Pourya Shahverdi

« Robotics | AI/ML | HRI/HCI | Affective Computing »

Rochester, Michigan pourya.shahverdi@gmail.com +1 (248) 805 9101

Website Google Scholar LinkedIn GitHub X.com YouTube

Summary

I am a Robotics and AI/ML Engineer focused on developing context-aware behavior models for robots and autonomous agents. My research integrates affective and cognitive theories with multimodal AI to enhance empathy, engagement, and efficacy in human-agent interactions. I have over 10 years of experience in robotics, working on humanoid imitation, manipulation, and navigation.

Education

Ph.D. **Oakland University**, Ph.D. Candidate in Electrical and Computer Engineering — Jan 2021 – 2025 (Expecting)

- *Dissertation:* "Emotional Intelligence and Context Awareness in Social HRI"
- *Advisor:* Prof. Wing-Yue Geoffrey Louie,

M.Sc. **University of Tehran/Azad University of Qazvin**, Mechatronics Engineering — 2013 – 2016

- *Thesis:* "Whole-Body Imitation of Human Movement by a Humanoid Robot"
- *Advisor:* Prof. Mehdi Tale Masouleh

B.Sc. **Hamedan University of Technology**, Robotics Engineering — 2008 – 2013

- *Final project:* Balance Recovery Techniques in Humanoid Robots
- *Advisor:* Prof. Behnam Miripour Fard

Selected Coursework (all A or A-): Human-Robot Interaction, Artificial Intelligence, Artificial Neural Networks, Dynamic Systems Modeling, Robotic Systems and Control, Advanced Robotics, Mobile Robot Navigation, Robot Sensors, Embedded Programming, Advanced Autonomous Vehicle, Engineering Project Management

Research Experience

Oakland University, Graduate Research Assistant — Michigan, USA, 2021 – Present

- In Real-Life Intelligent Robotics Laboratory (IRL^2), PI: Prof. Geoffrey Louie

University of Tehran, Research Assistant — Tehran, Iran, 2012 – 2017

- Taarlab Human-Robot Interactoin Laboratory, PI: Prof. Mehdi Tale Masouleh

Azad University of Qazvin, Research Intern (part-time) — Qazvin, Iran, 2013 – 2015

- Mechatronics Research Laboratory (MRL)

Skill Set

Research Tools and Techniques	Interdisciplinary Experimental Design for Social HRI/HCI; Psychological and Physiological Social Behavior Data Collection; Advanced Statistical Analysis and Qualitative Analysis
Robotics and Mechatronics Tools and Techniques	ROS/ROS2, Gazebo, NVIDIA Isaac Sim, CoppeliaSim, Controller Design for Real-World, Hardware-in-the-Loop (HIL), Embedded System Design (ARM, AVR), Real-Time Operating System (RTOS), Single Board Programming, PLC SIMATIC Step 7, PCB Design (Altium Designer), CAD (Solidworks)
Programming	Proficient with C++, Python, Matlab; Widely used Simulink, Mathematica, R; Familiar with Kotlin

AI Tools	Widely used OpenCV, PyTorch, scikit-learn; Familiar with TensorFlow, Keras, LangChain, Hugging Face, JAX
AI Techniques	Accomplished Robot Manipulation, Imitation, and Navigation Projects with Reinforcement Learning (DQN, PPO), Computer Vision (CNNs, YOLO), Time-Series ML (LSTM), Multimodal Learning (Vision-Radar-LiDAR Fusion), and Bayesian AI (Kalman & Particle Filters, Uncertainty Modeling); Supervised and Instructional Fine-Tuning (SFT/IFT), Parameter Efficient Fine-Tuning (PEFT)
Miscellaneous	Agile Scrum Master, Linux, Git, Docker, QT Creator (PyQt and C++), SPSS, LaTeX

