

# Ali Karimzade

Robotics Engineer

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📍 Ottawa



## SUMMARY OF QUALIFICATIONS

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- MEng student at the University of Ottawa, honing expertise in robotics and applied AI.
- Currently spearheading a project on 3D mapping and efficient navigation using TurtleBot 3 and RGBD depth cameras.
- Accomplished in collaborative project management, adept with Git and Docker.
- Directed a groundbreaking thesis project to optimize robotic manipulators using deep reinforcement learning.
- Specialized in SLAM, path planning, and manipulator control within the robotics domain.
- Experienced lab instructor, skilled at demystifying complex robotics concepts.
- Proven track record of innovation and leadership in interdisciplinary teams.

## EDUCATION

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### ● Master of Engineering, Mechanical Engineering (Robotics)

University of Ottawa, Ontario

September 2022 - Present

- **Master's Project:** - Currently working on a cutting-edge project involving 3D mapping and navigation optimization using TurtleBot 3 and RealSense depth cameras. The aim is to enhance robotic navigation efficiency through advanced mapping techniques.
- **Relevant Courses:** - Biomechanics of Movements - Digital Signal Processing - Applied Artificial Intelligence - Mechatronics - Machine Learning for Adaptive and Intelligent Control Systems - Robotics - Instrumentation Techniques (Audited) - Adaptive Signal Processing (Audited)
- **Overall GPA:** 3.73(as of now)

### ● Bachelor of Science, Mechanical Engineering (Robotics)

University of Isfahan, Isfahan

September 2016 - October 2020

- **Bachelor's Thesis:** [Using Deep Reinforcement Learning Algorithms to Control Robotic Manipulators](#)  
**Supervisor:** Dr. Karimpour **Grade:** 20/20
- **Relevant Courses:** - Computer Programming - Dynamics - Dynamics of Mechanics - Mechanical Vibration - Automatic Control - Robotics - Artificial Intelligence and Expert Systems - Simulation of Dynamic Systems and Control - Digital Image Processing (Audited)
- **Overall GPA:** 3.46

## SKILLS

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### ● Technical Skills

- **Robotics:** - SLAM (Simultaneous Localization and Mapping) - Path Planning - Manipulator Control - Motion Planning - Pick and Place
- **Digital Signal Processing:** - FIR and IIR Filters - FMCW Radars - Recursive Least Squares - Adaptive Prediction - Antenna Beamforming
- **Control Systems:** - Lead-Lag and PID Controllers - State-Space Controllers - Optimal Control - Reinforcement Learning - Self-Tuning Regulators
- **Machine Learning:** - Support Vector Machine (SVM) - Random Forests - Dimensionality Reduction - CNN (Convolutional Neural Networks) - RNN (Recurrent Neural Networks) - Reinforcement Learning
- **Computer Vision:** - Noise Filters - Spectral Analysis - Object Classification
- **Embedded Systems:** - Raspberry Pi - NVIDIA Jetson TX1 - Arduino

## ●Software Skills

- **Robotics:** - Robot Operating System (ROS) - Gazebo - MoveIt - MuJoCo - OpenSim - LabVIEW
- **Machine Learning:** - TensorFlow - PyTorch - scikit-learn
- **Computer Vision:** - OpenCV - Matlab Image Processing Toolbox
- **Operating Systems:** - Ubuntu - Windows - Debian

## ●Programming and Markup Languages

- **Programming Languages:** - Python - JavaScript - C++ - Java
- **Markup Languages:** -  $\text{\LaTeX}$  - XML - YAML - JSON - HTML - CSS

## ●Soft Skills

- **Quick Learner:** Constantly keen to learn more, especially in my area of interest.
- **Teamwork:** Proficient in collaborative projects, adept at using Git and Docker for efficient DevOps in teams.

