
Research Interest

Developing deep learning-based methods for real-time image-guided therapy, multi-modality image fusion, and abnormality detection in medical images.

Appointment

Postdoctoral Fellow

Sep. 2021-Present

Department of Radiological Sciences, University of California, Los Angeles

Concentration of Research: development and evaluation of deep learning and image analysis techniques for detection, classification, and segmentation of kidney and prostate cancer applications.

Postdoctoral Fellow

2020- Aug. 2021

Department of Radiation Oncology and Molecular Radiation Sciences, The Johns Hopkins University School of Medicine

Concentration of Research: develop an artificial intelligence (AI)-based normal tissue segmentation, multi-parametric MRI-based tumor classification, and fast signal and image processing for real-time image-guided gynecologic cancer radiation therapy.

Education

Ph.D. in Electrical and Computer Engineering

2020

Department of System and Computer Engineering, Carleton University, Ottawa, Canada

Carleton University Medal

Thesis Title: *Deep Learning Methods for Abnormality Detection and Segmentation in Computed Tomography and Magnetic Resonance Images.*

GPA: A+

M.Sc. in Biomedical Engineering

2016

Department of System and Computer Engineering, Carleton University, Ottawa, Canada

Thesis Title: *Continuous monitoring of mechanical properties of plantar soft tissue using wearable ultrasonic and force sensors for diabetic patients.*

GPA: A

B.Sc. in Biomedical Engineering

2001

Shahid Beheshti University, Tehran, Iran

GPA: A

Teaching Experience

Invited Lecturer

2021

School of engineering, University of Guelph, Guelph, ON, Canada

Deep Learning Methods for Medical Image Processing

Teaching Assistant

2014-2020

Department of System and Computer Engineering, Carleton University, Ottawa, Canada

Courses: Systems and Simulation, Microprocessor Systems, Problem Solving and Computers, Foundations of Imperative Programming

Substitute Lecturer

2017-2020

Department of System and Computer Engineering, Carleton University, Ottawa, Canada

Course: Systems and Simulation

Peer Reviewed Journal Publication

1. **F. Zabihollahy**, J.A. White, and E. Ukwatta, (2019), "Convolutional Neural Network-based Approach for Segmentation of Myocardial Scar from 3D Late Gadolinium Enhancement MR Images.", *Journal of Medical Physics*. ***Featured as a cover page on the Journal of Medical Physics, April 2019, Volume 46, Issue 4***
2. **F. Zabihollahy**, N. Schieda, S. Krishna, et al., (2019), "Automated segmentation of prostate zonal anatomy on T2-Weighted (T2W) and apparent diffusion coefficient (ADC) map MR images using cascaded U-nets.", *Journal of Medical Physics*.
3. **F. Zabihollahy**, E. Ukwatta, S. Krishna, et al., (2019), "Fully Automated Detection of the Prostate Peripheral Zone Tumors on Apparent Diffusion Coefficient Map MR Images Using Ensemble Learning Technique.", *Journal of Magnetic Resonance Imaging*.
4. **F. Zabihollahy**, M. Rajchl, J.A. White, et al., (2020), "Fully Automated Segmentation of Left Ventricular Scar from 3D Late Gadolinium Enhancement Magnetic Resonance Imaging Using a Cascaded Multi-Planar U-Net (CMPU-Net).", *Journal Medical Physics*.
5. **F. Zabihollahy**, N. Schieda, and E. Ukwatta, (2020), "Path-based CNN for Differentiation of Cyst from Solid Renal Mass on Contrast Enhanced Computed Tomography Image.", *IEEE Access*.
6. **F. Zabihollahy**, N. Schieda, S. Krishna, and E. Ukwatta, (2020), "Automated classification of solid renal masses on contrast-enhanced computed tomography images using convolutional neural network with decision fusion.", *European Radiology*.
7. **F. Zabihollahy**, N. Schieda, S. Krishna, et al., (2020), "Ensemble U-Net-Based Method for Fully Automated Detection and Segmentation of Renal Masses on Computed Tomography Images.", *Journal of Medical Physics*.
8. **F. Zabihollahy**, S. Rajan, and E. Ukwatta, (2020), "Machine Learning-based Segmentation of Left Ventricular Myocardial Fibrosis from Magnetic Resonance Imaging," *Current Cardiology Reports*. *** Invited Article***
9. E. Ukwatta, P. Nikolov, **F. Zabihollahy**, et al., (2018), "Virtual Electrophysiological Study as a Tool for Evaluating Efficacy of MRI Techniques in Predicting Adverse Arrhythmic Events in Ischemic Patients," *Journal of Physics in Medicine and Biology*.
10. N. Schieda, C.S. Lim, **F. Zabihollahy** et al., (2020), "Quantitative Prostate MRI.", *Journal of Magnetic Resonance Imaging*.
11. **F. Zabihollahy**, A.N. Viswanathan, E.J. Schmidt, et al., (Forthcoming), "Fully Automated Multi-Organ Segmentation of Female Pelvic Magnetic Resonance Images with Coarse-to-Fine Convolutional Neural Network", *Journal Medical Physics*.
12. J. Manokaran, **F. Zabihollahy**, A. Hamilton-Wright, et al, "Detection of COVID-19 from chest x-ray images using transfer learning," *J. Med. Imag.* 8(S1), 017503 (2021).