Publications

Journal Articles

- **P. Shahverdi**, S.Walker, W.-Y. G.Louie, "Embodied conversational agent's affective interaction: A survey," *IEEE Transactions on Affective Computing*, 2025, **Submitting**.
- **P. Shahverdi**, N.Huang, K.Rousso, M.Trombly, R.Berger, Q.Chen, J.Korneder, W.-Y. G.Louie, "Robot-mediated group instruction for children with asd: A longitudinal study," *Frontiers in Robotics and AI*, 2025, **Under Review**.
- K.Rayati, A.Beigy, A.Saadati, **P. Shahverdi**, M. T.Masouleh, A.Kalhor, W.-Y. G.Louie, "Few-shot learning from human demonstrations framework on a humanoid robot," *Robotics and Autonomous Systems*, 2025, **Under Review**.
- I.Bakhoda, **P. Shahverdi**, K.Rousso, E.Dallas, W.-Y. G.Louie, "Robot-mediated read-aloud context of reading comprehension and vocabulary development," *Computers & Education*, 2025, **Under Review**.
- C. M.Wilson, L.Boright, W.-Y. G.Louie, **P. Shahverdi**, S. K.Arena, R.Benbow, J. R.Wilson, Q.Chen, K.Rousso, N.Huang, "Effect of robotic delivery of physical activity and fall prevention exercise in older adults: A pilot cohort study," *Cureus*, vol. 15, no. 8, 2023. DOI: 10.7759/cureus.44264.
- M.Sharifzadeh, M. T.Masouleh, A.Kalhor, **P. Shahverdi**, "An experimental dynamic identification & control of an over-constrained 3-dof parallel mechanism in presence of variable friction and feedback delay," *Robotics and autonomous systems*, vol. 102, pp. 27–43, 2018. DOI: https://doi.org/10.1016/j.robot.2018.01.003.
- **P. Shahverdi** and M.Tale Masouleh, "Imitation of human motion by a nao humanoid robot using an analytical method and considering balance of the robot," *Modares Mechanical Engineering*, vol. 17, no. 7, pp. 386–396, 2017. [Online]. Available: https://mme.modares.ac.ir/browse.php?a_id=4583&sid=15&slc_lang=en.

Conference Proceedings

- W.-Y. G.Louie, T.Christ, **P. Shahverdi**, K.Rousso, E.Dallas, A.Tyshka, A.Wowra, K.Barnett, I.Bakhoda, "Exploring task-level contingent mediations for vocabulary instruction across robot, virtual, and human teachers," in *2024 33rd IEEE International Conference on Robot and Human Interactive Communication (ROMAN)*, 2024, pp. 1048–1055. DOI: 10.1109/RO-MAN60168.2024.10731230.
- W.-Y. G.Louie, T.Christ, A.Wowra, D.Alexander, I.Bakhoda, **P. Shahverdi**, ""if a robot was teaching, then everybody would definitely like school better": An analysis of grade 3-5 children's perceptions of learning stem vocabulary with an educational social robot," in *2024 33rd IEEE International Conference on Robot and Human Interactive Communication (ROMAN)*, 2024, pp. 1675–1680. DOI: 10.1109/RO-MAN60168.2024.10731322.
- **P. Shahverdi**, I.Bakhoda, K.Rousso, J.Klotz, W.-Y. G.Louie, "Exploring the impact of narrator type on response latency and utterance length during interactive storytelling," in *2024 IEEE International Conference on Robotics and Automation (ICRA)*, 2024, pp. 5499–5504. DOI: 10.1109/ICRA57147.2024.10610817.
- K.Rayati, A.Feizi, A.Beigy, **P. Shahverdi**, M. T.Masouleh, A.Kalhor, W.-Y. G.Louie, "Real-time imitation of human head motions, blinks and emotions by nao robot: A closed-loop approach," in *2023 11th RSI International Conference on Robotics and Mechatronics (ICRoM)*, 2023, pp. 794–800. DOI: 10.1109/ICRoM60803.2023.10412471.
- **P. Shahverdi**, K.Rousso, J.Klotz, I.Bakhoda, M.Zribi, W.-Y. G.Louie, "Emotionally specific backchanneling in social human-robot interaction and human-human interaction," in *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023, pp. 4059–4064. DOI: 10.1109/IROS55552.2023.10341823.
- **P. Shahverdi**, K.Rousso, I.Bakhoda, N.Huang, K.Rohrbeck, W.-Y. G.Louie, "Robot-mediated job interview training for individuals with asd: A pilot study," in *2023 32nd IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, 2023, pp. 564–570. DOI: 10.1109/RO-MAN57019.2023.10309611.

