Pourya Shahverdi

Applied Researcher in

Humanoid and Social Robotics | Human-Robot Interaction | Conversational and Affective AI

Curriculum Vitae | Updated November 2026

Rochester, MI (open to relocation) pourya.shahverdi@gmail.com (248) 805-9101 No visa sponsorship required

Portfolio Google Scholar ORCID LinkedIn GitHub X YouTube

Summary

Human-robot interaction researcher and robotics engineer with over a decade of experience building humanoid and social robots, from embedded control and whole-body motion imitation to LLM-enabled robot interaction and emerging VLA policy workflows. I build artificial emotional intelligence for social robots and virtual agents, so they can understand, adaptively respond to, and influence people through context-aware verbal and nonverbal behavior. My work connects robotics, AI, and human science: I design and run studies with real users, build the perception, data, and on-premises LLM systems they run on, and analyze the results. 17 papers, including first- and co-first-author *IEEE IROS, RO-MAN,* and *ICRA* papers.

Seeking: Applied AI and Robotics Scientist | Physical AI and Robotics Solutions Architect | Forward-Deployed Robotics Engineer

Research Interests

- Human-robot interaction
- Social, conversational, and humanoid robots
- Affective computing and artificial emotional intelligence
- Vision-Language-Action (VLA) policies
- Turn-taking and backchanneling
- Multimodal perception
- Robot learning from demonstration
- Human-subject research and user studies

Education

Ph.D., Electrical and Computer Engineering | Oakland University, Rochester, MI — 2021 – Dec 2026 (defense scheduled)
- *Dissertation:* Emotional Intelligence and Context Awareness in Social Human-Robot Interaction
- *Advisor:* Prof. Wing-Yue Geoffrey Louie | NSF-funded Ph.D. student

M.Sc., Mechatronics Engineering | University of Tehran / Azad University of Qazvin, Iran — 2013 – 2016
- *Thesis:* Whole-Body Imitation of Human Movement by a Humanoid Robot
- *Advisor:* Prof. Mehdi Tale Masouleh

B.Sc., Robotics Engineering | Hamedan University of Technology, Iran — 2008 – 2013
- *Final project:* Balance Recovery Techniques in Humanoid Robots
- *Advisor:* Prof. Behnam Miripour Fard

Selected coursework: 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 Vehicles, Engineering Project Management

Research Experience

Ph.D. Researcher

Jan 2021 – Present
Oakland University, In Real-Life Intelligent Robotics Laboratory [IRL]^2 — Rochester, MI

LEAD RESEARCH: AFFECTIVE AND CONVERSATIONAL HRI

Emotional intelligence and context awareness in social HRI (Ph.D. dissertation)

2025–Present Lead Researcher
- Developed an end-to-end emotion-regulation framework, from perception to expression, grounded in emotional-intelligence theory, for conversational robots and embodied conversational agents.
- Conducted a systematic survey of embodied conversational agents' affective behavior and user studies of the framework.
- Exploring pretrained Vision-Language-Action (VLA) policies for language-conditioned robot gesturing behavior, with an emphasis on policy adaptation, action representations, and simulation-based evaluation.
- *Tools:* PyTorch, Hugging Face, LangChain; LLM/VLM fine-tuning and prompt engineering; Kotlin, Furhat Robot API, ROS 2.

Human emotion during robot-mediated behavioral skills training

IEEE TAFFC, under review
Jan 2026–Present Lead Researcher HRI study, 66 participants — HRI 2027, submitted Video
- Designed and led a mixed-design study in which 66 adults rehearsed autism interventions six times each with two Furhat robots: a simulated child with routine or challenging behaviors and a trainer giving instruction and LLM-generated feedback; developed three challenging scenarios reviewed by a Board Certified Behavior Analyst.

- Collected 396 rehearsals and 1,188 affect reports and analyzed them with mixed-effects and ordinal models in R. Challenging rehearsals were associated with lower pleasure (−1.73) and dominance (−1.30) and higher arousal (+0.52), confusion (+0.61), and frustration (+0.34) when trainees appraised the child's behavior (all Holm-corrected $p < .001$).
- Built a 10-service Docker Compose platform for real-time HRI perception, streaming ASR (NVIDIA Riva/Parakeet, faster-whisper), facial affect (HSEmotion, EmotiEffLib), and gestures (MediaPipe) to the robots via FastAPI; engineered the GStreamer/WebRTC pipeline with stale-frame dropping, recovery, and per-stage latency monitoring (emotion inference about 18 ms).
- Built the study's data platform (FastAPI, SQLAlchemy, SQLite) synchronizing robot trials, a participant self-report tablet, and audio/video recording; logged 4.19 million perception events and resolved write-lock failures that crashed pilot sessions.
- Deployed Llama 3.3 70B on-premises across three NVIDIA RTX 6000 Ada GPUs (Ollama) as a shared lab inference service to keep participant data local; served perception models with NVIDIA Triton.

