Hamed Damirchi

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Education

K. N. Toosi University of Technology — Tehran, Iran
M.Sc. in Mechatronics Engineering (GPA: 18.36/20) — *Sep. 2018 – Sep. 2021*
Thesis: Deep Multimodal Localization Subsystem for a Large-Scale CDPR

Tabriz University — Tabriz, Iran
B.Sc. in Mechanical Engineering — *Sep. 2013 – Apr 2018*
Thesis: Sensor Fusion for Efficient Attitude Estimation

Publications

Papers

- Ali Farajzadeh, **H. Damirchi**, H. D. Taghirad, "Action Capsules: Human Skeleton Action Recognition", Conference on Artificial Intelligence (AAAI), 2023 (Under Review)
- **H. Damirchi**, R. Khorrambakht, H. D. Taghirad, B. Moshiri, "A Consistency-Based Loss for Deep Odometry Through Uncertainty Propagation", IEEE International Conference on Robotics and Automation (ICRA), 2023 (Under Review)
- R. Khorrambakht, **H. Damirchi**, H. D. Taghirad, "IMU Preintegrated Features for Efficient Deep Inertial Odometry", tinyML Research Symposium, 2022
- S.A. Khalilpour, Rooholla Khorrambakht, **H. Damirchi**, H. D. Taghirad, Philippe Cardou, "Tip-trajectory tracking control of a deployable cable-driven robot via output redefinition", Multibody System Dynamics, 2021
- **H. Damirchi**, R. Khorrambakht, H. D. Taghirad, "ARC-Net: Activity Recognition Through Capsules", International Conference on Machine Learning and Applications (ICMLA), 2020
- **H. Damirchi**, R. Khorrambakht, H. D. Taghirad, "Exploring Self-Attention for Visual Odometry", 2020
- **H. Damirchi**, R. Khorrambakht, H. D. Taghirad, "ARAS-IREF: An Open-Source Low-Cost Framework for Pose Estimation", International Conference on Robotics and Mechatronics (Best poster paper award), 2019
- R. Khorrambakht, **H. Damirchi**, H. D. Taghirad, "A Calibration Framework for Deployable Cable Driven Parallel Robots with Flexible Cables", International Conference on Robotics and Mechatronics, 2019
- MRJ. Harandi, S. A. Khalilpour, **H. Damirchi**, H. D. Taghirad, "Stabilization of Cable Driven Robots Using Interconnection Matrix: Ensuring Positive Tension", International Conference on Robotics and Mechatronics, 2019

Books

- M. Delrobaei, A. Riasi, **H. Damirchi**, A. Hassani, H. D. Yaghoubi, "A Biomechatronics Handbook", 2020

Research Interests

- Representation Learning
- Causal Learning
- Computer vision

Skills

Languages

- **English:** Fluent (TOEFL iBT: 114, Reading: 29, Listening: 30, Speaking: 27, Writing: 28)
- **Azeri, Persian:** Native

Programming/Software

- **Languages:** Python, C, C++, Matlab
- **Development Platforms:** PyTorch, TensorFlow, Keras, Qt, ROS, GTSAM
- **Embedded Platforms:** Keil+HAL Libraries, Arduino
- **Developer Tools:** Git, Docker, Google Cloud Platform
- **CAD/CAM:** CATIA, SolidWorks, Altium Designer, Fusion 360

Research Experience

Autonomous Robotics Group at ARAS Labs — Thesis
Global Localization for a Large-Scale Cable Robot — *Tehran, Iran*

- Collected a dataset consisting of data from a BumbleBee stereo camera, four encoders, four force sensors, one downward facing monocular camera and an IMU
- The data from one stream of camera images is used alongside the IMU readings to provide egomotion estimates. The result is fused with the data from the encoder to achieve global localization in an accurate and robust manner.

Autonomous Robotics Group at ARAS Labs — Research Assistant
Cryptocurrency Price Direction Forecasting — *Tehran, Iran*

- Used historical data alongside sentiment analyses of Reddit and major news sources to predict the direction of the next-day price movement.
- The RNN based pipelines were compared against classical time series forecasting methods such as SARIMAX.

Parallel and Cable Robotics Group at ARAS Labs — Research Assistant
Universal Cable Robot End-Effector — *Tehran, Iran*

- In collaboration with a colleague, an end-effector was designed in order to house a sensor array and allow for data collection.
- A DAQ system was also devised where a node was mounted with each anchor point and the CAN protocol was used to transfer data from each actuator to the central system.

Tabriz University Robotics Group — Thesis
Sensor Fusion for Efficient Attitude Estimation — *Tabriz, Iran*

- The goal of this project was to evaluate the efficiency of different filter-based methods such as KF, EKF, UKF and the complementary filter in estimation of the attitude of an Inertial Measurement Unit.

Tabriz University Robotics Group — Undergraduate
Custom Robotic Arm — *Tabriz, Iran*

- Design and implementation of a robotic arm. An Arduino based system was developed in order to control a miniature robotic arm.
- Nonlinear regression methods were used to model the inverse kinematics of the arm.

Teaching Experience

2015, Tabriz University, Iran Teaching Assistant, Robotics, Faculty of Mechanical Engineering
2016, Tabriz University, Iran Tutor, Introduction to Robotics, Scientific Association of Mechanical Engineering Department
2017, Tabriz University, Iran Teaching Assistant, Robotics, Faculty of Mechanical Engineering
2017, Tabriz University, Iran Tutor, Programming with C++, Scientific Association of Mechanical Engineering Department

Notable Graduate Courses

- Machine learning
- Data Fusion
- System Identification
- Control in Robotics
- Advanced Control
- Mechatronics
- Biomechatronics

Online Courses

- Intro to Deep Learning Course Instructed by Prof. Hinton on Coursera
- Deep Learning Specialization Course Instructed by Prof. Ng on Coursera
- Introduction to Self-Driving Cars Course Instructed by Prof. Waslander on Coursera
- Deep Reinforcement Learning Course Instructed by Prof. Levine
- Introduction to Reinforcement Learning Course Instructed by Prof.Silver

References

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