- **P. Shahverdi**, A.Tyshka, M.Trombly, W.-Y. G.Louie, "Learning turn-taking behavior from human demonstrations for social human-robot interactions," in *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022, pp. 7643–7649. DOI: 10.1109/IROS47612.2022.9981243.
- Q.Chen, E.Dallas, **P. Shahverdi**, J.Korneder, O. A.Rawashdeh, W.-Y.Geoffrey Louie, "A sample efficiency improved method via hierarchical reinforcement learning networks," in *2022 31st IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, 2022, pp. 1498–1505. DOI: 10.1109/RO-MAN53752.2022.9900738.
- **P. Shahverdi**, M.Trombly, N.Huang, Q.Chen, J.Korneder, W.-Y. G.Louie, "Robot-mediated group instruction for children with asd: A pilot study," in *2022 31st IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, 2022, pp. 1506–1513. DOI: 10.1109/RO-MAN53752.2022.9900584.
- **P. Shahverdi**, M. J.Ansari, M. T.Masouleh, "Balance strategy for human imitation by a nao humanoid robot," in *2017 5th RSI International Conference on Robotics and Mechatronics (ICRoM)*, 2017, pp. 138–143. DOI: 10.1109/ICRoM.2017.8466225.
- **P. Shahverdi** and M. T.Masouleh, "A simple and fast geometric kinematic solution for imitation of human arms by a nao humanoid robot," in *2016 4th International Conference on Robotics and Mechatronics (ICROM)*, 2016, pp. 572–577. DOI: 10.1109/ICRoM.2016.7886806.

Research Projects

Emotional Intelligence and Context Awareness in Social Human-Robot Interaction
2025 IRL^2 Lead Researcher (My Ph.D. Dissertation Project)

- *Tasks:* Proposed a Theoretical Framework Based on the Emotional Intelligence Theory, Conducted a Systematic Survey on Embodied Conversational Agents' (ECAs) Affective Behavior, Prototyping the Social HRI Framework and Designing the Experiment Now
- *Tools Used:* PyTorch, Hugging Face, LangChain, Prompt Engineering Techniques on different LLMs and VLMs, Kotlin, Furhat Robot API, ROS (Data Collection)

Few-shot Learning from Human Demonstrations Framework on a Humanoid Robot
2024/2025 A Collaboration Between IRL^2 and Taarlab Co-Advisor

- *Tasks:* Co-Advised a Team of Researchers on Framing the System with Emphasis on Feature Extraction and Evaluations for the Few-Shot Learning Algorithms
- *Tools Used:* PyTorch, Keras3, YOLO, CoppeliaSim

Robot-mediated Read-aloud for Pre-K Children
2024 IRL^2 Engineering Team Leader

- *Tasks:* Designed the Behaviors of a Pepper Robot, Developed the Wizard of Oz (WoZ) Interface, Collected and Coded Data, Statistical Analysis
- *Tools Used:* Python (PyQt, NAOqi), R

Robot-mediated STEM Vocabulary Training for Children
2024 IRL^2 Engineering Team Leader

- *Tasks:* Designed the Behaviors of a Pepper Robot, Developed the WoZ Interface, Collected and Coded Data, Statistical Analysis
- *Tools Used:* Python (PyQt, NAOqi), R

Emotionally Specific Backchanneling in Social HRI and Human-Human Interaction
2023 IRL^2 Lead Researcher

- *Tasks:* Developed the Theory, Designed the Experiment, Wrote the IRB, Designed the Behaviors of a Furhat Robot, Collected and Coded Data, Statistical Analysis
- *Tools Used:* Python, Kotlin, Furhat Robot API, R

Robot-mediated Physical Activity and Fall Prevention Exercises for Older Adults
2023 IRL^2 Engineering Team Leader

- *Tasks:* Designed Physical Therapy Behaviors for a NAO Robot, Developed a Teleoperation WoZ System through a Virtual Reality Headset and Kinect Camera for a Pepper Robot
- *Tools Used:* C++, Python, PyQt, ROS

