AmirHossein **Zamani**

Electrical and Computer Engineering Graduate Student

+1 (514) 430-3387 | amirhossein.zamani@mail.concordia.ca | AHHHZ975 | amirhosseinzamani

Education

Concordia University — ***Montreal, Canada***

M.A.Sc. in Electrical and Computer Engineering | CGPA: 4.23/4.3 — *Jan. 2021 - July. 2023*

- **Thesis Title:** 3D Point Cloud Reconstruction of a Single Image Using Deep Learning
- **Description:** Using a single RGB image as an input, I designed and implemented an AI-based system to model the 3D geometry of the object depicted in the input image using data-driven methods (deep learning and reinforcement learning) and 3D point cloud representation as an output.
- **Thesis Grade:** Outstanding (Candidate for Best Master's Thesis Award at Concordia University)

Amirkabir University of Technology — ***Tehran, Iran***

B.Sc. in Electrical Engineering | CGPA: 16.56/20 — *Sep. 2015 - Sep. 2020*

- **Thesis Title:** Design, Simulation, and Implementation of a Self-balancing Bicycle
- **Description:** Following an in-depth theoretical analysis and simulation, I built a self-balancing bicycle robot and validated its stability domain resulted from different control techniques (PID, PD, and state feedback).
- **Thesis Grade:** 20/20

Research Interests

- Robotics | Multi-agent systems
- 3D Computer vision | 3D Reconstruction
- Reinforcement learning | Deep learning | Machine learning
- Hybrid and nonlinear systems| Adaptive control | Modern control | Optimal control | Robust control
- Embedded systems

Publications

- **AmirHossein Zamani**, Kamran Ghaffari, Amir G. Aghdam "Leveraging Transformer and CNN for Monocular 3D Point Cloud Reconstruction" (Accepted in IEEE International Conference on Wireless for Space and Extreme Environments (WiSEE) 2023).
- **AmirHossein Zamani**, Amir G. Aghdam, Kamran Ghaffari, "Fast-Image2Point: Towards Real-Time Point Cloud Reconstruction of A Single Image Using 3D Supervision" (Accepted in IEEE International Conference on Machine Learning and Applications (ICMLA) 2022). **[Link]**
- Rahimi, Mohammad Mahdi, Mohammad Mahdi Shirazi, Maziar Arfaee, Mohammad Amin Najaf Gholian, **Amir Hossein Zamani**, Hamed Hosseini, Fateme Hashemi Chaleshtori et al. "PARSIAN 2017 Extended Team Description Paper." Robocup (2017). **[Link]**
- N.Hajizadeh and **A.H.Zamani**, "Basic Euclidean Geomtery", 1st edition, Tehran: Khoshkhan, 2015.

Research Experience

Research Assistant (Supervisor: Prof. Amir Aghdam)

Electrical and Computer Engineering Department, Concordia University — *Apr.2021 - Present*

- **Research project:** 3D Reconstruction of a single image using data-driven approaches.

Research Assistant (Supervisor: Prof. Mohammad Bagher Menhaj)

Computational Intelligence and Large Scale Systems Lab, Amirkabir University of Technology — *Jan.2019 - Sep. 2020*

- **Research project:** Design, simulation, and prototyping of an Autonomous Self-Balancing Bicycle.

Researcher (Supervisor: Prof. Mohammad Azam Khosravi)

Parsian Robotics Lab, Amirkabir University of Technology — *Mar. 2016 - Sep. 2018*

- **Research Project:** Design and development of A.I. and multi-agent algorithms to achieve intelligent decision making for eight small-size soccer playing robots.

