

# 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.

### 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 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.

## 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](https://facebook.github.io/wav2vec2-large-xlsr-53) for SER, [facebook/wav2vec2-large-960h](https://facebook.github.io/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) — 3<sup>rd</sup> place nationally · Football · Volleyball · Photography · Swimming