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, LaTeX
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.

IRL-DAL: Hybrid RL with a Safety-Aware Diffusion Planner for Autonomous Driving — *Ongoing Project*

Lead Researcher — *Jan. 2025 – Present*

- Architected a novel hybrid framework (IRL-DAL) by synergizing IL, IRL, and PPO, achieving a **50% reward increase** over baselines.
- Engineered a safety-aware *Diffusion Planner* as a fallback, generating feasible actions to significantly reduce collision rates.
- Designed a *Learnable Adaptive Mask (LAM)* for dynamic visual attention, leading to a precise lateral deviation of only **0.105m**.
- Implemented a two-phase curriculum (Imitation → Mixed RL) with prioritized replay, ensuring stable policy convergence in Webots.

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 270th,** Top 0.8% among 35,000+ Region 3 participants in the Iranian University Entrance Exam (Konkoor) 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.

A* Path Planning for Obstacle Avoidance with Computer Vision in Webots
Amirkabir University of Technology

Computer Vision – Path Planning — *2025*

- Developed an A*-based path planning system for real-time obstacle avoidance in Webots simulations.
- Applied computer vision for dynamic environment perception, improving autonomous navigation decisions.

End-to-End Generative AI Systems for Multilingual Alignment (RLHF)
Amirkabir University of Technology

Large Language Models – Multilingual NLP — *2025*

- Built an end-to-end RLHF pipeline with FLAN-T5, leveraging PPO, DPO, and GRPO to improve coherence and human-preference alignment.
- Fine-tuned English–Persian translation models using LoRA and QLoRA, achieving competitive BLEU/ROUGE scores while minimizing computational cost.

Multimodal Speech Processing with Wav2Vec2
Amirkabir University of Technology

Deep Learning – Speech Processing — *2025*

- Developed a multimodal pipeline for 8-class Speech Emotion Recognition and ASR, processing raw audio and corresponding text transcriptions.
- Fine-tuned Wav2Vec2 models (`facebook/wav2vec2-large-xlsr-53` for SER, `facebook/wav2vec2-large-960h` for ASR) on CREMA-D, RAVDESS, TESS, and SAVEE datasets with enhanced preprocessing, augmentation, and class mapping.

Transformer for Twitter Emotion Detection
Amirkabir University of Technology

Deep Learning – Natural Language Processing — *2025*

- Designed a Transformer in PyTorch for multi-class tweet emotion detection, leveraging GloVe embeddings and customized preprocessing.
- Integrated trainable positional encoding, oversampling for class balance, and dynamic learning-rate scheduling, enhancing model accuracy and generalization.

Self-Balancing Two-Wheeled Robot
Amirkabir University of Technology

Robotics – Autonomous Systems — *2025*

- 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.

Autonomous Navigation Algorithms in Webots
Amirkabir University of Technology

Robotics – Autonomous Systems — *2025*

- Developed a proportional controller for line-following robots in Webots, diagnosing control limitations and proposing PID with intersection detection to improve stability and accuracy.
- Built a maze-solving robot using iterative DFS in Webots and validated successful navigation; proposed BFS for shortest-path optimization.

RISC-V Single-Cycle Processor
Amirkabir University of Technology

Computer Architecture – Digital Design — *2025*

- 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.
- Validated CPU functionality via comprehensive testbenches across arithmetic, logical, immediate, and memory operations, ensuring hazard-free execution and correct control signaling.

TA and Workshop Experiences

Intensive MATLAB Programming Workshop
Amirkabir University of Technology

Instructor & Organizer — *Jun. 2023*

- Designed and taught an intensive MATLAB workshop focused on control system implementation.
- Led hands-on exercises and interactive problem-solving sessions for undergraduate engineering students.

Electronics II — Prof. Mehran
Amirkabir University of Technology

Teaching Assistant (Lead TA) — *Sep. 2024 – Dec. 2024*

- Led problem-solving sessions during lectures and supported grading.
- Assisted students with circuit design and analysis.

Linear Control Systems — Prof. I. Sharifi
Amirkabir University of Technology

Teaching Assistant (Supporting) — *Sep. 2024 – Dec. 2024*

- Supported tutorials and grading, provided guidance to students.

Instrumentation — Prof. I. Sharifi
Amirkabir University of Technology

Teaching Assistant (Supporting) — *Jan. 2025 – Jul. 2025*

- Assisted in coursework and student support.

Artificial Intelligence and Digital Transformation — Prof. Abdollahi
Amirkabir University of Technology

Teaching Assistant (Supporting) — *Sep. 2025 – Dec. 2025*

- Assisted in coursework and student support.

Modern Control Systems — Prof. Atrianfar
Amirkabir University of Technology

Teaching Assistant (Supporting) — *Sep. 2025 – Dec. 2025*

- Assisted in coursework and student support.

Industrial Control — Prof. Khosravi
Amirkabir University of Technology

Teaching Assistant (Supporting) — *Sep. 2025 – Dec. 2025*

- Assisted in coursework and student support.

Computer Vision — Prof.Shariatmadar
Amirkabir University of Technology

Teaching Assistant (Supporting) — *Sep. 2025 – Dec. 2025*

- Assisted in coursework and student support.

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) — 3rd place nationally · Football · Volleyball · Photography · Swimming