

# Nima Maghooli

Robotician and Intelligent Control System Design Engineer at Sina Robotics and Medical Innovators Co., Ltd  
Graduate Research Assistant at Advanced Robotics and Automated Systems (ARAS) | Hi-Tech Robotic Solutions

## AFFILIATIONS AND CONTACT INFORMATION

**Academic Affiliation:** Advanced Robotics and Automated Systems

**Industrial Affiliation:** Sina Robotics and Medical Innovators Co., Ltd



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## EDUCATION

- **M.Sc. in Mechanical Engineering (Dynamics and Control),** Sep 2020 - Sep 2023  
[K. N. Toosi University of Technology](#) Tehran, Iran
  - Thesis title: Intelligent Control System Design with Implementation for Tendon-Driven Continuum Robots (TDCRs) using Vision-Based Deep Reinforcement Learning [[Demo](#)],
  - Seminar title: Learning-Based Modeling and Control for Soft Robotic Systems,
  - GPA: 18.87 (out of 20), Rank: 1<sup>st</sup>,
  - Supervisor: [Prof. S. Ali A. Moosavian](#).
- **B.Sc. in Mechanical Engineering,** Sep 2015 - Sep 2020  
[University of Tehran](#) Tehran, Iran
  - Internship: Mapna Turbine Engineering and Manufacturing Company ([TUGA](#)),
  - GPA: 15.24 (out of 20), GPA for the last two semesters (43 units): 17.78 (out of 20),
  - Supervisor: [Dr. Tara Farizeh](#).

## WORK EXPERIENCE

- **Robotician and Intelligent Control System Design Engineer,** Feb 2024 - Present  
[Sina Robotics and Medical Innovators Co., Ltd](#) Tehran, Iran
  - 1<sup>st</sup> Project: Deriving Kinematics, Jacobian, and Dynamics Analytical Models with respect to Remote Center of Motion (RCM) for Hybrid Serial-Parallel Robotic Telesurgery System. [[Link](#)]
  - 2<sup>nd</sup> Project: Design and Implementation of Adaptive-IDC Control System for Master-Slave Robotic Telesurgery System for Minimally Invasive Surgery Applications. [In Progress]

## RESEARCH AND TEACHING EXPERIENCE

- **Graduate Research Assistant (Advanced Robotics and Automated Systems)**
  - Learning-based Control System Design for Continuum, Serial and Parallel Robots (Sep 2021 - Present)
- **Graduate Teaching Assistant (K. N. Toosi University of Technology)**
  - Advanced Robotics, Instructor: Prof. S. Ali A. Moosavian (Spring 2022, Spring 2023)  
*Kinematics, Dynamics, Planning, Position Control, Force & Impedance Control*
  - Advanced Dynamics, Instructor: Prof. S. Ali A. Moosavian (Fall 2021, Fall 2022)  
*Classical Dynamics, Motion of Celestial Bodies, Analytical Dynamics, Stability Analysis*
- **Teaching Assistant (Scientific Association of Mechanical Engineering, University of Tehran)**
  - MATLAB-Simulink Workshop (Jun 2020)  
*Control System Design and Optimization for Linear & Nonlinear Dynamic Systems*

## RESEARCH INTERESTS

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- Haptic Master-Slave Robotic Systems
- Medical Robotics and Robotic Surgery
- Robot Learning and Learning-Based Control
- Data-Driven and Intelligent Control Systems
- System Identification and Parameters Estimation
- Sim-to-Real Transfer in Deep Reinforcement Learning

## PUBLICATIONS

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- **N. Maghooli**, F. S. Tabatabaee-Nasab, and S. Ali A. Moosavian, “Self-Tuning Robust Tracking Control for Autonomous Underwater Vehicles,” 2022 10th RSI International Conference on Robotics and Mechatronics (ICRoM), Tehran, Iran, 2022, pp. 279-284, doi: 10.1109/ICRoM57054.2022.10025058. [[Published Paper](#)]
- **N. Maghooli**, O. Mahdizadeh and S. A. A. Moosavian, ”Intelligent Model-Free Control for Tendon-Driven Continuum Robotic Arms,” 2023 11th RSI International Conference on Robotics and Mechatronics (ICRoM), Tehran, Iran, 2023, pp. 606-613, doi: 10.1109/ICRoM60803.2023.10412410. [[Published Paper](#)]
- **N. Maghooli**, O. Mahdizadeh, M. Bajelani, and S. Ali A. Moosavian, “Adjusted MTJ Control Strategy using Deep Reinforcement Learning for Tendon-Driven Continuum Manipulators”, [[Submitted Paper](#)]
- **N. Maghooli**, O. Mahdizadeh, and S. Ali A. Moosavian, “Adaptive Shape Control for Continuum Robotic Arms based on Distinct Force Distribution Strategy”, [In Progress]

## SKILLS SUMMARY

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- **CAE:** MATLAB-Simulink (Advanced), ADAMS (Intermediate), ROS 2 (Basic)
- **CAD and CAM:** CATIA (Advanced), L<sup>A</sup>T<sub>E</sub>X (Intermediate), Prezi (Basic)
- **Programming Languages:** TwinCAT (Intermediate), Python (Intermediate), C/C++ (Basic)
- **Languages:** Persian (Native), English (Fluent) [The IELTS exam has been booked for May 2024.]

