

# Seyed Ahmad Hosseini Miangoleh

CONTROL ENGINEER · AI, REINFORCEMENT LEARNING & ROBOTICS

Amirkabir University of Technology (Tehran Polytechnic)

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## Education

### Amirkabir University of Technology (Tehran Polytechnic)

Tehran, Iran

B.Sc. IN ELECTRICAL ENGINEERING (CONTROL SYSTEMS)

Sept. 2021 – Present

- Minor in Robotics and Intelligent Systems.
- GPA: 3.18 / 4.00 (15.85/20.00)
- Last two years GPA: 3.45 / 4.00 (16.65/20.00)

### Abu Taleb Bagheri High School, NODET

Neka, Mazandaran, Iran

HIGH SCHOOL DIPLOMA IN MATHEMATICS AND PHYSICS

Sept. 2018 – July 2021

- Member of NODET (National Organization for Development of Exceptional Talents).
- High School GPA: 4.00/4.00 (19.28/20.00)

## Technical Skills

Programming Languages	Python, C++, C, MATLAB, JavaScript
ML & Deep Learning Frameworks	PyTorch, TensorFlow, Hugging Face, OpenAI Gym, Scikit-learn, Keras, Pandas
Robotics & Simulation	Webots, CARLA, Simulink
Development Tools	Linux, Git, VS Code
Hardware Platforms	Raspberry Pi, Arduino
Industrial Automation & PLC	Siemens SIMATIC STEP 7 (TIA Portal), PLC Programming (Ladder Logic), Factory I/O Simulation

## Publications and Ongoing Research

### BLIP-FusePPO: Vision–Language Model Enhanced Multimodal Reinforcement Learning for Autonomous Lane-Keeping

IEEE Transactions on Intelligent Vehicles

SEYED AHMAD HOSSEINI MIANGOLEH, AMIN JALAL AGHDASIAN, FARZANEH ABDOLLAHI

Under Review, 2025

- Developed a multimodal RL framework that fuses semantic embeddings from BLIP with geometric states, LiDAR data, and control feedback for autonomous driving.
- Designed a lightweight state representation preserving semantic awareness while eliminating on-the-fly VLM inference, enabling real-time deployment.
- Achieved a **54.5% RMSE reduction** compared to DDPG and a **44.4% performance improvement** over VL-SAFE across diverse driving scenarios.
- Validated policy stability and adaptability through extensive simulations.

### A Hybrid Adaptive Imitation–Reinforcement–Inverse Reinforcement Learning Approach to Vision-Based Autonomous Driving

Ongoing Project

LEAD RESEARCHER

Jan. 2025 – Present

- Integrated *Behavioral Cloning* for imitation learning from expert vision–LiDAR trajectories with adaptive training frequency.
- Applied PPO in the mixed phase with prioritized replay and safety-aware rewards for stable reinforcement learning.
- Employed a discriminator-based IRL module to generate reward signals, guiding policy refinement toward expert-like behavior.
- Designed a phased training pipeline (Imitation → Mixed) with deviation-limited control, achieving safe navigation in Webots simulations.

## Work Experiences

### Tavan Resan Co.

Tehran, Iran

COMPUTER VISION & ROBOTICS INTERN

Jun 2024 – Sep 2024

- Developed a vision-based system for object measurement and 3D localization using OpenCV with full intrinsic/extrinsic camera calibration.
- Integrated the pipeline with a 6-DOF robotic arm for autonomous pick-and-place operations based on spatial data.
- Validated performance, achieving sub-centimeter positioning accuracy for industrial automation.

## Honors & Awards

- 2021 **Ranked 270<sup>th</sup>**, Top 0.8% among 35,000+ Region 3 participants in the Iranian University Entrance Exam (Konkour) for B.Sc. in Engineering
- 2018 **Admitted to**, Abu Taleb Bagheri High School, Member of NODET (National Organization for Development of Exceptional Talents)

## Selected Academic Projects

### Multimodal RL for Autonomous Driving in Webots

Amirkabir University of Technology

REINFORCEMENT LEARNING – AUTONOMOUS DRIVING

2025

- Designed a deep RL framework integrating BLIP vision–language embeddings with LiDAR, control feedback, and geometric states, enabling robust lane-keeping in Webots simulations.
- Optimized state representation to maintain semantic awareness while removing runtime VLM inference overhead, achieving real-time performance.

