Curriculum Vitae/Resume

Shayan Khodabakhsh

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CURRENT POSITION

Sep 2025 – Present Masters Student in Electrical Engineering
Department of Electrical, Computer, and Biomedical Engineering, University of Rhode Island, Kingston, RI, USA

RESEARCH INTEREST

- Machine learning and computer vision systems for clinical neuromuscular assessment
- Multimodal sensor fusion (EEG, EMG, motion capture) for movement decoding and Brain-Computer Interface applications
- Wearable sensor validation
- Socially assistive robotics for rehabilitation

EDUCATION

Jan 2023 - Sep 2025 Graduate Researcher in Exercise Science, University of Rhode Island, Kingston, RI, USA

Sep 2020 - Oct 2022 Master of Science in Applied Exercises Physiology, Shahid Beheshti University, Tehran, Iran
Thesis: Acute Effects of Lunge Exercise with Blood-Flow Restriction on Amateur Male Basketball Players Performances.
Supervisor: Dr. Mohammad Fashi

Sep 2014 - Sep 2020 Bachelor of Science in Sports Engineering, Islamic Azad University Research And Science Branch, Tehran, Iran
Supervisor: Dr. Reza Sarang

RESEARCH EXPERIENCE

Jan 2026 – May 2026 *A Vision-Language Coach for Ingestive Behaviors* (NIH R01 - DIBS)
Dept. of Electrical, Computer, and Biomedical Engineering, URI.
Role: Graduate Researcher (Prof. Abiri); first-author poster, ECBE Graduate Student Poster Competition.

• Fine-tuned Qwen2.5-VL-3B vision-language model with LoRA (r=16, α=32) on profile-view meal video to jointly classify ingestive-behavior quality and generate clinician-style coaching feedback from a single text-generation head.
• Designed a multi-bite (G3/G5) temporal windowing strategy capturing chewing rhythm and inter-bite pauses; yielded +11.6 percentage point accuracy gain over per-bite clips.
• Built the training pipeline with TRL SFTTrainer and participant-level 5-fold cross-validation; achieved BLEU-4 = 0.385, ROUGE-L = 0.565, with 100% structurally parseable outputs.
• Demonstrated that a single LoRA adapter on a VLM matches classification accuracy of an earlier spatial-temporal multi-head architecture while adding clinically-grounded language generation in one pass.

Sep 2025 – Present *Automated Neuromuscular Assessment using Computer Vision & Robotics*
Dept. of Electrical, Computer, and Biomedical Engineering, URI.
Role: Graduate Researcher.

• Developing a non-invasive assessment system using Socially Assistive Robots (SAR) to automate standardized neuromuscular tests.
• Implementing computer vision pipelines (Python/OpenCV) for 3D hand pose estimation to quantify fine motor deficits without markers.
• Designing closed-loop algorithms to provide real-time feedback to patients during unsupervised rehabilitation sessions.

Sep 2025 – Present *Multimodal Integration of EEG and Motion Capture for Movement Decoding*
Dept. of Electrical, Computer, and Biomedical Engineering, URI.
Role: Graduate Researcher.

• Engineered a hardware synchronization solution to fuse high-density EEG (g.tec) data with optical motion capture systems.
• optimizing data acquisition protocols to reduce latency between cortical activity and recorded kinematic events.
• analyzing neural correlates of grasping and reaching movements for potential Brain-Computer Interface (BCI) applications.

Jan 2026 – May 2026 *PRIME: Closed-Loop LLM-Based Cobot for Dynamic Human-Robot Autonomy Allocation and Teaming*
Dept. of Electrical, Computer, and Biomedical Engineering, URI.
Role: Graduate Researcher (Prof. Abiri).

• Fine-tuned YOLOv26 for object detection and action recognition driving the closed-loop perception module of a human-robot teaming pipeline.
• Collected and labeled task-specific image datasets covering target objects and operator actions.
• Integrated the perception module with the cobot stack and ran evaluation experiments validating end-to-end task performance.

June 2025 – Aug 2025 *Cardiopulmonary Signal Analysis in Young Adults with Preterm Birth History* (NIH - R01NR018147)
Department of Nursing, University of Rhode Island.
Role: Research Assistant (Prof. D'Agata).

• Processed physiologic signal data from incremental exercise testing to compare cardiopulmonary responses against normative datasets.
• Managed large-scale physiological datasets, ensuring data integrity for statistical modeling.

June 2024 – Sep 2024 *Impact of Physical Activity Intensity on Muscle Oxidative Capacity* (NIH - R01HL151452)
Department of Kinesiology, University of Rhode Island.
Role: Research Assistant (Prof. Adami).