Robot-mediated behavioral skills training RO-MAN 2026 Paper

2024–2025 Lead Researcher, first author HRI study: multiple-baseline design

- Co-designed a two-robot trainer with expert behavior analysts: Furhat as the trainer and NAO as a child with autism.
- Compared ASR and LLM models and evaluated LLM-generated feedback in 135 autonomous trials across five teaching skills, separating trainee mistakes from errors in speech recognition, gesture, facial expression, and performance assessment.
- In a multiple-baseline user study, all participants reached the 80% mastery criterion.

Emotionally specific backchanneling in social HRI IROS 2023 Paper ICRA 2024* Paper Demo

2023 Lead Researcher, first author (*co-first on ICRA 2024) HRI study: 2 × 2 mixed design

- Led a 28-participant study comparing verbal and nonverbal listener backchannels during human vs. Furhat robot storytelling in happy and sad contexts; designed the robot's expressive behaviors and coded and analyzed the interaction data.
- Participants produced 2.4 times as many emotional backchannels with the robot storyteller as with the human (11.92 vs. 5.00, $p < .001$), for both positive (8.92 vs. 3.89, $p = .003$) and negative (3.00 vs. 1.10, $p = .011$) backchannels.
- Participants also responded to the robot narrator with longer latency and shorter utterances than to the human (ICRA 2024).
- *Tools:* Python, Kotlin, Furhat Robot API, R.

Robot-mediated job-interview training for autistic individuals RO-MAN 2023 Paper Demo

2023 Lead Researcher, first author

- Developed the study concept, designed the experiment, and wrote the IRB protocol; built a telepresence Wizard-of-Oz (WoZ) interface for Furhat that mirrored facial features in real time; collected and coded data and ran the statistical analysis.
- *Tools:* Python, Kotlin, SPSS.

Learning turn-taking from human demonstrations IROS 2022 Paper Talk Code

2022 Lead Researcher, first author

- Built a learning-from-demonstration system that teaches a robot when to take the turn, rather than treating every pause as a turn end: an LSTM trained on verbal (ASR/TurnGPT), prosodic, and gestural cues from 150 job-interview speaking turns.
- Leave-one-participant-out: verbal and prosodic cues reached 0.258 MAE vs. 0.270 for a silence-only baseline (250 ms horizon).
- Developed the study concept, designed the experiment, wrote the IRB protocol, and collected and annotated the data.
- *Tools:* TensorFlow, ROS (data collection).

Robot-mediated group instruction for children with autism RO-MAN 2022 Paper Demo

2022 Lead Researcher, co-first author

- Contributed to the study concept, designed the experiment, and wrote the IRB protocol; designed Pepper robot behaviors and built the WoZ interface; collected and analyzed longitudinal data.
- *Tools:* Python (PyQt, NAOqi), SPSS.

TECHNICAL LEADERSHIP AND MENTORING

Multimodal affect recognition Code

Jan–Sep 2026 Mentor

- Defined the problem and mentored undergraduates building continuous pleasure–arousal–dominance (PAD) recognition from text, speech, and facial video: RoBERTa-large, HuBERT-large, and MTCNN/HSEmotion features, per-modality transformer encoders, and cross-modal transformer fusion with separate PAD regression heads.
- Two-stage training (unimodal pretraining, then frozen encoders with fusion) evaluated with speaker-independent leave-one-session-out cross-validation on IEMOCAP, using fold-matched encoders to prevent test-session leakage. In an initial single-split experiment, text-audio fusion reached a CCC of 0.56 vs. 0.40 (text) and 0.46 (audio).

MakiMate: open-source conversational robot 2026 Graduate Students Showcase Award

May 2025–Apr 2026 Technical Lead and Mentor

- Rebuilt the open-platform Maki robot's software as modular ROS 2 packages so teams could work in parallel.
- Led integration of a real-time conversation loop: on-device speech recognition (Vosk), an Ollama-served LLM, and Piper neural TTS, with sentence-level streaming to shorten response delay and half-duplex turn-taking.

- Led three interdisciplinary senior-design teams (15 students) through development, integration, and live testing; remodeled the robot's body and arms and added face tracking and active speaker detection with live head movement.

