Python library and GUI to parse, process, and analyze ultrasound signal data, images, and videos using scientific Python modules and the Qt framework.
- Presented preliminary studies and experimental results at various conferences and research events, publishing 4 conference papers and winning the 3rd place presentation award at the 8th IEEE Research Boost.
- Reviewed conference papers for the 2022 IEEE International Symposium on Medical Measurements and Applications (MeMeA) conference.

Industry Experience

Network Management Solutions Developer Apr 2020 – Aug 2020
Nokia Canada Inc. | Ottawa, ON, Canada

- Developed and maintained customized features for Nokia's Network Services Platform using Java, the Spring framework, and Maven.
- Updated and replaced deprecated dependencies for user authentication in Nokia Service Portals.

Industry Experience (Cont.)

Front End UI Software Developer   Sept 2019 – Dec 2019

Ciena | Ottawa, ON, Canada

- Led and delivered major UI features to Ciena's Manage, Control and Plan product with agile and test-driven development using Ember.js, JavaScript, HTML, and SCSS.
- Designed and implemented flexible, generic, and self-contained UI components using JavaScript, HTML, and SCSS in accordance with UX specifications.
- Refactored codebases to adhere to coding conventions and participated in code reviews.

COOP Engineer & Software Designer   Jan 2019 – Aug 2019

Thales (formerly Gemalto) | Ottawa, ON, Canada

- Resolved X509 certificate parsing bugs and implemented multi-threaded manufacturing for Thales smart cards using Java, Java Card, C++, and C.
- Built a UNIX CLI tool to track automated Jenkins tests and publish summaries to Jira using Python, replacing paid Zapier integration and saving $500+/year.
- Designed, drove, and deployed an internal web application to facilitate interactions, analyses, and Excel report generation with PostgreSQL test performance databases using Python, Flask, JavaScript, jQuery, HTML, CSS, and Docker.

Student Spectrum Engineer   Apr 2018 – Dec 2018

Innovation, Science and Economic Development (ISED) Canada | Ottawa, ON, Canada

- Analyzed and approved Canadian digital TV applications for the 600 MHz Transition Plan and Safety Code 6 certification.

Teaching Experience

Teaching Assistant – Systems and Computer Engineering   Sept 2020 – Apr 2023

Carleton University | Ottawa, ON, Canada

- Supervised labs, guided students, and graded assignments, quizzes, reports, midterms, and final exams for the following courses:
  - **ECOR 1041**: Computation and Programming (introduction to programming with Python).
  - **SYSC 2006**: Foundations of Imperative Programming (memory management, recursion, and data structures with C).
  - **SYSC 2310**: Introduction to Digital Systems (logic gates, Boolean algebra, circuits, Logisim).
  - **SYSC 2320**: Introduction to Computer Organization and Architecture (computer system components, instruction set architectures, assembly language, and Logisim).
  - **SYSC 3006**: Computer Organization (computer system components, instruction set architectures, assembly language, and Logisim).
  - **SYSC 3610**: Biomedical Systems, Modeling, and Control (Laplace transform, transfer functions, frequency responses, and classical control systems).

Extracurricular Activities

Carleton Artificial Intelligence Society (CAIS)   Sept 2021 – Jul 2022

Carleton University | Ottawa, ON, Canada

- Organized lectures and coding workshops on machine learning topics as a Technical Workshop Lead:
  - Presented a lecture and coding tutorial on linear regression, Oct 2021.
  - Presented a lecture and coding tutorial on linear classification, Nov 2021.
  - Presented a lecture and coding tutorial on convolutional neural networks, Mar 2021.
  - Led a workshop on classifying the MNIST dataset using CNNs, Mar 2021.
- Helped plan the undergraduate machine learning competition (CAIS X 2022).

Extracurricular Activities (Cont.)	**Carleton Planetary Robotics Team**	Sept 2017 – Apr 2018

Carleton University | Ottawa, ON, Canada

- Worked with a multidisciplinary team of engineering students to design and construct a modular electrical system for the University Rover Challenge 2018.

Terry's CAUSE on Campus	Nov 2016

Carleton University | Ottawa, ON, Canada

- Volunteered to run the Terry's CAUSE on Campus charity event in collaboration with the Ottawa Terry Fox Run 2016.

Awards & Scholarships

- **OGS**, from Carleton University, 2022 ($15000, declined).
- **NSERC CGS-M**, from Carleton University, 2022 ($17500).
- **OGS**, from Carleton University, 2021 ($15000, declined).
- **Vector Scholarship in Artificial Intelligence**, from the Vector Institute, 2021 ($17500).
- **NSERC USRA**, from Carleton University, 2021 ($6000).
- **Senate Medal for Outstanding Academic Achievement**, from Carleton University, 2021 (Honour Only).
- **Dean's Honour List**, from Carleton University, 2016-2021 (Honour Only)
- **Davidson Dunton Scholarship**, from Carleton University, 2020 ($4000).
- **Faculty Scholarship**, from Carleton University, 2016-2019 ($16000 total).