Robot-mediated Job Interview Training for Individuals with Autism Spectrum Disorder (ASD)
2023 IRL^2 Lead Researcher

- *Tasks:* Developed the Theory, Designed the Experiment, Wrote the IRB, Developed a Telepresence WoZ Interface, Collected and Coded Data, Statistical Analysis
- *Tools Used:* Python, Kotlin, SPSS

LIDAR, Radar, and Vision Data Fusion and Classification-Autonomous Vehicle Course
2022 Oakland University Team Member

- *Tasks:* Merged Measurements into Single-Object Track, Object Annotation by YOLO Image Classification, Filtered Noises by Extended Kalman Filter (EKF)
- *Tools Used:* ROS, C++, YOLO, PCL, EKF

Learning Turn-Taking Behavior from Human Demonstrations for Social HRI
2022 IRL^2 Lead Researcher

- *Tasks:* Developed the Theory, Designed the Experiment, Wrote the IRB, Collected and Annotated Data, Trained and Tested an LSTM RNN Model
- *Tools Used:* TensorFlow, ROS (Data Collection)

Robot-Mediated Group Instruction for Children with ASD
2022 IRL^2 Lead Researcher

- *Tasks:* Contributed in Developing the Theory, Designed the Experiment, Wrote the IRB, Designed the Behaviors of a Pepper Robot, Developed the WoZ Interface, Collected and Coded Data, Statistical Analysis
- *Tools Used:* Python (PyQt, NAOqi), SPSS

Augmented Reality for Assisting End-User Development For Social Robot Applications
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2021 IRL^2 Co-Advisor

- 2021-@IRL^2- Co-Advisor
- *Tasks:* Helped Undergraduate Students with Modeling a NAO Robot in Microsoft HoloLens 2 and How to Choreograph this Robot Through a Representative Virtual Hologram. (Abstract Submission to Mid-SURE)
- *Tools Used:* Unreal Engine 4, Blueprint

A Health, Safety, and Environment (HSE) Data Logger Device for Iron Workers
2018 Freelancing

- *Tasks:* Designed an Embedded Electronic Board to Collect Gate Pattern Data from an IMU Module Connected to Iron Workers, Collected Hours of Data from 35 Iron Workers Walking on 5 Types of Beams with Different Widths, Trained a K-NN Model to Classify the Beams from the IMU Data
- *Tools Used:* Altium Designer, Arduino, scikit-learn

Whole-Body Imitation of Human Motion by a NAO Humanoid Robot
2016 Taarlab Lead Researcher (My M.Sc. Thesis)

- *Tasks:* Developed the Motion Capture Framework, Modeled the whole body of a NAO Robot Kinematically and Dynamically, Presented a Geometric Solution for the Inverse Kinematics with the Imitation Goal
- *Tools Used:* Python (OpenNI, NAOqi), ROS, Mathematica

Humanoid Robot Push Recovery
2015 MRL Team Member

- *Tasks:* Developed a Push Recovery Model Using an Inverted Pendulum Model and a PID Controller
- *Tools Used:* Matlab, Webots

Humanoid Robot Navigation
2015 MRL Team Member

- *Tasks:* Developed a Navigation Model Towards the Opponent's Gate Utilizing Compass Data
- *Tools Used:* Matlab, Webots

Tripteron: a 3-DoF Parallel Manipulator
2013 Taarlab Team Member

- *Tasks:* Designed a PCB and Programmed an AVR Micro Controller to Communicate Under the MODBUS Protocol with the three AC Servo Motor Drivers in the Torque-Control Mode, Designed a Graphical User Interface (GUI) to Control the Robot in Different Modes (e.g., Position, Speed, Torque)
- *Tools Used:* Altium Designer, AVR Codevision, C, C++, Qt Creator

Teaching Experience

Lab Instructor, EGR2800: Electromechanics System Design Lab — Oakland University, MI, 2021-Present

- Course Lecturer: A Group of ECE/ME Professors Led by Prof. Osamah Rawashdeh,
- Instructing the Lab's Experiments: Arduino Programming, Electronic Circuit Design, Sensors and Actuators
- Leading and Training Graduate Teacher Assistants
- Mentoring Sophomore Design Project Team Works

