Pourya Shahverdi

« Social Robots for Social Justice »

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 specializing in Social Robot Learning, Affective Computing, Conversational AI, and Human Factors in HRI/HCI. My work spans Humanoid Imitation, Manipulation, Navigation, and Autonomous Vehicles. I also bring 10+ years of mentoring experience in Robotics.

Research Experience

Oakland University, Graduate Research Assistant — Michigan, USA, 2021 – Present
- In Real-Life Intelligent Robotics Laboratory (IRL^2), PI: Prof. Wing-Yue 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)

Education

Ph.D. **Oakland University**, Ph.D. Candidate in Electrical and Computer Engineering — Jan 2021 – April 2025 (Expecting)
- *Dissertation:* "Emotional Intelligence and Context Awareness in Social HRI"
- *Advisor:* Prof. Wing-Yue Geoffrey Louie,
- *Selected Courses:* Human-Robot Interaction, Artificial Intelligence, Advanced Autonomous Vehicle, Engineering Project Management

M.Sc. **Azad University of Qazvin**, Mechatronics Engineering — 2013 – 2016
- *Thesis:* "Whole-Body Imitation of Human Movement by a Humanoid Robot"
- *Advisor:* Prof. Mehdi Tale Masouleh
- *Selected Courses:* Advanced Robotics, Mobile Robots (Navigation), Dynamic System Modeling, Mechatronics Design (I and II)

B.Sc. **Hamedan University of Technology**, Robotics Engineering — 2008 – 2013
- *Final project:* Balance Recovery Techniques in Humanoid Robots
- *Advisor:* Prof. Behnam Miripour Fard
- *Selected Courses:* Robotic Systems and Control, Robot Sensors, Artificial Neural Networks, Fuzzy Systems and Control, Embedded Programming

Skill Set

Programming	Python, C++, R, Kotlin, Matlab, Mathematica
AI Tools	scikit-learn, PyTorch, TensorFlow, OpenCV, Hugging Face, LangChain
AI Techniques	Natural Language Processing (NLP/NLU), Large Language Model (LLM) APIs, Chain-of-Thought (CoT) Prompting of LLMs, Supervised and Instructional Fine-Tuning, Parameter-Efficient Fine-Tuning (PEFT), Reinforcement Learning (Deep Q-Networks), Time-Series Machine Learning (LSTM)

Robotic and Mechatronic Tools and Techniques	ROS/ROS2, Point Cloud Libraries (PCL), Controller Design and Real-World Implementation, Embedded System Design (AVR, ARM) and Real-Time Operating System (RTOS), Single Board Microcontroller/Computer Programming (Arduino, Raspberry Pi), CAD (Solidworks)
Miscellaneous	Linux, LaTeX, QT Creator (PyQt and C++), Git, SPSS, Network, Unreal Engine

Projects

Emotional Intelligence and Context Awareness in Social Robot's Backchanneling Behavior

- Ongoing 2025-@IRL-Lead Researcher (My Ph.D. Dissertation Project)
- *Tasks:* Developed the Theory, Conducted a Systematic Survey on Embodied Conversational Agents' (ECAs) Affective Behavior, Prototyped the Model, Designed the Experiment, and Wrote the IRB, Running the Experiment Now
- *Tools Used:* PyTorch, Hugging Face, LangChain, Prompt Engineering Techniques on different LLMs, Kotlin, Furhat Robot API, ROS (Data Collection)

Robot-mediated Read-aloud for Pre-K Children

- 2024-@IRL-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-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-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-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-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

- 2022-Autonomous Vehicle Course Project
- *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-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-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 (AR) for Assisting End-User Development For Social Robot Applications Page 62

- 2021-@IRL- 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

- 2017-@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-at 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

Publications

- 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**.
- **P. Shahverdi**, I.Bakhoda, K.Rousso, J.Klotz, W.-Y. G.Louie, "The dynamics of story internalization: A pathway to deeper interaction with social robots," in *2025 IEEE International Conference on Robotics and Automation (ICRA)*, **Under Review**, 2025.
- 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, 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**, 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.
- 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.
- 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**, 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.
- 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**, 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.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.
- **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.

Teaching Experience

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

- Course Lecturer: Prof. Osamah A. Rawashdeh, ECE Chair
- 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

Honors and Awards

- Member of the Institute of Electrical and Electronics Engineers Honor Society, IEEE-Eta Kappa Nu
- Recognized as the Best Teacher Assistant for 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 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

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

Chair and Referee of the FIRA Innovation and Business League 2019
Changwon, South Korea

Technical Committee (TC) Member of Different RoboCup Competition Leagues 2010-2018
Humanoid Soccer, Demonstration, Junior Rescue Tehran, Iran

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