

Sepand AliMadarSoltani

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Education

Master 2 in Medical Device Engineering

Polytech Lyon, Claude Bernard University Lyon 1

Lyon, France
2024-2025

- **GPA:** 15.31/20
- **Courses:** Magnetic Resonance Imaging, Segmentation & Registration, Artificial Intelligence in Medical Imaging, Image Reconstruction & Inverse Problems
- **€10,000** Excellence Scholarship awarded for excellent academic background

Bachelor of Science in Electrical Engineering

K.N. Toosi University of Technology

Tehran, Iran
2018-2023

- **Concentration:** Biomedical Engineering
- **GPA:** 16.33/20
- **Courses:** Statistical Pattern Recognition, Signals & Systems

Research Interests

- Functional Imaging
- Positron Emission Tomography (PET) and Kinetic Modelling
- Magnetic Resonance Imaging (MRI)
- Machine Learning and Artificial Intelligence in Health

Research Experience

Master's Internship: Estimation of Image-Derived Input Function in Hybrid MRI and Dynamic Brain PET Imaging

CERMEP Lyon, France
March 2025-August 2025

- Conducted a state-of-the-art literature review
- Conducted pre-processing steps on **MRI and PET** images to ensure data quality and consistency
- Developed a robust segmentation algorithm for extraction of arteries from MR angiography images in python
- Implemented different Partial Volume Correction algorithms for obtaining accurate input function
- Assessed method performance across multiple datasets with different radiotracers using multiple **PET quantification techniques**
- Performed **Monte Carlo PET simulations** to support and strengthen evaluation outcomes
- Developed new tools and improved existing ones for fast and efficient processing of PET and MRI data in C and Python

Bachelor's Thesis: Interactive and Intelligent Tissue Boundary Segmentation Tool

Machine Vision & Medical Image Processing Laboratory (MVMIP), KNTU

Tehran, Iran

January-June 2023

- Developed a **Python-based medical image analysis** software, from scratch utilizing VTK and PyQt libraries
- Implemented multiple interactive tools (ruler, shapes, and text insertion tools)
- Developed an image processing algorithm for detecting tissue boundaries
- Designed a smart interactive scissor tool for fast, semi-automatic **tissue segmentation**
- Enabled users to import custom plugins to extend the functionality of the software based on their needs
- Successfully shipped the software for Linux and Windows operating systems

Skills

- **Programming:** Python, C, C++, CMake, Bash, QML
- **Software and Tools:** GNU/Linux, Git, FMRIB FSL, 3D Slicer, NiftyReg, dcm2niix, TPCCLIB
- **Libraries:** Tensorflow, PyTorch, NumPy, pandas, scikit-learn, Matplotlib, ITK, VTK, Qt, PyQt
- **Languages:** English (TOEFL score:101/120), French (Intermediate), Persian (Native)

Work Experience

Sharif University Science & Technology Park

Junior C++ & QML Software developer

Tehran, Iran

October 2023-July 2024

- Designed and developed a modern interface using the Qt Framework's QML language
- Built and optimized backend logic in C++ to handle large volumes of data efficiently

- Created a **Python-based medical analysis software** focusing on user-friendliness and user experience
- Designed and implemented a workflow user interface for bioinformatics analysis and processing using the Qt framework
- **Worked with a team** of engineers to integrate various machine learning algorithms into the workflow
- Designed and integrated a medical image visualizer using VTK
- Integrated multiple visualization tools and pipelines such as colormaps, image thresholding and interactive segmentation

Razeq Co.

Electronics Engineer Internship

Tehran, Iran

Summer 2021

- Implemented smart presence detection and remote-control support for the monitor stand in Valiasr Street Museum

Projects

Image-based Persian and English Character Sequence Recognition using Recurrent Convolutional Neural Networks(RCNN)

Winter 2023

- Implemented the network based on a paper using the Tensorflow library in Python
- Synthesized images of Persian text of different variety
- Applied data augmentation techniques such as rotating, translating, adding distortion, and adding noise to images
- Successfully trained the model for both languages using the self-made synthesized Persian dataset and public English datasets
- Achieved +85% accuracy for both languages

Exploring Possibility of Alzheimer's Disease Detection using Deep Neural Network based on fMRI Functional Connectivity Maps and Time-series Data

Fall 2022-Winter 2023

- Pre-processed and processed raw fMRI and MRI data from the ADNI database using the FSL library to extract time-series data to calculate functional connectivity maps of the subjects' brains
- Studied the previous works on this subject to find the gap
- Experimented with RCNN & CNN networks using Tensorflow to extract temporal and spatial features from images
- Gained hands-on experience with image pre-processing, neural network architecture, and deep learning principles
- Although a full model was not achieved, a lot of experience and insight were gained into medical imaging and deep learning concepts

Automated fMRI Pre-processing and Time-series Extraction Pipeline for Large Datasets using FSL in Python

Summer 2022

- Implemented brain extraction from structural reference MR image
- Implemented **fMRI pre-processing** including motion correction, slice timing correction, spatial smoothing, and co-registration
- Implemented atlas-based ROI time-series extraction
- Enabled parallel processing to accelerate computation for large datasets
- Utilized the program for processing fMRI data from the ADNI dataset

The Game of Tetris with a Custom Game Engine Using OpenGL in C++

Spring 2022

- Developed a custom 2D graphics renderer completely from scratch using the OpenGL graphics API in C++
- Implemented user input handling, navigatable menus, and text rendering capabilities to the engine
- Designed and implemented the game of Tetris using the said engine in Object Oriented C++