• Analyzed NIRS (Near-Infrared Spectroscopy) signals to quantify muscle oxidative capacity in clinical populations.
• Performed sub-analysis on accelerometer data to correlate activity duration with physiological outcomes.

May 2024 – Aug 2024 *Biomechanical & Myoelectric Pattern Recognition in ALS* (ALS Foundation - No.1159154).
Biomechanics and Motion Analysis Lab, URI.
Role: Research Assistant (Prof. D'Andrea).

• Synchronized EMG signals with gait kinematics to identify pathological movement patterns.
• Utilized motion capture software (Visual3D) to model joint mechanics and muscle activation timing.

June 2023 – Sep 2023 *Validation of Wearable Inertial Sensors against Optical Motion Capture*
Biomechanics and Wearable Sensors Lab, URI.
Role: Research Assistant (Prof. Chapman).

• Conducted validation studies comparing commercial IMU sensor accuracy against "Gold-Standard" optical capture systems.
• Analyzed sensor drift and calibration errors in measuring sagittal knee angles during dynamic tasks.

PUBLICATIONS

Journal Articles

- Chapman RM., Taylor K., Kaczynski E., **Khodabakhsh S.**, Richard S., Hutchinson JB., Marchand RC.Evaluating a commercially available wearable sensor system and its associated calibration procedures for monitoring sagittal knee motion in patients undergoing total knee arthroplasty. The Knee. 2025;54:316-28. doi: https://doi.org/10.1016/j.knee.2025.03.001.
- Marchand, R. C., Taylor, K. B., Kaczynski, E. C., Richards, S., Hutchinson, J. B., **Khodabakhsh, S.**, & Chapman, R. M. (2025). Consistency Is Key: A Secondary Analysis of Wearable Motion Sensor Accuracy Measuring Knee Angles Across Activities of Daily Living Before and After Knee Arthroplasty. Sensors, 25(13), 3942. https://doi.org/10.3390/s25133942

Manuscripts Under Review

- Rabiee A., Farhadi MH., **Khodabakhsh S.**, Sendag R., Abiri R. PRIME: A Closed-Loop LLM-Based Cobot for Dynamic Human-Robot Autonomy Allocation and Teaming. (Under review).
- (Authors anonymized for double-blind review; **Khodabakhsh S.** as co-author.) Detecting Eating Microstructure and Cumulative Food Intake Behavior From Jaw and Wrist Inertial Sensing. *Submitted to Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.* (IMWUT), 2026.
- Farhadi MH., Rabiee A., Ghafouri S., Cetera A., Frisks A., **Khodabakhsh S.**, Abiri R. End-to-end Optimization of Belief and Policy Learning in Shared Autonomy Paradigms. (Manuscript in preparation).

Posters and Presentations

- **Khodabakhsh S.**, Abiri R., Akinkurolere A., Arvonen C., Melanson K., Thomaz E., Walls T. A Vision Language Coach For Ingestive Behaviors. ECBE Graduate Student Poster Competition, University of Rhode Island, 2026.

Peer-reviewed published abstracts

- **Khodabakhsh S.**, Calmelat RA., Casaburi R., Rossiter HB., Adami A. Physical activity behaviors are similar among preserved ratio impaired spirometry (PRISm), normal spirometry and moderate COPD. Medicine and Science in Sports and Exercise. 2024; 56(10S): 884-5.
- Adami A., **Khodabakhsh S.**, Calmelat RA., Casaburi R., Rossiter HB. Association of duration and intensity of physical activity on muscle oxidative capacity in older adults with or without COPD. American Journal of Respiratory and Critical Care Medicine 2024; 209: A4713.
- Adami A., **Khodabakhsh S**., Calmelat RA., Casaburi R., Rossiter HB. Free-living physical activity behaviours are similar among PRISm, moderate COPD and normal spirometry smokers. Int Medic J (Suppl. 1) 2025,50-51:TO109. doi:10.1111/imj.70003.
- Adami A., Cradeur M., **Khodabakhsh S.**, Lawler S., Klinger JR., Mullin CJ., Singh N., Whittenhall M., Ventetuolo CE. Skeletal muscle oxidative capacity is impaired in patients with PAH: a pilot study. Int Medic J (Suppl. 1) 2025,51-52:TO110. doi:10.1111/imj.70003
- Adami A., Cradeur M., **Khodabakhsh S.**, Lawler S., Klinger JR., Mullin CJ., Singh N., Whittenhall M., Ventetuolo CE. Skeletal Muscle Oxidative Capacity Is Impaired in Middle-Aged Adults With Pulmonary Arterial Hypertension: A Pilot Study [abstract]. Am J Respir Crit Care Med 2025;211:A4312. https://doi.org/10.1164/ajrccm.2025.211.Abstracts.A4312.

