REZA KARIMZADEH

Tehran-Iran Last Update: September 29, 2022

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EDUCATION

SHARIF UNIVERSITY OF TECHNOLOGY Tehran, Iran

MASTER OF SCIENCE IN BIOMEDICAL ENGINEERING *Sep. 2019 – May 2022*

- **Thesis:** "Medical Images Segmentation Using Deep Learning Methods" , PDF **Advisors:** Prof. Fatemizadeh, Prof. Arabi
- **GPA:** 17.10/20

AMIRKABIR UNIVERSITY OF TECHNOLOGY Tehran, Iran

BACHELOR OF SCIENCE IN BIOMEDICAL ENGINEERING *Sep. 2014 – Sep. 2019*

- **Thesis:** "Design and implementation of brain surgery bipolar electrocoagulation simulator using haptic technology" , PDF **Advisor:** Prof. Azarnoush
- **GPA:** 16.44/20

PUBLICATIONS

• JOURNAL PAPERS

✹ **Karimzadeh R.**, Fatemizadeh E., Arabi H., Zaidi H.; *"Organ Morphology Loss Function: an approach to enforce deep neural networks to learn shape for medical images segmentation"*, Journal of Nuclear Medicine, Vol. 63, Issue supplement 2 June 1, 2022. Link

✹ **Karimzadeh R.**, Fatemizadeh E., Arabi H.; *"A novel shape-based loss function for machine learning-based seminal organ segmentation in medical imaging"*, Journal of Medical Image Analysis (Under Review). arXiv Link

✹ **Karimzadeh R.**, Sheikh J., Azarnoush H., Arabi H.; *"Design and implementation of brain surgery bipolar electrocautery simulator using haptic technology"*, Iranian Journal of Science and Technology, Transactions of Electrical Engineering (Under Review), arXiv Link

• CONFERENCE PAPERS

✹ **Karimzadeh R.**, Fatemizadeh E., Arabi H.; *"Attention-based deep learning segmentation: Application to brain tumor delineation"*; 28th National and 6th International Iranian Conference on Biomedical Engineering (ICBME), November 2021, Pages 248-252. Link

✹ **Karimzadeh R.**, Rajabi N., Fatemizadeh E., Arabi H.; *"3D dilated and residual convolutional neural network for COVID-19 detection from the chest computed tomography"*; 28th National and 6th International Iranian Conference on Biomedical Engineering (ICBME), November 2021, Pages 33-37. Link

✹ Rasti A., **Karimzadeh R.**, Zarei A., Ghaffari A.; *"A Non-contact heart rate estimation framework based on photoplethysmography amplitude variation elimination and data fusion"*; 28th National and 6th International Iranian Conference on Biomedical Engineering (ICBME), November 2021, Pages 236-241. Link

✹ **Karimzadeh R.**, Fatemizadeh E., Arabi H., Zaidi H; *"Knowledge distillation: a strategy to enhance performance of deep learning-based seminal segmentation"*; IEEE NSS and Medical Imaging Conference 2021. Link

✹ **Karimzadeh R.**, Fatemizadeh E., Arabi H., Zaidi H; *"Prediction error propagation: A novel strategy to enhance performance of deep learning models in seminal segmentation"*; IEEE NSS and Medical Imaging Conference 2021. Link

✹ **Karimzadeh R.**, Rajabi N., Khodabakhsh A., Taghavi F., Fatemizadeh E., Arabi H., Zaidi H; *"X-Net: A novel deep learning architecture with high-resolution feature maps for image segmentation"*; IEEE NSS and Medical Imaging Conference 2021. Link

✹ TaghiBeyglou B., **Karimzadeh R.**, Bagheri F., Bayani A., Azarnoush H.; *"New Platform for Automatic Iranian License Plate Detection and Recognition using Deep Learning Techniques"*; Sixth National Congress on Electrical Engineering and Computer Engineering of Iran with a New Approach to New Energy. Link

- **BOOK CHAPTER**

✹ Abouie V., Taghizadeh S., Froozanfar A., **Karimzadeh R.**, Shaygan S., et al.; 2021; Medical Equipment Book, chapter:*"Medical Imaging systems"*, (in persian language), PDF

RESEARCH INTERESTS

- Medical Image Processing / Image Segmentation / Deep Convolutional Neural Networks
- Computer Vision / Deep Learning / Machine Learning

SELECTED ACADEMIC PROJECTS

- **COLLABORATION WITH PINLAB, GENEVA UNIVERSITY HOSPITAL**

PET INSTRUMENTATION AND NEUROSCIENCES LAB (PINLAB). Link

✻ Organs at risks and Tumor segmentation with deep learning methods.

✻ COVID-19 diagnosis from CT images using deep learning.

- **NATIONAL ELITES FOUNDATION PROGRAM**

✻ Non-contact vital signs (Heart Rate and SPO_2) measurement using RGB camera image sequence.

