Seyed Amirhosein Mohaddesi

Roboticist, Computer Scientist, Data Analyst, AI/ML Engineer

(949)426-8113 amir.mohaddesi@gmail.com CA, USA amohaddesi AmirMohaddesi

Summary

Innovative researcher specializing in robotics and machine learning with over 6 years of experience in developing autonomous systems and implementing advanced computational models for various robotics applications.

Research Experience

Graduate Researcher *CARL Lab, University of California, Irvine* **CA, USA** *Sep 2021 - Present*

- **Evaluating effects of network quality on the integrity of the state-of-the-art swarm robotics packages: (Current Project):** Implemented a simulation of swarms of robots for mapping and rescue applications. The goal is to study the effects of communication blackout zones on the performance of employed rescue teams. I used SLAM, NAV2, Frontier-based Exploration(explore-lite), and map-merge packages in ROS2(Humble) to emulate a disaster response scenario. My PYTHON package can be used as a toolbox for exploring and mapping simulations. It also has the potential to enhance the decentralized multi-agent rescue team's performance by using our Human-inspired close contact communication techniques
- **Unearthed a pivotal trade-off margin that leverages the advantages of mixed navigation strategies for optimized robotic performance:** Established a Webots simulation of a maze-shaped art exhibition with multi-agent Clearpath PR2 robots and investigated the benefits of employing varying cognitive navigation strategies inspired by human studies. A robust multi-agent simulation was achieved using unique obstacle avoidance C++ controllers with pairwise robot communications. Explored strategies including Route, Survey, and mixed approaches, highlighting the advantages of variability in navigation strategies for improved task completion time and environment coverage. Presented at "From animals to animats 17, SAB2024" Publication.
- **My autonomous navigation software reduces cognitive load of NASA telepresence robots operators:** Enhanced autonomous navigation of the Toyota Human Support Robot (HSR) using SLAM in ROS to map an entire building floor and enable autonomous navigation, reducing cognitive load and improving user efficiency, as evidenced by a scavenger hunt experiment with 22 participants. Presented at IEEE ICDL.

Assistant *NMI Lab, University of California, Irvine* **CA, USA** *Jul 2020 - Jul 2021*

- **Our 8-bit quantization technique for spiking neural networks reduces embedded device power consumption significantly** Implemented an 8-bit spiking neural network optimized for embedded computing, and designed an 8-bit quantization technique to enhance efficiency. Our technique reduced power consumption by 12%-18% for MNIST, CIFAR10, CIFAR20 benchmarks by only reducing test accuracy by 3%-7%.

Selected Projects

Lunar Lander Trajectory Prediction (LLTP), GitHub *2021*

- Utilized a Neural Network prediction approach using a Recurrent Neural Network (RNN) and Convolutional AutoEncoder (CAE) in PyTorch to predict the trajectory of the OpenAI lunar lander with random actions. Successfully predicted the next frames of the Lunar Lander.

Bee Navigation *2021*

- Developed a Webots simulation and an obstacle avoidance C++ controller for the E-Puck robot inspired by real-life bee navigation, using optic flow from the robot's camera. E-Puck successfully navigated through a hallway filled with obstacles and reached the end.

The Street View House Numbers (SVHN) classifier *2020*

- Created a CNN classifier for the Street View house numbers dataset using Torchvision from PyTorch, achieving 98% accuracy in predicting the correct numbers.

Education

Irvine, CA *University of California, Irvine Ph.D. in Information Computer Science (ICS)* *Sep 2019 - Expected Jun 2025*

- Cumulative GPA: 3.93
- Relevant Courses: Intro to Embedded Ubiquitous Systems, Machine Learning, NeuralNet Machine Learning, Computational Neuroscience, Cognitive Robotics
- Awards: Selected for Donald Bren School of Information and Computer Sciences Dean's award

Tehran, Iran *Sharif University of Technology B.S. in Computer Engineering* *Sep 2015 - Jun 2019*

- Cumulative GPA: 3.95
- Relevant Courses: Computer Architecture, Embedded Systems, Electrical Circuits, VLSI, Real-Time Processing

Achievements

- **Direct PhD fellowship** Donald Bren School of Information and Computer Science **UCI, Irvine, CA** *2019*
- **Dean's Award** Donald Bren School of Information and Computer Science **UCI, Irvine, CA** *2019*
- **Silver Medal** in Iran's National Physics Olympiad, NODET **Tehran, Iran** *2013*

Skills

- **Robotics**: ROS, Gazebo, SLAM, Multi-agent Systems Modeling, Path Planning and Autonomous Navigation, Behavioral and Cognitive Modeling
- **Programming Languages**: C/C++, Python, Java, MATLAB, Verilog, Spice, HTML, CSS, PHP, JavaScript
- **Libraries/Toolkits**: OpenCV, OpenMP, PyTorch, TensorFlow, NumPy, Pandas, SciPy
- **Machine Learning**: Deep Learning (CNN/RNN/VAE), Reinforcement Learning (Q-learning/Markov Decision Process)
- **Software/Tools**: Webots, Git, Docker
- **Single-Boards/Robots**: Raspberry Pi 3, Arduino Uno/Nano, Toyota HSR, Clearpath's UGV Jackal
- **Operating Systems**: Unix/Linux, Windows, Mac-OS