## RESEARCH INTERESTS

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- Machine Learning (Reinforcement learning)
- Control System Design
- Computer vision
- Robotics and Simulation
- Digital Signal Processing
- Embedded systems programming

## RELEVANT WORK EXPERIENCE

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### ●Teacher Assistant in Robotics

Laboratory Instructor — University of Ottawa, Ontario

MAY 2023 - Present

- Proficiently taught working with robots: TurtleBot3, OpenManipulator, Simulation of KUKA LBR iiwa.
- Effectively instructed ROS 1&2, Gazebo simulation for control, manipulation, and navigation tasks.
- [Demonstrated expertise in teaching MoveIt for pick and place and motion planning.](#)
- [Instructed SLAM and path planning with Navigation Stack and Nav 2 for autonomous mobile robots.](#)

### ●Robotics Researcher

Research Team Member — University Of Isfahan, Isfahan

JAN 2019 - JAN 2021

- Reconstruction of a homemade 3 DOF robot and servo motor drivers connection to Advantech PCI cards.
- [Operation of the robot with ROS and its simulation in the Gazebo software.](#)
- Development of a controller and motion planner for it in the ROS environment.

### ●Computer Vision Engineer

Internship — Novinilya Company, Isfahan

JUN 2019 - AUG 2019

- Examination of the surface quality of the parts on the mass production at the plants.
- Object recognition with embedded boards like Jetson TX1 and industrial Basler cameras in the company's R&D team.

## ACADEMIC PROJECTS

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### ●Artificial Intelligence

- [Twin Delayed DDPG \(TD3\) algorithm implementation for the Ant robot in MuJoCo \(in Gym library\) to run forward.](#)
- Evolutionary algorithms Implementation, including the Differential Evolution Algorithm (DE) and the [Multi-Verse Optimizer \(MVO\)](#).
- [Implementation of DDPG and TD3 algorithms in my B.Sc. thesis to push objects to their desired goal in a simulated environment with the help of hindsight experience replay paper.](#)
- Implementation of deep Q-Networks in a four-player fruit-eating game for an AI competition.
- Using K-means and KNN in Scikit-Learn for the Classification of cities' weather as dry or humid using unlabeled data

## ●Image Processing and Computer Vision

- [Implementation of the AlexNet architecture for image classification on the MNIST and CIFAR-10 datasets.](#)
- Designing filters in the frequency and spatial domain in both OpenCV and MATLAB.
- Android software development to recognize chosen cap colors and program an Arduino board to sort plastic bottle caps.

## ●Robotics

- Currently developing 3D maps using REALSENSE RGBD cameras with TurtleBot3 for homes and offices.
- Developed a line-following robot using an Android phone and Arduino for image processing.
- Simulated and controlled KUKA LBR iiwa in Gazebo using ROS controllers, implemented motion planning with MoveIt for pick and place tasks, and gained hands-on experience with the robot at Isfahan University of Technology (IUT).

## ●Digital Signal Processing

- Implemented a noise canceling system using time domain multichannel FIR causal Wiener method for precise source extraction from acoustic mixtures.
- implemented a next frame video predictor utilizing the Wiener-Hopf solution, successfully reducing power in residual prediction error and enhancing video compression efficiency.
- [FMCW radar simulation for autonomous vehicles to detect objects' movement within 300 meters.](#)

## ●Systems and Controls

- Designing a PID controller for a simulated 3-DOF robot in ROS (used in the B.Sc. thesis).
- Using LabVIEW for the implementation of keyboard-based control with PID control.
- Torque control of servomotors, system identification, and PID/lead-lag controller design with MATLAB.

## LANGUAGES

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### ●Persian

- Native

### ●English

- IELTS Academic: 6.5 Overall
- DEC 2021

## REFERENCES

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### ●Dr. Amirhossein Monjaze

- Professor, Faculty of Engineering, University of Ottawa, Ontario
- Master's Project Supervisor
- Tel: [+1\(613\)266-1854](tel:+1(613)266-1854)



### ●Dr. Hossein Karimpour

- Professor, Department of Mechanical Engineering, University of Isfahan, Isfahan
- Bachelor's Thesis Supervisor
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