

# REZA KARIMZADEH

Tehran-Iran

Last Update: June 26, 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

### SHAHID BEHESHTI HIGHSCHOOL

Shahrekord, Iran

DIPLOMA IN MATHEMATICS AND PHYSICS DISCIPLINE

Sep. 2010 – Sep. 2014

- Under the supervision of NODET (National Organization for Developing Exceptional Talents)
- **GPA:** 18.84/20

## PUBLICATIONS

### • JOURNAL PAPERS

- ✳ **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 (in press).
- ✳ **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 (in press).

- \* **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 (in press).
- \* 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](#)

# 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 Adversarial 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*
- Summarize 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

### 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

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

## HONORS & AWARDS

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### *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.

## RESEARCH INTERESTS

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- Medical Image Processing
- Deep Learning
- Machine Learning
- Computer Vision
- Computational Neuroscience
- Bioinformatics NGS data analysis

## HOBBIES

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**SPORTS:** Football(Soccer), Hiking

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

**READ BOOK:** Persian Poems, History, Psychology

## REFERENCES

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*Assoc. Prof. Hossein Arabi, Department of Medical Imaging, Geneva University Hospital*

**Email:** Hossein.Arab@unige.ch

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

**Email:** fatemizadeh@sharif.edu

*Asst. Prof. Hamed Azarnoush, Department of Biomedical Engineering, Amirkabir University of Technology*

**Email:** azarnoush@aut.ac.ir

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

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