Professional Affiliations

- IEEE Young Professionals, Member, 2021-Present
- IEEE Computational Intelligence Society, Member, 2021-Present
- IEEE Engineering in Medicine and Biology Society, Member, 2021-Present
- IEEE Signal Processing Society, Member, 2021-Present

Conference Publications

- **K. Tran**, S. Steinberg, Y. Ono, S. Rajan and R. Arntfield, "Lung Sliding Detection in M-Mode Using Wearable Ultrasonic Sensor: An In-Vivo Feasibility Study," *2023 IEEE International Ultrasonics Symposium (IUS)*, Quebec, Canada, 2023, (Proceedings paper is submitted for publication).
- **K. Tran**, S. Rahman, Y. Ono, S. Rajan and R. Arntfield, "Wearable Ultrasound Assessment of Lung Sliding in M-Mode: A Phantom Simulation-Based Study," *2022 IEEE 22nd International Conference on Bioinformatics and Bioengineering (BIBE)*, Taichung, Taiwan, 2022, pp. 1-4, doi: 10.1109/BIBE55377.2022.00009.
- **K. Tran**, S. Rajan and Y. Ono, "Comparison of Particle Swarm Optimization and Genetic Algorithm for Ultrasound Estimation of Carotid Intima-Media Thickness Using Matching Pursuit," *2022 IEEE International Symposium on Medical Measurements and Applications (MeMeA)*, Messina, Italy, 2022, pp. 1-6, doi: 10.1109/MeMeA54994.2022.9856525.
- S. Steinberg, **K. Tran**, S. Rajan and Y. Ono, "Estimation of Intima-Media Thickness of Carotid Artery by Ultrasound Radiofrequency Signal Decomposition Using Matching Pursuit," *2021 IEEE International Ultrasonics Symposium (IUS)*, Xi'an, China, 2021, pp. 1-4, doi: 10.1109/IUS52206.2021.9593598.

Presentations

- **K. Tran**, S. Steinberg, Y. Ono and S. Rajan, "Characterization of Lung Texture in M-Mode Ultrasound Image Obtained by Wearable Ultrasonic Sensor," presented at the *Tissue Engineering & Applied Materials Hub Workshop*, Ottawa, Canada, Jun. 27, 2023.
- **K. Tran**, S. Steinberg, S. Rajan and Y. Ono, "Estimation of Carotid Intima-Media Thickness Using Gaussian Model of Ultrasound Envelope Signals," presented at the *Eighth IEEE Research Boost*, Montreal, Canada, Nov. 17, 2021. **Awarded the 3rd place presentation award**.

Projects

Classification of Motion-Mode Ultrasound Images Obtained Using Wearable Ultrasonic Sensor for Automated Lung Monitoring

- Thesis project for MASc Electrical and Computer Engineering, under the supervision of Dr. Yuu Ono and Dr. Sreeraman Rajan.
- Investigated image complexity and texture features, machine learning binary classifiers, and image segmentation techniques for lung disease diagnosis using developed wearable ultrasonic sensors.

Ultrasound Tongue Image Sequence Classification Using Deep Learning

- Course project for EACJ 5100: Machine Vision.
- Developed and evaluated a signal/image processing pipeline and compared a custom CNN and 3D CNN model built with PyTorch for word classification in ultrasound videos of the tongue.

Agent Programming Using a Jason BDI Approach for 2D RoboCup Simulation

- Course project for SYSC 5103: Software Agents.
- Developed a simulated soccer team of agent-based players developed using agent-based programming, Jason BDI (beliefs-desires-intentions) architecture, and Java for a class 2D RoboCup competition.

Protein Lysine Methylation Classification Through K-Nearest Neighbours Algorithm

- Course project for SYSC 5405: Pattern Classification and Experimental Design.
- Developed and evaluated a KNN pipeline (data normalization, outlier detection, feature selection using Spearman's Rank Order Correlation, dimensionality reduction using NCA, and data augmentation using SMOTE) to predict protein lysine methylation.

Arterial Diameter Estimation Using Ultrasound

- Capstone engineering project for BEng Biomedical and Electrical Engineering, under the supervision of Dr. Yuu Ono and Dr. Sreeraman Rajan.
- Developed a signal/image processing pipeline, a U-Net segmentation model, and a CNN-LSTM model in TensorFlow to track arterial wall movements for cardiovascular disease diagnosis.