Few-shot learning from human demonstrations for a humanoid robot arXiv 2026 Paper

2024–2025 Co-Advisor IRL^2–Taarlab collaboration

- Co-advised a team of researchers on framing a data-efficient learning-from-demonstration system for a NAO humanoid, with emphasis on feature extraction and evaluation.
- The framework learns manipulation skills from compact features (Kinect human-joint estimates, prompt-based object detection, depth) and a temporal model predicting robot joint trajectories. In simulation it reached 78% pick-and-place success from 16 demonstrations (86% with 100) and 71% pushing success from 8; it was also demonstrated on the physical robot.
- *Tools:* PyTorch, Keras 3, YOLO, CoppeliaSim.

Augmented reality for end-user development of social robot applications Mid-SURE 2021, p. 62

2021 Co-Advisor

- Co-advised undergraduate students modeling a NAO robot in Microsoft HoloLens 2 and choreographing it through a virtual hologram; the work was presented as an abstract at Mid-SURE 2021.
- *Tools:* Unreal Engine 4, Blueprint.

COLLABORATIVE RESEARCH AND ENGINEERING

Robot-mediated read-aloud for preschool children CALL 2026 Paper Demo

2025 Lead Developer and Data Analyst

- Designed Pepper robot behaviors and built a WoZ control interface; collected and coded data and ran the analysis in R.
- *Tools:* Python (PyQt, NAOqi), R.

Robot-mediated STEM vocabulary instruction for children RO-MAN 2024 Paper Demo

2024 Lead Developer and Data Analyst

- Designed Pepper robot behaviors and built a WoZ control interface; collected and coded data and ran the analysis in R. A companion paper analyzed grade 3–5 children's perceptions of learning with the robot (RO-MAN 2024). Paper
- *Tools:* Python (PyQt, NAOqi), R.

Robot-mediated exercise and fall prevention for older adults Cureus 2023 Paper Demo

2023 Lead Developer and Data Analyst

- Designed physical-activity and fall-prevention behaviors for a NAO robot and built a teleoperation WoZ system for a Pepper robot driven by a VR headset and a Kinect camera.
- *Tools:* C++, Python, PyQt, ROS.

Real-time imitation of human head motions, blinks, and emotions by a NAO robot ICRoM 2023 Paper

2023 Co-author IRL^2–Taarlab collaboration

- Co-authored a closed-loop approach in which a NAO humanoid imitates a person's head motions, blinks, and emotions.

Sample-efficient learning from demonstration via hierarchical RL RO-MAN 2022 Paper

2022 Co-author

- Co-authored a method that improves the sample efficiency of learning from demonstration for social robots through data augmentation, dynamic experience-replay sizes, and hierarchical deep Q-networks, validated on two datasets.

LiDAR, radar, and vision data fusion and classification Code

2022 Team Member Advanced Autonomous Vehicles course project

- Fused LiDAR, radar, and camera data into a single-object track with an extended Kalman filter; classified objects with YOLO.
- *Tools:* ROS, C++, YOLO, PCL.

Researcher

2015 – 2017

University of Tehran, Taarlab Human-Robot Interaction Laboratory

Tehran, Iran

HUMANOID MOTION IMITATION AND ROBOT CONTROL

Whole-body human motion imitation by a NAO humanoid robot ICRoM 2016 2017 Demo Code

2016–2017 Lead Researcher, first author M.Sc. thesis

- Developed a human motion imitation system for the NAO humanoid robot, including a geometric inverse-kinematics solution and closed-loop PID balance control.
- Built the motion-capture framework and modeled the NAO robot's whole body kinematically and dynamically; verified the balance model in a Mathematica simulation. Simulation code
- *Tools:* Python (OpenNI, NAOqi), ROS, Mathematica.

Tripteron: three-DOF parallel robot control RAS 2018 Paper

2015 Research Intern

- Built AVR microcontroller firmware driving three AC servo drives, plus a GUI for position, speed, and torque control.
- Designed the controller PCB and implemented MODBUS communication with the drives in torque-control mode; the platform supported a published study of dynamic identification and control (*Robotics and Autonomous Systems*, 2018).
- *Tools:* Altium Designer, AVR CodeVision, C, C++, Qt Creator.

Research Intern and RoboCup Humanoid Team Member

2013 – 2015
Azad University of Qazvin, Mechatronics Research Laboratory (MRL) Qazvin, Iran

HUMANOID SOCCER ROBOTS

Humanoid robot push recovery

2015 Team Member

- Developed a humanoid push-recovery model using an inverted-pendulum model and a PID controller (MATLAB, Webots).

Humanoid robot navigation

2015 Team Member

- Developed a navigation model toward the opponent's goal using compass data (MATLAB, Webots).