Peer-reviewed unpublished abstracts (conference does not offer proceedings)

- **Khodabakhsh S.**, Marchand RC., Chapman RM. Nothing but a knee thing: Wearable motion sensors versus optical motion capture measuring knee range of motion before and after TKA. Orthopaedic Research Society Conference. Long Beach, Feb 2024.
- **Khodabakhsh S.**, Chapman RM. Don't sweat the technique: Accurately measuring knee range of motion using poorly placed wearable sensors. Orthopaedic Research Society Conference. Long Beach, Feb 2024.
- **Khodabakhsh S.**, Marchand RC., Chapman RM. Are wearable motion sensors equivalent to the 'Gold-Standard' measuring knee range motion before and after total knee arthroplasty? New England ACSM Fall Conference. Springfield, Oct 2023.
- D'Andrea SE., **Khodabakhsh S.**, Ward-Ritacco C., Quinlan K. Biomechanical investigation of gait and myoelectric activity in ALS patients. 6th International Scientific Conference Motor Control. Poland, Sept 2024.

TEACHING EXPERIENCE

Teaching Assistant
University of Rhode Island

- KIN122: Human Anatomy and Physiology,Fall 2024 & Fall 2025
- KIN275: Introduction to Exercise Science, Spring 2023 - Fall 2025
- KIN370: Introduction to Biomechanics, Spring 2023 - Fall 2025
- KIN375G: Exercise is Medicine, Fall 2024 & Fall 2025
- KIN390: Seminar in Kinesiology, Spring 2025
- KIN420: Fitness Program for Chronic Diseases, Spring 2023 - Fall 2025
- KIN425: Fitness and Wellness Program Development, Spring 2025 & Fall 2025

HONORS & AWARDS

- Teaching Assistantship, University of Rhode Island, College of Health Sciences, Department of Kinesiology. Jan 2023 - Sep 2025.
- Dr. Thomas "Doc" Manfredi Student Research Fund Awardee, University of Rhode Island, College of Health Science, Department of Kinesiology. May 2024.
- Finalist for Student Investigator Award in New England American College of Sport Medicine. Springfield, Oct 2023.
- Finalist for Presidential Cup Award in New England American College of Sport Medicine. Springfield, Oct 2023.
- Dr. Thomas "Doc" Manfredi Student Research Fund Awardee, University of Rhode Island, College of Health Science, Department of Kinesiology. Oct 2023.
- Kinesiology Dean's Scholarship 2023. University of Rhode Island
- Ranked Top 5 in the Cumulative GPA in Master's Degree, Shahid Beheshti, Tehran, Iran. 2022.

CERTIFICATE

Feb 2024	Fundamentals of Deep Learning, University of Rhode Island, NVIDIA. (Course Certificate)
March 2024	A Deep Understanding of Deep Learning, Udemy. (Course Certificate)
March 2024	Master the Fourier Transformation and Its Applications, Udemy. (Course Certificate)
Jan 2023	MATLAB Fundamentals, University of Rhode Island, MathWorks. (Course Certificate)

PROJECTS

Feb 2026 YCB Object Segmentation with YOLOv26: fine-tuned YOLOv26n-seg for segmenting YCB benchmark objects in images an perception module for robotic manipulation. (GitHub)

Jan 2026 EEG Motor-Intention Classification: Filter Bank Common Spatial Patterns (FBCSP) pipeline for decoding motor intention from accuracy. (GitHub)

Jan 2026 3D Hand Pose Estimation from RGB: CNN with transfer learning to recover 3D hand keypoints from monocular RGB images

Summer 2024 Motor Unit Pair Analysis Post MU Decomposition with BSS. (GitHub)

TECHNICAL SKILLS

Languages: Persian (Native), English (Full Proficiency)

Programming Languages: Python, MATLAB, R, KERAS, PyTorch, OpenCV, PyBullet

Softwares: Qualysis, Motive, StretchSense, Visual 3D, SPSS, Prism GraphPad

COMMUNITY WORK

Center for Health and Human Performance Laboratory: Provided community physiological testing services, including body composition, lactate threshold, VO_2max, and Biodex isokinetic assessments.

Biomechanics Day Outreach: Participated in university-led Biomechanics Day for local high schools, demonstrating laboratory equipment, explaining biomechanical principles, and engaging students in hands-on STEM activities.