Education Department Chair, Iran Chapter Based in Amirkabir University of Tech. — FIRA, Iran, 2018-2020

- Designed Syllabus and Educational Platforms in Collaboration with FIRA-International
- Trained Teachers
- Created Educational Content for Online Courses
- Designed Competitions for FIRA-Iran and FIRA-International

Teaching Assistant, Rapid Prototyping in Embedded Systems — University of Tehran, Iran, 2016-2017

- *Professor:* Dr. Mostafa Ersali
- Designed a Modular Educational Robot Platform Based on Raspberry Pi and Arduino Capable of Interfacing with Different Sensor and Actuator Modules
- Taught Lab Experiments of the Course
- Supervised the Students' Final Projects

Robotics Mentor, NOET, Iran
2012-2018

- Directed a Team of Robotics Mentors from Top-Ranked Iranian Universities to Teach Robotics in Middle Schools and High Schools
- Designed Syllabus and Educational Platforms
- Participated in National and International Robotics Competitions such as RoboCup and FIRACup

Teaching Assistant, Physics of Mechanics — Hamedan University of Technology, Iran
2009-2011

- Helped Students to Understand the Concepts by Working through Sample Problems

Honors and Awards

- Member of the Institute of Electrical and Electronics Engineers Honor Society, IEEE-Eta Kappa Nu
- Received the Highest Student Evaluation Score for Teaching the Electromechanics System Design Lab (EGR-2800) in the Electrical and Computer Engineering Department at Oakland University (2023-2024)
- Outstanding Early Career Scientist Paper Award, 31st IEEE International Conference on Robot & Human Interactive Communication, RO-MAN 2022, Naples, Italy
- Approved for Permanent Residency (Green Card) in the US Based on National Interest Waiver (NIW), No Need for VISA Sponsorship to Work in the US
- National Science Foundation (NSF) Fully-funded Ph.D. Student
- Multiple International Awards from Robotic Competitions such as Robocup (e.g., 2013 Eindhoven, 2014 Brazil, 2015 IranOpen) and FIRACup (2016, 2017 Iran)

Service

Reviewer

- International Journal of Social Robotics (IJSR AKA SORO)
- IEEE Robotics and Automation Letters (RA-L)
- IEEE Transactions on Neural Systems & Rehabilitation Engineering
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- IEEE International Conference on Robot & Human Interactive Communication (RO-MAN)
- Association for the Advancement of Artificial Intelligence (AAAI) Symposium Series
- Journal of Intelligent Systems
- International Conference on Reconfigurable Mechanisms and Robots
- SICE Journal of Control, Measurement, and System Integration

Oakland University's SECS Day Representative — 2022-Present
Presented a Warm and Welcoming Demonstration of our Lab (IRL^2) and Robots to Showcase Oakland University's School of Engineering and Computer Science (SECS) Potential to Prospective Students and their Families in the SECS Days — Oakland University, Michigan

International OASIS's Ambassador — 2022-Present
Empowering International Students to Embrace Their New Life in the US — Rochester, Michigan

Co-Chair of the FIRA World Cup Innovation and Business League 2019-2021
Changwon, South Korea

Technical Committee (TC) Member of the International RoboCup Competitions 2010-2018
Humanoid Soccer, Demonstration, Junior Rescue Tehran, Iran

Executive Administrator of the Robotics Engineering Students' Scientific Association 2009-2011
Organized Workshops, Talks, Competitions, and STEM Tours for the Robotics Engineering Students at Hamedan University of Technology Hamedan, Iran

Reference

Professional References

Dr. Wing-Yue Geoffrey Louie
louie@oakland.edu
Associated Professor
Oakland University
Department of Electrical and Computer Engineering

Dr. Osamah Rawashdeh
rawashd2@oakland.edu
Professor and Department Chair
Oakland University
Department of Electrical and Computer Engineering

Personal References

Dr. Lionel Robert
lprobert@umich.edu
Professor of Robotics and Information
University of Michigan-Ann Arbor
School of Information and College of Engineering