

MOHAMMADREZA DINDARLOO

Robotic Researcher at Applied Robotics and AI Solutions (ARAS)

CONTACT INFORMATION

Webpage

LinkedIn

Email: mohammadrezadindarlou@gmail.com

Phone: +98 938 808 6348

EDUCATION

M.Sc. in Electrical Engineering,

2021 - 2024

[K.N. Toosi University of Technology](#), Tehran, Iran,

Thesis title: Development of a Graph-Based Unified Optimization Framework for Robot Calibration and State Estimation [\[PDF\]](#),

Advisor: [Prof. Hamid D. Taghirad](#),

Co-Advisor: [Prof. Philippe Cardou](#),

GPA: , 3.88/4 (18.82/20).

B.Sc. in Electrical Engineering,

2017 - 2021

[K.N. Toosi University of Technology](#), Tehran, Iran,

Thesis title: Design and Implementation of a Comprehensive Data Acquisition System(DAQ) for Real-Time Applications in ARASH:ASiST Eye Surgery Training Robot,

GPA: 3.52/4 (16.74/20).

RESEARCH INTERESTS

- **Sensor Fusion:** Designing and implementing fusion algorithms for SLAM, localization, and calibration
- **Multi Agent Perception & Localization:** Optimizing communication, positioning, and data fusion using algorithmic methods
- **Medical Robotics:** Calibrating and controlling surgical robots for minimally invasive surgery, haptics, and teleoperation
- **Machine Learning for Hybrid Statistical Learning and Control in Robotic Systems:** Enhancing robotic applications utilizing machine learning methods for more adaptive and efficient control strategies

RESEARCH EXPERIENCE

Research Assistant at [ARAS](#), Surgical Robots Lab ([SR Lab](#))

2018-Present

- Unified Graph-Based Kinematic Calibration Algorithm for Surgical Robots [\[Github\]](#) [\[Paper\]](#)
 - Developed SE(3)-based kinematic calibration for DIAMOND and ARASH:ASiST surgical robots
 - Implemented a ROS node for real-time communication and NTP synchronization server [\[Github\]](#)
 - Collected and published visual-inertial-kinematic data via TagSLAM [\[Github\]](#)
- Real-Time Multi-Robot Data Acquisition System & Control System [\[Paper\]](#)
 - Developed STM32F7-based DAQ with isolated I/O, encoders, serial protocols, and Ethernet
 - Configured UDP multi-DAQ communication via Matlab RTOS for dual-core ARASH:ASiST robot
 - Implemented IDC/PID controllers in Matlab Simulink for ARASH:ASiST, DIAMOND, and ARASCam
- IR-Tracked CT Navigation for Elbow Surgery with 3D Simulation [\[Github\]](#)
 - Collaborated on a custom stereo IR-tracker for real-time surgical registration and navigation [\[Github\]](#)

- ARASH:ASiST Preclinical Electrical & Mechanical Evaluation
 - Initiated preclinical tests on the ARASH:ASiST robot to assess electrical and mechanical performance
 - Collaborated closely with surgeons to integrate clinical insights into evaluation procedures.

Research Assistant at [ARAS](#), Parallel and Cable-Driven Robots Lab ([PACR Lab](#)) 2018-Present

- Graph-Based Self-Calibration Technique for Cable-Driven Robots with Sagging Cable [[Github](#)] [[Paper](#)]
 - Developed a graph-based simultaneous localization and self-calibration technique for deployable CDPRs
 - Verified the proposed method using a Finite Element approach in RecurDyn software
 - Developed a C++ and Python-based framework for implementation utilizing GTSAM and SymForce
- Graph-Based Visual-Kinematic Fusion and Monte Carlo Initialization for CDPRs [[Github](#)] [[Paper](#)]
 - Collaborated in the development of a graph-based visual-kinematic fusion utilizing SVO and factor graph
 - Collected an open-source visual-inertial and kinematic dataset for state estimation and calibration
- A Novel Cable-Driven Robot Kinetostatic State Estimation [[Github](#)] [[Paper](#)]
 - Developed CDPR module for kinetostatic estimation; sag compensation eliminated force sensors
- Arastronaut Indoor/Outdoor Positioning System [[Github](#)] [[Paper](#)]
 - Developed a real-time ESP32 positioning module integrating IMU, UWB, pressure, and compass sensors
 - Set up a UDP-based web GUI for programming, sensor calibration, and data visualization
- Embedded System Development for Kamal-ol-Molk Painter Robot [[Github](#)]
 - ESP32 based wireless embedded board using Altium for Kamal-ol-Molk 3DoF cable planar robot