In this teamwork project, we design and implement many methods to capture vital signs: 1) phone app. that exploits phone camera and user fingertip for HR estimation 2) design and implement pulse-oximeter device 3) develop an algorithm for HR estimation using face video 4) design and implement a setup for HR and SPO_2 extraction from the palm image sequence. Github Link

- **DEEP LEARNING**

✻ Image captioning system using Recurrent Neural Network (RNN) and Convolutional Neural Networks (CNN) trained with coco dataset. Github Link *Deep Learning Course Project*

✻ Generate fake images by exploiting Generative Adverserial Networks (GAN) and Conditional Variational Auto Encoders (CVAE). Github Link

✻ Three layer Multi-Layer Perceptron (MLP) from scratch for image classification. Github Link

✻ Predict the second hemistich of Shahnameh's couplet poem (Iranian epic poem book) using Recurrent Neural Networks (RNN). Github Link

- **IMAGE PROCESSING AND COMPUTER VISION**

✻ Video Synopsis. Github Link *Computer Vision Project*

Summerize long videos into a shorter time.

✻ Article Reproduction; "MRI noise estimation and denoising using non-local PCA" Github Link

Image Processing Project

✻ Implement image Stitching and panorama algorithm from scratch. Github Link

✻ Extract Eigenfaces from face images and reconstruct a face with weighted sum of eigenfaces. Github Link

- **DESIGN AND IMPLEMENTATION OF ELECTRICAL DEVICES**

  ✻ Digital Device for Measuring Blood Pressure. Github Link
  In this work, an electrical device was designed and implemented to inflate a medical cuff and measure blood pressure with a pressure sensor and an AVR microcontroller.

  ✻ Electrocardiograph (ECG) Visualizer Device. Github Link
  In this work, a PCB was designed and implemented to acquiesces and amplify ECG signals from Stuck electrodes to the body.

  ✻ Digital Piano Touch Keypad. Github Link
  Made a piano using a touch keypad and ARM microcontroller.

  ✻ Design and Simulation of a MAZE game by AVR Programming. Github Link
  Design a simple game by AVR and simulating in proteus.

WORKING EXPERIENCE

VIRA ARTIFICIAL INTELLIGENCE START UP 2022 - present

Co Founder

- Working on clinical images like CT and MR for whole body segmentation in contract with clinics

ELECTRO-XRAY COMPANY Summer 2017

ENGINEERING INTERN

- Becoming familiar with Repair and maintenance of imaging systems such as MRI, CT, Portable Radiology device, Angiography, C-Arm, Mammography and OPG

TEACHING EXPERIENCE

WORKSHOP TUTOR | *Deep Learning Coding Using Tensorflow* winter 2022

- Deep Learning workshop at first international congress on 'Advanced Health Technologies-Artificial Intelligence in Medicine' , Github Link

TEACHING ASSISTANT | *Deep Learning* Fall 2021

- Department of Electrical Engineering, Sharif University of Technology **Supervisor:** Prof. Fatemizadeh

TUTOR | *From Basic Python to Deep Learning Coding* Summer 2021

- Public Virtual Tutorial

TEACHING ASSISTANT | *Medical Images Analysis and Processing* Spring 2021

- Department of Electrical Engineering, Sharif University of Technology **Supervisor:** Prof. Fatemizadeh

TEACHING ASSISTANT | *Medical Imaging Systems* Spring 2021

- Department of Electrical Engineering, Sharif University of Technology **Supervisor:** Prof. Vosough Vahdat

TEACHING ASSISTANT | *Image Processing* Fall 2018

- Department of Biomedical Engineering, Amirkabir University of Technology **Supervisor:** Prof. Azarnoush

LANGUAGES

English *(Professional Working Proficiency)*

Persian/Farsi *(Native)*

TECHNICAL SKILLS

Programming Languages:	Python, C/C++, Assembly
Python Selected Libraries:	Pytorch, Tensorflow, Keras, OpenCV, Matplotlib, Numpy, Scipy
Software Simulators:	Matlab, Simulink
Hardware Simulator:	Pspice, LTspice, Proteus, Altium Designer
Microcontrollers:	AVR, Arduino (CodeVision, Atmel Studio)
Typesetting:	TEX, Microsoft Office(Word, Powerpoint, Excel)
Operating Systems:	Windows, Ubuntu

HONORS & AWARDS

IRAN'S NATIONAL ELITES FOUNDATION

- Being a member, due to standing among top students of university.

TRAINEE GRANT IN NSS AND MEDICAL IMAGING CONFERENCE 2021

- Granted for conference due to numerous contributions.

M.Sc. NATIONAL UNIVERSITY ENTRANCE EXAM

- Achieved the 80th place in the national M.Sc entrance exam in Electrical Engineering among 40,000 students.

B.Sc. NATIONAL UNIVERSITY ENTRANCE EXAM

- Ranked in the top 0.3% among 222,500 students in the national university entrance exam in mathematics and physics discipline.

HOBBIES

SPORTS: Football(Soccer), Hiking

ART: Play Setar(Traditional Iranian Instrument), Pencil Drawing

READ BOOK: Persian Poems, History, Psychology

REFERENCES

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Asst. Prof. Emad Fatemizadeh, *Department of Electrical Engineering, Sharif University of Technology*
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Asst. Prof. Bijan Vosoughi Vahdat, *Department of Electrical Engineering, Sharif University of Technology*
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