<b>A* Path Planning for Obstacle Avoidance with Computer Vision in Webots</b> COMPUTER VISION – PATH PLANNING <ul style="list-style-type: none"> <li>Developed an A* -based path planning system for real-time obstacle avoidance in Webots simulations.</li> <li>Applied computer vision for dynamic environment perception, improving autonomous navigation decisions.</li> </ul>	Amirkabir University of Technology 2025
<b>End-to-End Generative AI Systems for Multilingual Alignment (RLHF)</b> LARGE LANGUAGE MODELS – MULTILINGUAL NLP <ul style="list-style-type: none"> <li>Built an end-to-end RLHF pipeline with FLAN-T5, leveraging PPO, DPO, and GRPO to improve coherence and human-preference alignment.</li> <li>Fine-tuned English–Persian translation models using LoRA and QLoRA, achieving competitive BLEU/ROUGE scores while minimizing computational cost.</li> </ul>	Amirkabir University of Technology 2025
<b>Multimodal Speech Processing with Wav2Vec2</b> DEEP LEARNING – SPEECH PROCESSING <ul style="list-style-type: none"> <li>Developed a multimodal pipeline for 8-class Speech Emotion Recognition and ASR, processing raw audio and corresponding text transcriptions.</li> <li>Fine-tuned Wav2Vec2 models (<a href="#">facebook/wav2vec2-large-xlsr-53</a> for SER, <a href="#">facebook/wav2vec2-large-960h</a> for ASR) on CREMA-D, RAVDESS, TESS, and SAVEE datasets with enhanced preprocessing, augmentation, and class mapping.</li> </ul>	Amirkabir University of Technology 2025
<b>Transformer for Twitter Emotion Detection</b> DEEP LEARNING – NATURAL LANGUAGE PROCESSING <ul style="list-style-type: none"> <li>Designed a Transformer in PyTorch for multi-class tweet emotion detection, leveraging GloVe embeddings and customized preprocessing.</li> <li>Integrated trainable positional encoding, oversampling for class balance, and dynamic learning-rate scheduling, enhancing model accuracy and generalization.</li> </ul>	Amirkabir University of Technology 2025
<b>Self-Balancing Two-Wheeled Robot</b> ROBOTICS – AUTONOMOUS SYSTEMS <ul style="list-style-type: none"> <li>Built a modular two-wheeled self-balancing robot with Arduino UNO and L298N motor driver, using dual 25GA 330RPM DC motors and MPU6050 IMU for real-time tilt correction and stable motion under disturbances.</li> </ul>	Amirkabir University of Technology 2025
<b>Autonomous Navigation Algorithms in Webots</b> ROBOTICS – AUTONOMOUS SYSTEMS <ul style="list-style-type: none"> <li>Developed a proportional controller for line-following robots in Webots, diagnosing control limitations and proposing PID with intersection detection to improve stability and accuracy.</li> <li>Built a maze-solving robot using iterative DFS in Webots and validated successful navigation; proposed BFS for shortest-path optimization.</li> </ul>	Amirkabir University of Technology 2025
<b>RISC-V Single-Cycle Processor</b> COMPUTER ARCHITECTURE – DIGITAL DESIGN <ul style="list-style-type: none"> <li>Implemented a modular single-cycle RISC-V CPU in VHDL supporting R-type (ADD, SUB, AND, OR) and I-type (ADDI, ANDI, ORI, LW, SW) instructions, including PC, memory units, register file, ALU, immediate generator, and control unit.</li> <li>Validated CPU functionality via comprehensive testbenches across arithmetic, logical, immediate, and memory operations, ensuring hazard-free execution and correct control signaling.</li> </ul>	Amirkabir University of Technology 2025

## TA and Workshop Experiences

<b>Intensive MATLAB Programming Workshop</b> INSTRUCTOR & ORGANIZER <ul style="list-style-type: none"> <li>Designed and taught an intensive MATLAB workshop focused on control system implementation.</li> <li>Led hands-on exercises and interactive problem-solving sessions for undergraduate engineering students.</li> </ul>	Amirkabir University of Technology Jun. 2023
<b>Electronics II — Prof. Mehran</b> TEACHING ASSISTANT (LEAD TA) <ul style="list-style-type: none"> <li>Led problem-solving sessions during lectures and supported grading.</li> <li>Assisted students with circuit design and analysis.</li> </ul>	Amirkabir University of Technology Sep. 2024 – Dec. 2024
<b>Linear Control Systems — Prof. I. Sharifi</b> TEACHING ASSISTANT (SUPPORTING) <ul style="list-style-type: none"> <li>Supported tutorials and grading, provided guidance to students.</li> </ul>	Amirkabir University of Technology Sep. 2024 – Dec. 2024
<b>Instrumentation — Prof. I. Sharifi</b> TEACHING ASSISTANT (SUPPORTING) <ul style="list-style-type: none"> <li>Assisted in coursework and student support.</li> </ul>	Amirkabir University of Technology Jan. 2025 – Jul. 2025
<b>Introduction to Computational Intelligence — Prof. Abdollahi</b> TEACHING ASSISTANT (SUPPORTING) <ul style="list-style-type: none"> <li>Supported tutorials and coursework on fuzzy systems and neural networks.</li> </ul>	Amirkabir University of Technology Sep. 2025 – Dec. 2025

## Passed Courses

**Linear Algebra** · **Probability & Statistics** · **Linear Control Systems** · **Modern Control** · **Digital Control Systems** · **Introduction to Computational Intelligence** · **Introduction to Robotics** · **Machine Learning**

## Language Skills

**Persian** Native Proficiency  
**English** TOEFL: Preparing to take the test

## Hobbies

**Martial Arts (Ninjutsu)** — 3<sup>rd</sup> place nationally · **Football** · **Volleyball** · **Photography** · **Swimming**