SELECTED PUBLICATIONS

- **M. R. Dindarloo**, A. Hassani, A. Sharifi, S. A. Khalilpour, P. Cardou and H. D. Taghirad, “Graph-Based Kinetostatic State Estimation in Cable-Driven Parallel Robots,” *2025 7th International Conference on Cable-Driven Parallel Robots (CableCon 2025)*, [[PDF](#)].
- **M. R. Dindarloo**, A. S. Mirjalili, S. A. Khalilpour, R. Khorrambakht, Stephan Weiss, and H. D. Taghirad, “A Graph-Based Self-Calibration Technique for Cable-Driven Robots with Sagging Cable,” *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2024)*, [[PDF](#)].
- M. Vakili, A. S. Mirjalili, **M. R. Dindarloo**, Ali. Sharifi, and H. D. Taghirad, “Arastronaut: An Open Source UWB/IMU Hardware and Software for Indoor Positioning,” *2024 12th IEEE RSI International Conference on Robotics and Mechatronics (ICRoM 2024)*, [[PDF](#)].
- D. A. Nejad, A. Sharifi, **M. R. Dindarloo**, A. S. Mirjalili, S. A. Khalilpour, and H. D. Taghirad, “Control of Cable Driven Parallel Robots Through Deep Reinforcement Learning,” *2024 12th IEEE RSI International Conference on Robotics and Mechatronics (ICRoM 2024)*, [[PDF](#)].
- A. Sharifi, M. Vakili, **M. R. Dindarloo**, A. S. Mirjalili, S. A. Khalilpour, B. Tavassoli, and H. D. Taghirad, “Graph-Based Simultaneous Localization and Calibration for Planar Cable-Driven Parallel Robots,” *2024 12th IEEE RSI International Conference on Robotics and Mechatronics (ICRoM 2024)*, [[PDF](#)].
- R. Khorrambakht, H. Damirchi, **M. R. Dindarloo**, A. Saki, S. A. Khalilpour, H. D. Taghirad, and Stephan Weiss, “Graph-Based Visual-Kinematic Fusion and Monte Carlo Initialization for Fast-Deployable Cable-Driven Robots,” *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2023)*, [[PDF](#)].

- **M. R. Dindarloo**, A. S. Mirjalili, R. Khorrambakht, S. A. Khalilpour, P. Cardou and H. D. Taghirad, “Kinematic Calibration of a Spherical Parallel Robot,” *2023 11th IEEE RSI International Conference on Robotics and Mechatronics (ICRoM 2023)*, [PDF].
- A. Rashvand, R. Heidari, M. Motaharif, A. Hassani, **M. R. Dindarloo**, M. J. Ahmadi, K. Hashtrudi-Zaad, M. Tavakoli, H. D. Taghirad, “An observer-based responsive variable impedance control for dual-user haptic training system,” *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2022)*, [PDF].
- M. M. Kalantari, R. Khorrambakht, **M. R. Dindarloo**, S. A. Khalilpour, H. D. Taghirad, P. Cardou, “Marker Correspondence Initialization in an IR Motion Capturing System,” *2022 10th IEEE RSI International Conference on Robotics and Mechatronics (ICRoM 2022)*, [PDF].
- A. Hassani, **M. R. Dindarloo**, R. Khorrambakht, A. Bataleblu, R. Heidari, M. Motaharif, S. F. Mohammadi, H. D. Taghirad, “On The Dynamic Calibration and Trajectory Control of ARASH: ASiST,” *2022 8th IEEE International Conference on Control, Instrumentation and Automation (ICCIA 2022)*, [PDF].
- A. Hassani, **M. R. Dindarloo**, R. Khorrambakht, A. Bataleblu, H. Sadeghi, R. Heidari, A. Iranfar, P. Hasani, N. S. Hojati, A. Khorasani, N. KhajeAhmadi, M. Motaharif, H. Riaz-Esfahani, A. Lashay, S. F. Mohammadi, H. D. Taghirad, “Kinematic and dynamic analysis of ARASH:ASiST Toward micro positioning,” *2021 9th IEEE RSI International Conference on Robotics and Mechatronics (ICRoM 2021)*, [PDF].

WORK EXPERIENCE

- Medical Robotics Engineer at [Farabi Eye Hospital](#), Tehran University of Medical Sciences 2019-Present
 - Developing [eye surgery training systems](#) in collaboration with eye surgeons Part-time
- Robotics Engineer at [ARASRobot](#), K. N. Toosi University of Technology 2020-Present
 - Designing control and electrical systems and algorithms for robotic platforms Full-time

TEACHING EXPERIENCES

- **Nonlinear Control System, Linear Control System, Industrial Control System, Robotics**
- Instructor: Prof. Hamid D. Taghirad [Scholar]
- **Signals and Systems** - Instructor: Dr. Lotfollah Beygi [Webpage]
- **Engineering Economics** - Instructor: Dr. Amirhossein Nikoofard [Scholar]

SKILL AND PROFICIENCY

- **Programming Languages:** Python, C/C++, MATLAB, Maple
- **Embedded Systems:** ROS, STM32CubeMX, Raspberry Pi, Arduino
- **Software:** Altium Designer, Simulink, RecurDyn, MuJoCo
- **Languages:** Persian, English (TOEFL iBT: 91/120 - R: 23, L: 24, S: 21, W: 23).

REFERENCES

- **Prof. Hamid D. Taghirad**
Professor, Director of the Advanced Robotics and Automated System (ARAS), Faculty of Electrical Engineering, K.N. Toosi University of Technology, Tehran, Iran.
Email: taghirad@kntu.ac.ir
- **Prof. Philippe Cardou**
Professor, Robotics Laboratory, Department of Mechanical Engineering, Laval University, Québec, Canada.
Email: pcardou@gmc.ulaval.ca