

# Sepand Ali Madad Soltani

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## Education

### K.N. Toosi University of Technology

Bachelor of Science in Electrical Engineering

Concentration: **Electronics Engineering**

GPA: 16.33/20 (Last two years: 17.29/20)

GPA 4.0 scale: 3.41 (Last two years: 3.73)

Tehran, Iran

September 2023

## Research Interests

- Machine learning and artificial intelligence
- Neuroscience
- Biomedical Engineering

## Bachelor Thesis

### MedVisPy: Python-Based Medical Image Analysis Software

- Developed "MedVisPy" a Python-based medical image analysis software, from scratch utilizing Python, VTK, and PyQt5 packages
- Implemented multiple interactive tools (ruler, shapes and text insertion tools)
- Developed a smart interactive scissor tool for assisted semi-automated 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

## Research Experience

### Detection of Alzheimer's Disease Patients using Deep Neural Network based on fMRI Functional Connectivity

- Studied the previous works on this subjects for finding the gap
- Preprocessed the raw fMRI and MRI data using the FSL library to extract timeseries data

June 2022 - Ongoing

## Skills

- **Programming Language:** Python, C++, MATLAB, VHDL
- **Software:** PSpice, Proteus design suite, Altium Designer, FMRIB FSL library, PyQt/PySide, Visualization Toolkit (VTK)
- **Hardware:** Arduino, Various wireless communication modules (BLE, RF, GSM, IR and ESP8266)
- **Language:** Persian(Native), English(Fluent), French(Intermediate-A2)

## Academic Projects

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

Winter 2023

- Implemented the network and using the Tensorflow library in Python
- Synthesized images of Persian text of different variety
- Applied data augmentation techniques such as adding distortion and noise to images
- Successfully trained the model for both languages
- Achieved +95% accuracy for both languages

### Automated fMRI Preprocessing and Timeseries Extraction Pipeline for Large Datasets using FSL in Python

Summer 2022

- Implemented brain extraction from structural reference MR image
- Implemented fMRI preprocessing including motion correction, slice timing correction, spatial smoothing and co-registration
- Implemented atlas-based ROI timeseries extraction
- Enabled multiprocessing to accelerate computation for large datasets

### Tetris player bot using Deep Reinforcement Learning

Summer 2022

- Developed the game from scratch using C++
- Created a custom C++ to Python API for the game using Pybind11 library
- Developed a Deep Q learning agent for training the AI player to play the game

### 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++
- Added game functionalities, menus and text rendering capabilities to the engine
- Designed and implemented the game of Tetris using the said engine in Object Oriented C++

### **Implementation of Synthesizable A\* Search Algorithm in FPGA-VHDL**

Spring 2021

- Developed a synthesizable VHDL code for A\* algorithm capable of solving any 10x10 mazes
- Developed a python script for generating random mazes
- Simulated and tested the algorithm for solving random mazes using VHDL test bench

### **Smart Temperature Detection PCB Circuit Design**

Summer 2020

- Designed circuit schematic and PCB layout using Altium designer  
(Key components: ATMEGA64 and SIM800C)

### **Calculating the Magnetic Field Caused by a Spherical Solenoid**

Winter 2019

- Derived the formula for the magnetic field caused by a spherical solenoid
- Calculated and graphed the magnetic field on multiple plates
- Integrated the graphs and the calculator in a custom GUI developed using MATLAB App Designer

## **Work Experience**

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### **ETS, University of Quebec**

Montreal, Canada

Remote Research Assistant Internship

Winter 2022

- Assisted in a project aiming to predict multiple cognitive traits and performances based on EEG using Deep Convolutional Neural Networks

### **Razeq Co.**

Tehran, Iran

Electronics Engineer Internship

Summer 2021

- Researched the design and development process of a parametric speaker (directional speaker) and examined the feasibility of manufacturing it
- Implemented smart presence detection and remote-control support for the monitor stand in Valiasr Street Museum
- Developed and assembled various hardware for installation in Iran's pavilion in Dubai Expo 2020 (Electric control panel, wiring, lighting and presence detection system)