Teaching Experience

Teaching Assistant

Electrical Engineering Department, Amirkabir University of Technology — *Jan. 2015 - Jun. 2015*

- **Lecturer:** Prof. A.Jahanshahi
- **Course:** Basic Programming

Robotic Teacher

THREE DIFFERENT HIGH SCHOOLS IN TEHRAN, IRAN — *Jun. 2015 - May. 2017*

- **Lectures:**
  - Control algorithms
  - Microcontrollers' architecture
  - C & C++ programming
  - Electrical designing and simulation (Altium Designer/Proteus)
  - Mechanical modeling & designing (Solidworks)

Work Experience

Traxara Robotics [Link] — ***Montreal, Canada***

RESEARCH AND DEVELOPMENT (R&D) ENGINEER — *Jan. 2023 - Present*

- **Work area:** Firmware and software development
- **Description:** My main focus is on firmware and software design and development for their human-in-the-loop robotic platforms. More specifically, I designed and developed a reliable firmware updating system and a real-time ethernet-based communication protocol for their platforms.

Touché Technologies [Link] — ***Montreal, Canada***

RESEARCH AND DEVELOPMENT (R&D) ENGINEER — *Jan. 2021 - Present*

- **Work area:** Electronics | Firmware development
- **Description:** Touché Technologies designs and develops high-fidelity force and motion control robotic devices for training simulators, remote operations, and custom space and defense projects. My main focus is on advanced AI design and development for human-in-the-loop systems.

Datis [Link] — ***Tehran, Iran***

RESEARCH AND DEVELOPMENT (R&D) ENGINEER — *May. 2020 - Dec. 2020*

- **Work area:** Electronics | Firmware development | Computer vision
- **Description:** Datis was founded for design and mass production of elevator control panels and electronics by employing innovative technologies and advanced infrastructure. My main focus was on design, implementation, and programming of electronics and control PCBs (printed circuit boards).

Major Projects

Robotics & AI:
- Design, simulation, modeling, prototyping, and control of a **self-balancing bicycle**
- Design, simulation, modeling, prototyping, and control of a **two-wheeled segway robot**
- Design, simulation, modeling, prototyping, and control of a **omni-directional soccer robot**
- Implementation of an **intelligent defense behavior** on a **small-size soccer robot**
- Implementation of an **intelligent goalkeeper behavior** on a **small-size soccer robot**
- Modeling, prototyping, and control of a **pick & place Robot (5-DOF manipulator)**
- Design, simulation, and control of a **two-Link flexible manipulator robot**

Computer Vision:
- Design and implementation of a system for **3D point cloud reconstruction of a single image using deep learning**
- Design and implementation of an **automated optical inspection (AOI) system for PCB inspection** using OpenCV library

Programming & Software:
- Advanced **data-base** development for **stock market institutions** using **Django** framework
- **IMU data acquisition** using standard communication protocols written in C++
- Design, development, and programming an online book shop website using PHP, HTML, and CSS

Skills

Mathematics:
- Proficient in various **Math** topics including **Calculus**, **Linear Algebra**, and **Discrete Mathematics**

AI:
- Proficient in deep generative neural architectures including **AE**, **VAE**, and **GANs**
- Proficient in deep neural architecture design and implementation including **Transformer**, **Attenion-based**, **CNN**, and **MLP** networks
- Proficient in classical **optimization methods**
- Proficient in **Genetic Algoritm**
- Knowledgeable in classical AI decision making solutions

Computer Vision:
- Knowledgeable in **3D Reconstruction** and **3D Representation Learning** using deep generative neural networks
- Proficient in the **Feature Extraction** process from Images

Control:
- Knowledgeable in **path-planning** algorithms such as **RRT** and **Potential Field**
- Proficient in modelling and control of **linear** and **non-linear** Control Systems
- Proficient in **real-time control systems** implementation (both in simulation and real world using embedded devices)
- Knowledgeable in routine automation solutions and **PLC** programming using **Ladder programming** language

Programming:
- Highly experienced in **code development**, **refactoring**, and **debugging** large code-based
- **Languages: C++/C** (8 Years), **Matlab**, **PHP**, **HTML**, **CSS** (4 Years), **Python** (2 Years), **Java/Android**, **VHDL** (< 1Years)
- **Embedded: AVR** (7 Years), **TI**, **ARM**, **PLC** (1 Years)
- **Frameworks: Pytorch** (1 Year), **Qt** (4 Years), **Django** (1 Year)
- **IDEs: Visual Studio** (8 Years), **Codevision AVR**, **Altium Designer**, **Solidworks** (2 Years), **Matlab**, **Qt creator**, **Proteus** (3 Years), **Pspice**, **Keil uVision** (2 Years), **ISE** (< 1 Year)