CONFERENCE PAPER

1. **F. Zabihollahy**, B. Tridade, and Y. Ono, (2016), "Continuous monitoring of mechanical properties of plantar soft tissue for diabetic patients using wearable ultrasonic and force sensors," *IEEE EMBS ISC Proceedings, Ottawa, Canada, 2016*.
2. **F. Zabihollahy**, J.A. White, and E. Ukwatta, (2018), "Myocardial scar segmentation from magnetic resonance images using convolutional neural network," *SPIE Medical Imaging Conference, Texas, US*.
3. **F. Zabihollahy**, J.A. White, and E. Ukwatta. (2019), "Fully Automated Segmentation of Left Ventricular Myocardium from 3D Late Gadolinium Enhancement Magnetic Resonance Images Using a U-Net-Based Convolutional Neural Network," *SPIE Medical Imaging, San Diego, US*.
4. **F. Zabihollahy**, A. Lochbihler, and E. Ukwatta., (2019), "Deep Learning Based Approach for Fully Automated Segmentation of Hard Exudate from Retinal Images," *SPIE Medical Imaging, San Diego, US*.
5. **F. Zabihollahy**, and E. Ukwatta. (2019), "Fully-Automated Segmentation of Optic Disk from Retinal Images Using Deep Learning Techniques," *SPIE Medical Imaging, San Diego, US*.
6. C. Mckeen, **F. Zabihollahy**, J. Kurian, et al., (2019), "Machine Learning Based Approach for Fully Automated Segmentation of Muscularis Propria from Histopathology Images of Intestinal Specimens," *SPIE Medical Imaging, San Diego, US*.

7. J. Manokaran, **F. Zabihollahy**, A. Hamilton-Wright, et al., (2021), "Deep Learning-based Detection of COVID-19 from Chest X-ray Images," *SPIE Medical Imaging, San Diego, US*.

Book Chapter

F. Zabihollahy, E. Ukwatta, and N. Schieda, (2021), "Computer-Aided Diagnosis of Renal Masses", State of the Art in Neural Networks and Their Applications, Elsevier.

Abstract

F. Zabihollahy, Ehud J. Schmidt, Akila N. Viswanathan, et al., (2021), "3D Dense U-Net for Fully Automated Multi-Organ Segmentation in Female Pelvic Magnetic Resonance Imaging", AAPM.

Invited Talk and Presentation

1. "Deep learning for automated segmentation of myocardial scar from 3-D MR images", Virtual Open Forum on Machine Learning in Cardiac Imaging, Ontario, Canada, June 18th, 2021.
2. "Fully Automated Multi-Organ Segmentation of Female Pelvic Magnetic Resonance Images with Coarse-to-Fine Convolutional Neural Network", Department of Radiation Oncology and Molecular Radiation Sciences Scientific Retreat, Baltimore, MD, US, June 4th, 2021. *****Second-Place Winner*****
3. "Convolutional Neural Network for Abnormality Detection in Medical Images", ML workshop at Technolgap, Ottawa, Ontario, Canada, October 24th, 2020.
4. "Deep Learning Methods for Abnormality Detection and Segmentation in Computed Tomography and Magnetic Resonance Images", IEEE Ottawa EMBS, Ottawa, October 1st, 2020.
5. "Computer-Aided Detection and Evaluation of Renal Masses in Computed Tomography Images Using Deep Learning Methods", Imaging Network Ontario, Toronto, Ontario, Canada, March 25th, 2020.
6. "Deep Learning for Abnormality Detection in Medical Images", UCLA, Los Angeles, CA, January 17th, 2020.
7. "Deep Learning for Medical Image Analysis", IEEE Ottawa Seminar Series on AI and Machine Learning, Kanata, Ottawa, Ontario, June 26th, 2019.
8. "Computer-aided Detection of Renal Masses in Computed Tomography Images using Deep Learning Methods," Annual Dr. Cheemun Lum Radiology Research Day, Ottawa University, June 20, 2019. *****Best Oral Presentation for Undergraduate, Graduate, and Post-Graduate Student**.***
9. "Application of Deep Learning for Medical Image Analysis," Distinguished Speaker at Data Science Seminar, Carleton University, April 25th, 2018.
10. "Semi-Automated Segmentation of the Myocardial Scar from 3D Late Gadolinium Enhancement Magnetic Resonance Images Using a Deep Learning Approach", 16th Annual Imaging Network Ontario Symposium, University of Toronto, March 28th, 2018.
11. "Automated Segmentation of the Left Ventricle Myocardium from 3D Late Gadolinium Enhancement Magnetic Resonance Images Using a U-Net Model", Annual Dr. Cheemun Lum Radiology Research Day, Ottawa University, June 21st, 2018.

