

MOHAMMADREZA DINDARLOO

Robotic Researcher at Edinburgh Centre for Robotics

CONTACT INFORMATION

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EDUCATION

PhD in Dependable and Deployable AI for Robotic (CDT-D2AIR), 2025 - Present
[The University of Edinburgh](#),

M.Sc. in Electrical Engineering, 2021 - 2024
[K.N. Toosi University of Technology](#),

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](#),

B.Sc. in Electrical Engineering, 2017 - 2021
[K.N. Toosi University of Technology](#),

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

RESEARCH INTERESTS

- **Applied AI for Robotics:** Learning-based Vision–Language–Action policies, cross-robot generalization, and safety constraints for reliable real-world deployment.
- **Medical Robotics:** Control, calibration, and teleoperation of minimally invasive surgical robots, integrating haptics to enhance precision and safety.

RESEARCH EXPERIENCE

Research Assistant at [Edinburgh Centre for Robotics](#) 2025-Present

- Neural Network Verification
 - NN Verification using CORA, KeYmaera X, and Marabou implemented with Vehicle language.

Research Assistant at [ARAS](#), Surgical Robots Lab ([SR Lab](#)) 2018-2025

- Unified Graph-Based Kinematic Calibration Algorithm for Surgical Robots [\[Github\]](#) [\[Paper\]](#)
 - Calibrated DIAMOND and ARASH:ASiST surgical robots (SE(3)), built ROS + NTP sync tooling, and published visual–inertial–kinematic data (TagSLAM) [\[Github\]](#) [\[Github\]](#)
- Real-Time Multi-Robot Data Acquisition System & Control System [\[Paper\]](#)
 - Built an STM32F7-based embedded DAQ (isolated I/O, encoders, serial, Ethernet) with UDP multi-DAQ networking via Matlab RTOS, and deployed onboard IDC/PID control for [ARAS surgical robots](#).
- 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
 - Designed the electrical evaluation and collaborated on mechanical assessments, conducting preclinical performance testing of the ARASH:ASiST robot with surgeon input to refine the evaluation protocol.

- Graph-Based Self-Calibration Technique for Cable-Driven Robots with Sagging Cable [\[Github\]](#) [\[Paper\]](#)
 - Developed a graph-based SLAM/self-calibration method for deployable CDPRs, validated via finite-element simulation in RecurDyn, and implemented in C++/Python using GTSAM and SymForce.
- Graph-Based Visual-Kinematic Fusion and Monte Carlo Initialization for CDPRs [\[Github\]](#) [\[Paper\]](#)
 - Co-developed a graph-based visual-kinematic fusion pipeline (SVO + factor graphs) and collected an open-source visual-inertial-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-based positioning module integrating IMU, UWB, pressure, and compass sensors, with a UDP-enabled web GUI for programming, calibration, and data visualization.
- Embedded System Development for Kamal-OL-Molk Painter Robot [\[Github\]](#)
 - ESP32 based wireless embedded system using Altium for Kamal-OL-Molk 3DoF cable planer 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)*, [\[PDF\]](#).
- R. Heidari, E. A. Khameneh, A. Rastaghi, **M. R. Dindarloo**, M. M. N. Ardakani, M. J. Ahmadi, M. Mohammadzadeh, H. Riazi-Esfahani, A. Lashay, M. Motaharifar, Seyed-Farzad Mohammadi, Mahdi Tavakoli, and Hamid D. Taghirad, “Evaluating force and motion in posterior vitreous detachment manoeuvres using a robotic data acquisition system in cadaveric human eyes,” *Scientific Reports (2025)*, [\[PDF\]](#).
- M. M. N. Ardakani, K. A. Jafari, A. Hassani, A. Khorasani, **M. R. Dindarloo**, R. Heidari, M. Hassanpour, A. Hamzenava, H. Riazi-Esfahani, S. F. Mohammadi, M. Tavakoli, and H. D. Taghirad, “Mechatronics Design and Preclinical Evaluation of ARASH ASiST: ARAS Haptic System for Eye Surgery Training,” *IEEE Transactions on Medical Robotics and Bionics (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

- | | |
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| • Medical Robotics Engineer at Farabi Eye Hospital , Tehran University of Medical Sciences | 2019-2025 |
| – Developing eye surgery training systems in collaboration with eye surgeons | Part-time |
| • Robotics Engineer at ARASRobot , K. N. Toosi University of Technology | 2020-2025 |
| – Designing control and electrical systems and algorithms for robotic platforms | Full-time |

TEACHING EXPERIENCES

- **Nonlinear Control System, Linear Control System, Industrial Control System, Robotics, Signals and Systems** – Instructor: Prof. Hamid D. Taghirad [\[Scholar\]](#)

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.
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- **Prof. Mohan Sridharan**
Professor, Chair in Robot Systems, University of Edinburgh (UK), CDT-D2AIR Manager.
Email: m.sridharan@ed.ac.uk
- **Prof. Philippe Cardou**
Professor, Robotics Laboratory, Department of Mechanical Engineering, Laval University, Québec, Canada.
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