Electronics:
- Solid understanding of **micro-controller** architecture
- Proficient in **electronics circuits** (digital & analog)
- Proficient in Printed Circuit Board (**PCB**) design and simulation using Altium Designer and Proteus
- Highly experienced with various digital interfaces and protocols including I2C, SPI, and UART

Software Version Control:
- Proficient in **Git**
- Familiar with **SVN**

Design Tool:
- Experienced in mechanical part and system design using **Solidworks**

Honors, Awards, and Bursaries

- **Candidate for Best Master's Thesis Award** Concordia University, Montreal, Canada | Jul. 2023
- **Conference and Exposition Award** | Award value: $1000 | Concordia University, Montreal, Canada | Oct. 2022
- **CAE Scholarship In Engineering Excellence** | Award value: $2474 | Concordia University, Montreal, Canada | May. 2022
- **FRS Bursary** | Bursary value: $7083 | Concordia University, Montreal, Canada | Mar. 2022 - Apr. 2022
- **MITACS Accelerated Program Bursary** | Bursary value: $39900 | Touché Technologies and Concordia University, Montreal, Canada | Jan. 2022 - Jan. 2023
- **Qualified for membership in the Golden Key International Honour Society** | Canada | Nov. 2021 - Present
- **"High Achieving Graduate Student" (Grade: A+)** | Concordia University, Montreal, Canada | Sep. 2021 - Present
- **Ranked $3rd$, in Small-Size Soccer Robot League** | Robocup Iran Open, Tehran, Iran | Apr. 2018
- **Ranked $4th$, in Small-Size Soccer Robot League** | Robocup, Nagoya, Japan | Jul. 2017 | **[Link]**
- **Ranked $1st$, in Small-Size Technical Challenge** | Robocup Iran Open, Tehran, Iran | Apr. 2017
- **"Super Team World Champion", in Junior Soccer Robot League** | Robocup, Joao Pessoa, Brazil | Jul. 2014 | **[Link]**
- **"Spirit of Robocup Award", in Junior Soccer Robot League** | Robocup, Joao Pessoa, Brazil | Jul. 2014 | **[Link]**
- **Ranked $2nd$, in Presentation Junior Soccer Robot League** | Robocup, Joao Pessoa, Brazil | Jul. 2014 | **[Link]**

Certificates

- **Building Transformer-Based Natural Language Processing Applications** | NVIDIA | Jun. 2022 |**[Link]**
- **Fundamentals of Accelerated Computing with CUDA C/C++** | NVIDIA | Mar. 2022 |**[Link]**
- **Certification of Participation in RoboCup Small-size Soccer Robots League** | RoboCup, Nagoya, Japan | Jul. 2017 |**[Link]**
- **Certification of Participation in RoboCup Junior Soccer Robots League** | RoboCup, Joao pessoa, Brazil | Jul. 2014 |**[Link]**

References

Prof. Amir Aghdam [Link]

Professor of Electrical and Computer Engineering Department, Concordia University, Montreal, Canada

My Supervisor
- **Email:** amir.aghdam@concordia.ca
- **Tel:** +1 (514) 848-2424 Ext. 4137

Prof. Yiming Xiao [Link]

Assistant Professor of Computer Science Department, Concordia University, Montreal, Canada

My Co-supervisor and the lecturer of one of my courses (Neuroimage computing)
- **Email:** yiming.xiao@concordia.ca
- **Tel:** +1 (514) 848-2424 Ext. 3063

Prof. Eugene Belilovsky [Link]

Assistant Professor of Computer Science Department, Concordia University, Montreal, Canada

The lecturer of one of my courses (Deep Learning)
- **Email:** eugene.belilovsky@concordia.ca
- **Tel:** +1 (514) 848-2424 ext. 7830

Dr. Kamran Ghaffari [Link]

Founder & CEO, Touché Technologies, Montreal, Canada

My technical lead
- **Email:** kamran.ghaffari@touche-technologies.com
- **Tel:** +1 (514) 5828667