## HONORS AND AWARDS

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- **Rank in M.Sc.**
  - 1<sup>st</sup> out of 50 students of Mechanical Engineering (Dynamics and Control), K. N. Toosi University of Technology, 2023.

## COURSES

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- Advanced Robotics (19.5/20)
- Reinforcement Learning (20/20)
- Artificial Intelligence & Expert Systems (20/20)
- Automatic Control (19.1/20)
- Advanced Engineering Mathematics (20/20)
- Fuzzy Logic & Neuro-Fuzzy Control (Audited)
- Nonlinear Control (19/20)
- Advanced Control Systems (18.5/20)
- Advanced Dynamics (18.5/20)
- Robotics (18.5/20)
- Computer-Aided Design (17/20)
- System Identification (Audited)

## ACADEMIC PROJECTS

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- **3-RRS Parallel Robot Modeling and Learning-Based Control** [[Link](#)]
  - Research Project, Supervisor: [Prof. S. Ali A. Moosavian](#) Spring 2024  
*Deep Reinforcement Learning Application for 3-RRS Parallel Robot Real-Time Control and Sim-to-Real Transfer*

- **Dynamics Modeling, Planning and Control for 5-DoF Rail-Mounted Industrial Robot** [[Link](#)]
  - Advanced Robotics, Instructor: [Prof. S. Ali A. Moosavian](#) Spring 2021  
*Analytical Modeling (Forward & Inverse Kinematics, Jacobian, and Dynamics Model), Path Planning, Control System Design for Trajectory Tracking (PID, IDC, TJ, MTJ, SMC, MRAC), and Force Interaction with Environment (IC, OIC, MIC)*
- **Performance Comparison of FLC & PID Controllers for 3R Spatial Robotic Arm** [[Link](#)]
  - Artificial Intelligence & Expert Systems, Instructor: [Dr. Esmail Najafi](#) Spring 2022  
*Coding GA-PSO Hybrid Evolutionary Algorithm for finding the Optimal Gains for PID Controller, and Optimal Membership Functions Parameters and Rule-Base for Fuzzy Logic Controller*
- **Agent Navigation in Discrete Environments by Reinforcement Learning Algorithms** [[Link](#)]
  - Reinforcement Learning, Instructor: [Dr. S. Hossein Khasteh](#) Spring 2022  
*Implementation of Dynamic Programming, Monte Carlo, and Temporal Difference (Q-Learning & SARSA) Algorithms for the Agent Navigation in Discrete Environments*
- **Data-Driven Modeling for Tendon-Driven Continuum Robot as a MIMO System** [[Link](#)]
  - System Identification, Instructor: [Dr. Mahdi Aliyari-Shoorehdeli](#) (Audited Course) Fall 2021  
*Dynamics Modeling for TDCR using Linear & Nonlinear Identification techniques for MIMO Systems, such as ARX, ARMAX, OE, BJ, NARX, ANFIS, and MLP Neural Network*
- **Design and Optimization of Fuzzy Logic Controller for Tendon-Driven Continuum Robot** [[Link](#)]
  - Fuzzy Logic & Neuro-Fuzzy Control, Instructor: [Prof. Ali Ghaffari](#) (Audited Course) Fall 2021  
*Optimization of Membership Functions Parameters and Rule-Base for FLC by GA-PSO Algorithm and Replacing the Designed Controller with Adaptive Neuro-Fuzzy Inference System (ANFIS) for Computational Cost Reduction*
- **PID Controller Design for Ball & Beam System Actuated by the Servo-Motor** [[Link](#)]
  - Automatic Control, Instructor: [Dr. Tara Farizeh](#) Fall 2019  
*Control System Design, Gain Tuning, and Optimization by MATLAB-Simulink Toolboxes*
- **Analytical Kinematics & Dynamics Modeling and Verification** [[Link](#)]
  - Robotics, Instructor: [Dr. Kambiz Ghaemi Osgouie](#) Spring 2020  
*Analysis and Sketching of the PUMA-560 Manipulator (6-DoF) by CATIA and MATLAB*

## VOLUNTEER AND EXECUTIVE EXPERIENCE

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- **Member of Conference Organising Committee** May 2017
  - The Conference of Future of Electric Vehicles, Challenges and Opportunities, Department of Mechanical Engineering, University of Tehran. [[Link](#)]

## REFERENCES

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- [Prof. S. Ali A. Moosavian](#) [Professor]  
 Department of Mechanical Engineering,  
 K. N. Toosi University of Technology,  
 Email: [moosavian@kntu.ac.ir](mailto:moosavian@kntu.ac.ir)
- [Prof. Mansour N. Bahrami](#) [Retired Professor]  
 Department of Mechanical Engineering,  
 University of Tehran,  
 Email: [mbahrami@ut.ac.ir](mailto:mbahrami@ut.ac.ir)
- [Dr. Tara Farizeh](#) [Assistant Professor]  
 Department of Mechanical Engineering,  
 University of Tehran,  
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- [Dr. Rahele Rostamian](#) [University Lecturer]  
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