Teaching, Mentoring, and Education Leadership

- **Teaching:** Taught the Sophomore Design Lab (EGR-2800) at Oakland University; received the ECE department's highest student evaluation score, 2022–2025.
- **Mentoring:** Mentored or co-advised 24 students in master's theses, undergraduate research, senior design, and honors projects. Led three interdisciplinary senior-design teams (15 students) on MakiMate, and co-advised research teams on humanoid learning from demonstration, multimodal affect recognition, and AR end-user robot programming.
- **Education Department Chair**, Federation of International Robot Sports Association (FIRA), Iran Section (2018–2020): led robotics education and online training programs that trained 20+ robotics mentors serving 570+ students, and co-organized the FIRA Innovation and Business League.

Publications

Bold: Pourya Shahverdi. *: equal contribution. Full list and citations on Google Scholar.

Journal articles

J1 I. Bakhoda, **P. Shahverdi**, K. Rousso, E. Dallas, and W.-Y. G. Louie, "Robot-mediated read-aloud context of reading comprehension," *Computer Assisted Language Learning*, pp. 1–28, 2026. DOI

J2 C. M. Wilson, L. Boright, W.-Y. G. Louie, **P. Shahverdi**, S. K. Arena, R. Benbow, J. R. Wilson, Q. Chen, K. Rousso, and 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

J3 M. Sharifzadeh, M. T. Masouleh, A. Kalhor, and **P. Shahverdi**, "An experimental dynamic identification & control of an overconstrained 3-DOF parallel mechanism in presence of variable friction and feedback delay," *Robotics and Autonomous Systems*, vol. 102, pp. 27–43, 2018. DOI

J4 **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. Link

Conference proceedings

C1 **P. Shahverdi**, S. Walker, K. Kenville, A. Tyshka, J. Korneder, and W.-Y. G. Louie, "Co-design of a robot-mediated training program for informal caregivers to learn to deliver interventions to children with autism," in *Proc. IEEE RO-MAN*, 2026. IEEE

C2 W.-Y. G. Louie, T. Christ, **P. Shahverdi**, K. Rousso, E. Dallas, A. Tyshka, A. Wowra, K. Barnett, and I. Bakhoda, "Exploring task-level contingent mediations for vocabulary instruction across robot, virtual, and human teachers," in *Proc. IEEE RO-MAN*, 2024, pp. 1048–1055. DOI

C3 W.-Y. G. Louie, T. Christ, A. Wowra, D. Alexander, I. Bakhoda, and **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 *Proc. IEEE RO-MAN*, 2024. DOI

C4 I. Bakhoda*, **P. Shahverdi***, K. Rousso, J. Klotz, and W.-Y. G. Louie, "Exploring the impact of narrator type on response latency and utterance length during interactive storytelling," in *Proc. IEEE ICRA*, 2024, pp. 5499–5504. DOI

C5 K. Rayati, A. Feizi, A. Beigy, **P. Shahverdi**, M. T. Masouleh, A. Kalhor, and W.-Y. G. Louie, "Real-time imitation of human head motions, blinks and emotions by NAO robot: A closed-loop approach," in *Proc. RSI ICRoM*, 2023, pp. 794–800. DOI

C6 **P. Shahverdi**, K. Rousso, J. Klotz, I. Bakhoda, M. Zribi, and W.-Y. G. Louie, "Emotionally specific backchanneling in social human-robot interaction and human-human interaction," in *Proc. IEEE/RSJ IROS*, 2023, pp. 4059–4064. DOI

C7 **P. Shahverdi**, K. Rousso, I. Bakhoda, N. Huang, K. Rohrbeck, and W.-Y. G. Louie, "Robot-mediated job interview training for individuals with ASD: A pilot study," in *Proc. IEEE RO-MAN*, 2023, pp. 564–570. DOI

C8 **P. Shahverdi**, A. Tyshka, M. Trombly, and W.-Y. G. Louie, "Learning turn-taking behavior from human demonstrations for social human-robot interactions," in *Proc. IEEE/RSJ IROS*, 2022, pp. 7643–7649. DOI

C9 M. Trombly*, **P. Shahverdi***, N. Huang, Q. Chen, J. Korneder, and W.-Y. G. Louie, "Robot-mediated group instruction for children with ASD: A pilot study," in *Proc. IEEE RO-MAN*, 2022, pp. 1506–1513. DOI

C10 Q. Chen, E. Dallas, **P. Shahverdi**, J. Korneder, O. A. Rawashdeh, and W.-Y. G. Louie, "A sample efficiency improved method via hierarchical reinforcement learning networks," in *Proc. IEEE RO-MAN*, 2022, pp. 1498–1505. DOI

