Hamed Hamzeh

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Research Interests

- Robotics
- Human Robot Interaction
- IOT
- Machine Learning
- Computer Vision
- Reinforcement Learning

Education

2019–2023 **B.Sc. in Mechanical Engineering**,
University of Tehran, Tehran, Iran, GPA: 16.13/20, last two years GPA: 3.59/4

B.Sc.'s Thesis, *Design and development of a whole body continuous passive motion (CPM) device for neurorehabilitation. Under the supervision of Dr. Daneshmehr (18.50/20)*

Selected Courses

- Artificial Intelligence: 19.5/20
- Mechatronics: 16.75/20
- Dynamics: 19/20
- Fundamental of Electronics: 20/20
- Control: 16.3/20

Publications

Under Review **Design of A Bio-inspired, Compliant, and Modular Robot with Magnetic Adhesion System for Iron Surface Inspection**, *Journal of Mechanisms and Robotics*
P Parhami, M Salehpour, **H Hamzeh**, Nasiri R and Moradi H

Experience

Jul 2023 -present **Research assistant**, *Advanced Robotics and Intelligent Systems Lab*, School of Electrical and Computer Engineering, University of Tehran
Supervisor: Prof. Manouchehr Moradisabzevar

Hand Puppeteer Robot: Visit webpage

- Engineered a wireless-controlled, 3D-printed robot, integrating design and coding for interactive movement.
- Programmed NodeMCU and Arduino to process real-time data from a gyroscopic sensor for robotic control.
- Investigated gesture-controlled robotics and selected **YOLO v8** for puppet detection and pose recognition.
- Developed and annotated a dataset of 2,000 images, including keypoints and bounding boxes.
- Achieved **91.4%** accuracy with the YOLO v8 pose detection model.
- Utilized **Kalman filtering** during inference to enhance the stability of pose estimation.
- Synced the pose detection model with the robot for remote-controlled movement.

Silkworm Robot: Visit webpage

- developed a modular, semi-soft robotic system for movement on metallic surfaces, aimed at inspection and maintenance applications.
- Designed and 3D-printed components using **PLA and TPU**, with additional parts made from Plexi.
- Developed a web-based interface for remote controling, utilizing ESP32 microcontroller.
- Achieved a **6.7%** lower cost of transportaion through experiments with variable module speeds.
- Co-authoring an upcoming publication detailing the design methodology, experimental findings, and potential applications of the Silkworm Robot in industrial inspection tasks.

Jul 2021 -Jan 2022 **Mechanical Engineer**
GANJE, a startup in the field of smart logistics
- Worked in the Research and Development (R&D) team to design and manufacture smart lockers.
- Developed new solutions to improve lockers' functionality and user experience through research and testing.
- Created CAD designs for the lockers, turning concepts into detailed models and drawings.
- Utilized a top-down design approach to efficiently manage complex assemblies.

Jun - Oct 2021 **Internship**
Avita Company
- Collaborated with a team to design and manufacture wheelchairs using carbon fibers.
- Assisted in the manufacturing process, creating fixtures to enhance the assembling process.

Honors & Rewards

2024 **Privilege Of Studying MSC:** Technical university of Milan, Automation and Control Engineering, Engineering Faculty

2018 Ranked within the top 0.5% students amongst more than 160000 participants in Iranian University Entrance Exam (Konkur)

Selected Projects

Predicting Hydrogen Storage in MOFs, *Visit GitHub Repo*

- Data preprocessing, feature selection, and visualization to enhance model input.
- Trained different tree-based models and neural networks, with hyperparameter optimization using Optuna.

Pediatric Bone Age Prediction Using Xception Model, *Visit GitHub Repo*

- Predicted pediatric bone age using hand X-ray images with an Xception model.
- Applied data augmentation and tracked model preformance via Wandb, achieved a training error of 4.9 months and validation error of 9.1 months.

Exploration of Recurrent Networks: RNNs and LSTMs, *Visit GitHub Repo*

- Studied and applied RNNs and GRUs to weather forecasting, with GRUs providing superior performance compared to RNNs.
- Developed and trained LSTM networks to overcome RNN limitations in capturing long-term dependencies; applied the model to analyze and forecast trends in S&P 500 stock market data.

Mechanical Component Classification with ResNet-50

- Utilized the ResNet-50 algorithm to classify four distinct mechanical components, demonstrating proficiency in machine learning and component recognition.

Skills

Programming	Python, C++, Matlab, Latex, HTML, CSS, JavaScript
Frameworks	Scikit-learn, OpenCV, TensorFlow, Keras, PyTorch, React
Databases	MySQL
CAD/CAE	SolidWorks, Siemens NX, 3D print software, COMSOL
Platforms	NodeMCU, Arduino, Git, Linux
Soft Skills	Critical thinking, R&D, teamwork, Problem solving

Languages

Fluent	English: IELTS: 7/9 R:7.5, L:8, S:7, W:6
Learning	Deutsch: A1
Native	Farsi

Certificate

May 2023 **Machine learning Specialization**, *link*

Institute: DeepLearning.AI

- Supervised Machine Learning: Regression and Classification
- Advanced Learning Algorithms
- Unsupervised Learning, Recommenders, Reinforcement Learning

References

Pr.Manouchehr Moradisabzevar, *Professor at College of Electrical and Computer Engineering*, University of Tehran, Email: moradih@ut.ac.ir

Relationship: Research Supervisor

Dr.Alireza Daneshmehr, *Assosiate Professor at College of Mechanical Engineering*, University of Tehran, Email: daneshmehr@ut.ac.ir

Relationship: Bachelor Thesis Supervisor

Dr.Rezvan Nasiri, *Assosiate Professor at College of Electrical and Computer Engineering*, University of Tehran, Email: rezvan.nasiri@ut.ac.ir

Relationship: Research Supervisor