Poster

1. R. Gaikar, **F. Zabihollahy**, N. Schieda, et al., (2021), "Transfer Learning Approach for Automated Kidney Segmentation on MRI sequences," Imaging Network Ontario.
2. J. Manokarana, **F. Zabihollahy**, A. Hamilton-Wright, et al., (2021), "Detection of COVID-19 from Chest X-ray Images using Transfer Learning," Imaging Network Ontario.
3. **F. Zabihollahy**, N. Schieda, S. Krishna, et al., (2020), "Fully Automated Segmentation of Prostate Zonal Anatomy on T2-weighted (T2W) and Apparent Diffusion Coefficient (ADC) Map MR Images and Localization of Prostate Peripheral Zone Tumors on ADC Map MR Image Using a U-Net-based Method," Imaging Network Ontario.

4. **F. Zabihollahy**, J.A. White, and E. Ukwatta, (2018) "Myocardial Scar Segmentation from Magnetic Resonance Images Using Convolutional Neural Network.". Life Science Day 2018, Carleton University, and (***)**Second Best Poster**(**) Ottawa Cardiovascular Research Day.

Awards and Honors

- University medal for outstanding graduate work at the doctoral level (2020)
- Ontario Graduate Scholarship (2018 and 2019)
- Queen Elizabeth II Scholarship in Science and Technology (Sep. 2017)
- Gabriel Warshaw Scholarship (2018)
- Cover of Journal Medical Physics (April 2019)
- SPIE travel award (2018)
- Carleton University travel award (2018 and 2019)
- Allan Buchanan Award in Biomedical Engineering (2014)
- Rank 71 among 300000+ competitors of National University Entrance Exam in Iran (1997)

Professional Experiments

Firmware Developer

2009 – 2013

Medical devices Industry of SAIRAN (www.ioico.ir)

- Design the electrical control board of "Pulse-oximeter" system using microcontroller to read data from the "SpO2" sensor in a real time manner and display %SpO2, pulse rate and Plethysmograph on the LCD display with the ability of control and adjust alarm criteria and store numeric parameters for 24 hours.
- Design the electrical control board of "Capnograph" using microcontroller to read the data from the IRMA CO2 sensor and display the inspired and end-tidal volume of CO2 and CO2 waveform (Capnogram) on the LCD in real time manner with the ability of control and adjust alarm criteria.

Quality System Manager

2005 – 2008

Medical devices Industry of SAIRAN (www.ioico.ir)

- Responsible for CE marking of "Patient Monitor" and "Medical Suction" according to the Directive 93/42/EEC by preparing technical file including reports of harmonized standard, clinical investigation report, labeling and accompanied documents, risk management report and design documents.
- Responsible for the coordination of all activities associated with the creation, implementation and maintenance of the Quality Management System including document creation/revision, internal quality audit and management of the corrective/preventive action system to ensure continuous improvement.

Medical Devices Purchase Counselor

2002 – 2004

Ministry of Health of Iran

- Technical assessment of medical imaging systems and giving advise for purchase.

Selected Professional Service

- Guest Editor, Journal of Diagnostics, Special Issue "Advanced Techniques in Body Magnetic Resonance Imaging"
- Performing peer review for more than 80 papers for a variety of international technical journals including IEEE Transactions on Medical Imaging, IEEE Transactions on Industrial Informatics, Magnetic Resonance Imaging, Medical Physics, IEEE Access, Frontiers (Neuroscience, Computational Neuroscience, and Plant Science), Computer in Biology and Medicine, Nature Scientific Report, Medical Imaging, Cardiovascular Diagnosis and Therapy, and Imaging Systems and Technology.
- Volunteering in the 7th IEEE Global Conference on Signal and Information Processing (GlobalSIP) that was held in Ottawa, Ontario, Canada in November 2019.
- Being a judge at the "Ottawa Regional Science Fair (ORSF)" in 2019 and 2020.