C11 **P. Shahverdi**, M. J. Ansari, and M. T. Masouleh, "Balance strategy for human imitation by a NAO humanoid robot," in *Proc. RSI ICRoM*, 2017, pp. 138–143. DOI

C12 **P. Shahverdi** and M. T. Masouleh, "A simple and fast geometric kinematic solution for imitation of human arms by a NAO humanoid robot," in *Proc. RSI ICRoM*, 2016, pp. 572–577. DOI

Preprints and submissions under review

P1 K. Rayati, A. Beigy, A. Saadati, **P. Shahverdi**, M. T. Masouleh, A. Kalhor, and W.-Y. G. Louie, "Data-efficient learning from demonstration for humanoid robots via feature-level perception and prompt-based object detection," arXiv:2610.26170, 2026.

P2 Manuscript on human emotion during robot-mediated behavioral skills training (66 participants), under review at *IEEE TAFFC*.

P3 Video on human emotion during robot-mediated behavioral skills training, submitted to the ACM/IEEE HRI 2027 Video and Demos track. Video

Honors and Awards

- IEEE RO-MAN 2022 Outstanding Early Career Scientist Paper Award (31st IEEE RO-MAN, Naples, Italy).
- 2026 Graduate Students Showcase, Oakland University: first place and public vote for MakiMate.
- ECE department's highest student evaluation score for teaching EGR-2800, Oakland University (2022–2025).
- NSF-funded Ph.D. student.
- Approved for U.S. permanent residency through a National Interest Waiver (NIW).
- Member, IEEE Eta Kappa Nu honor society.
- Multiple RoboCup Humanoid League championships with the MRL Humanoid team (2013–2015); FIRA Cup awards (2016, 2017).

Service and Leadership

- **Reviewer:** ACM/IEEE HRI; IEEE RO-MAN; IEEE ICRA; IEEE/RSJ IROS; IEEE Robotics and Automation Letters (RA-L); IEEE Transactions on Neural Systems and Rehabilitation Engineering; International Journal of Social Robotics; AAAI Symposium Series; Journal of Intelligent Systems; International Conference on Reconfigurable Mechanisms and Robots; SICE Journal of Control, Measurement, and System Integration.
- **AI Advisory Board Member** to the Dean of the School of Business, Oakland University (2025–2026): advised school leadership as a subject-matter expert on applying AI research and preparing the school for a hybrid human-AI workplace.
- **SECS Day Representative**, Oakland University (2022–Present): showcased the lab's robots to prospective students and families.
- **International OASIS Ambassador**, Rochester, MI (2022–Present): supporting international students as they settle in the U.S.
- **RoboCup Technical Committee Member** (Humanoid Soccer, Demonstration, Junior Rescue), Iran (2010–2018).
- **Executive Administrator**, Robotics Engineering Students' Scientific Association, Hamedan University of Technology (2009–2011): organized workshops, talks, competitions, and STEM tours.

Technical Skills

AI and ML: PyTorch, TensorFlow/Keras, Hugging Face, scikit-learn, LangChain; transformers, LSTMs, CNNs/YOLO; LLM/VLM prompting and fine-tuning; multimodal fusion; learning from demonstration; cross-validated model evaluation

AI infrastructure: on-premises LLM serving (Ollama, multi-GPU), NVIDIA Triton and Riva; Docker Compose microservices; FastAPI REST/WebSocket APIs; GStreamer/WebRTC streaming; SQLAlchemy/SQLite data pipelines; Linux, Git, GitHub CI/CD

Robotics and simulation: ROS/ROS 2, NVIDIA Isaac Sim, CoppeliaSim, Gazebo, Webots; sensor fusion and state estimation (EKF, particle filters, PCL); teleoperation (VR, Kinect); Furhat, Pepper, NAO, and Maki robots

Interaction and perception: dialogue systems, ASR/TTS (Riva, faster-whisper, Vosk, Piper), facial affect (HSEmotion), gesture recognition (MediaPipe), face tracking, active speaker detection, OpenCV

Deployment: co-design with domain experts, live user sessions, cross-team integration, root-cause debugging, mentoring

Programming languages: Python, C++, C, R, SQL, Java, Kotlin, MATLAB/Simulink, Mathematica

Controls, embedded, and hardware: PID and balance control, kinematic and dynamic modeling; AVR/ARM microcontrollers, RTOS, MODBUS, Arduino, Raspberry Pi, PCB design (Altium Designer), CAD (SolidWorks)

Research methods: user-study design, IRB protocols, Wizard-of-Oz studies, mixed-effects and ordinal models in R, SPSS