

Resume
Hamid D. Taghirad
Associate Professor



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- Education:**
- Ph.D. in Electrical Engineering** 1997
[McGill University](#), Montreal. Supervisors: Prof. P. Belanger and Prof. G. Zames
Thesis title: Robust torque control of harmonic drive systems, GPA 4/4.
 - M.Eng. in Mechanical Engineering** 1993
McGill University, Montreal. Thesis title: Analysis, design,
Thesis title: Implementation and control of a hopping robot, GPA 4/4.
 - B. Eng in Mechanical Engineering** 1989
[Sharif University](#) of Technology, Tehran, Iran.
The second-best student (2/45) in the department, GPA 3.75/4.

Research Experience:

Industrial Contracts @ Advanced Robotics and Automated Systems (ARAS)

- Design and implementation of a 4DOF piston-casting industrial robot ([D&A 101](#)). Grant 22 K\$
- Design and implementation of an automatic radial welding robot for pipes ([D&A 110](#)). Grant 150K\$
- Design of climbing robot for automatic washing of road lights ([D&A 120](#)). Grant 25 K\$
- Design and implementation of an automatic casting machine ([D&A 201](#)). Grant 320K\$
- Design and implementation of a semi-automatic light guided assembly table for electronic boards. ([D&A 301](#)) Grant 110K\$
- Design and implementation of an automated quality control system for piston pins ([D&A 310](#)); Grant 205K\$ including ultrasonic, Eddy current flaw detection units and dimension testing with sub-micron accuracy.
- Development of Statistical Process Control (SPC) software ([D&A 320](#)). Grant 75 K\$
- Design and implementation of an automatic robotic cell: ([D&A 401](#)); Grant 115K\$ including a 4DOF servo robot, a 5DOF robot, an indexing table and a quality control unit.
- Analysis and design of Nekka Power Plant control logic ([D&A 410](#)). Grant 138K\$

Current Projects @ Robotics Lab, K. N. Toosi U. of Tech.

- [Cable Driven Redundant Parallel Manipulator](#) 2005-Current
Analysis, Design and implementation of 6DOF over-constrained cable robot for extra precision 3D Laser Cutting
- [Adaptive Robust Control of Hard Disk Drives](#) 2003-Current
Design of extra precise ARC controllers for single- and dual-stage HDD
- [Mobile Robotics](#) 2006-Current
Analysis and Design of autonomous mobile robots for unstructured environments, by performing SLAM, Fast SLAM, 3D mapping, visual navigation.
- [Visual Servoing](#) 2007-Current
Development of vision guided robots based on EKF pose estimation routines.
- [Telerobotics](#) 2008-Current
Development of high-fidelity force feedback master-slave telerobots, using a 6DOF Haptic device and a 3DOF flexible link robot teleoperated via internet.

Other Projects @ Robotics Lab, K. N. Toosi U. of Tech.

- [Flexible Joint Robots](#) 1993-2007
Design and implementation of composite H_{∞} , composite QFT, Nonlinear H_{∞} , and supervisory control schemes on FJR to avoid actuator saturation.
- [High Precision Parallel Shoulder Manipulator](#) 2001-2006
This mechanism is designed based on biological structure of human shoulder, and is a 3 DOF redundant parallel manipulator. Kinematics analysis and controller synthesis is implemented on this manipulator.
- [Cybernetics Robotics](#) 2003-2008
Modeling and Control of artificial arm prosthesis based on acquired and classified neuro-cybernetic signals (EMG).
- [Intelligent Pigs](#) 2001-2003
Analysis of MFL and UT methods used in Pipeline Inspection Gauges (PIG).

Robotics Lab, Center for Intelligent Machines (CIM), McGill. 1993-1997
Implementation of robust H_∞ torque control of harmonic drive systems through intelligent built-in torque sensor developed for harmonic drives.

International Submarine Engineering Ltd, BC, Canada 1995-1996
Subcontract job to STEAR project; modeling, parameter identification and robust torque control of a robot joint actuated with harmonic drive.

Ambulatory Robotics Lab, [CIM](#), McGill 1991-1993
Design and implementation of an under-actuated one-legged hopping robot and developing stabilizing control strategies implemented on the robot.

Teaching Experience:

Undergraduate Courses: 1997-current
Signals and systems, linear control, modern control, industrial control, instrumentations, digital control, nonlinear control at K.N. Toosi U. of Tech, control engineering at McGill University (1996).

Graduate Courses: 1997-current
Nonlinear control, robust H_∞ control, robotics, parallel robotics, linear system theory, digital control, advanced industrial control, advanced dynamics at K.N. Toosi U. of Tech, Robotics at McGill University (2005).

Supervising Experience:

6 Ph.D. Students: 2000-current

37 M.Sc. students graduated 1997-current

48 B.Sc. students graduated 1997-current

Conference Tutorials:

Mobile Robot design as a Mechatronic Product, ICCE'08, Tehran 2008

Mechatronic design of a dual stage hard disk drive, ICME'06, Tehran 2006

Analysis and design of H_∞ and QFT control, ICEE'98, Tehran 1998

Robot evolution, the development of Antrobotics, Zahedan, Iran 1997

H_∞ control in practice; McGill University, Montreal 1995

Occupations:

[Iranian Society of Mechatronics](#), Tehran, Vice President 2007-current

[K.N. Toosi U. of Tech](#), Tehran, Director of the [Office of International Scientific Cooperation \(OISC\)](#) 2007-current

[McGill University](#), [Center for Intelligent Machines](#), Montreal, Visiting Professor 2005-2006

[Iranian Society of Mechatronics](#), Tehran, Member of the board 2004-current

K.N. Toosi U. of Tech, Tehran, Director of the Department of Systems and Control 2003-2005

K.N. Toosi U. of Tech, Tehran, Associate Professor. 2005-current

K.N. Toosi U. of Tech, Tehran, Assistant Professor. 1997-2005

K.N. Toosi U. of Tech, Tehran, Faculty of ECE, Dean of Research. 1999-2001

K.N. Toosi U. of Tech, Tehran, Faculty of ECE, Computer Center Manager 1998-2001

K.N. Toosi U. of Tech, Tehran, Faculty of ECE, Head of [Industrial Control Lab](#) 1997- current

K.N. Toosi U. of Tech, Tehran, Faculty of ECE, Head of [Robotics Lab](#) 2001- current

[Advanced Robotics and Automated Systems \(ARAS\)](#), Head of Electrical Engineering Dept. 1997- current

Pargasiran Co. LTD, Tehran, Mechanical engineer researcher. 1990-1991

Dept. of Ports and Shipping, Tehran, Mechanical engineer. 1991

Sharif University Research Center, Tehran, control engineer. 1986-1989

Awards:

Quebec Merit Fellowship 2005

Best University Professor Prize 2002

Best University Researcher Prize 2001

J.C. McConnell Memorial McGill Major Fellowship 1995-97

The most prestigious award offered only to top 5% of the students in each department; for 3 years.

David Stewart Memorial McGill Major Fellowship, one year 1993

John Bonsal Porter Graduate Scholarship 1992

Faculty of Graduate Studies, McGill University, Four tuition fee waivers. 1992-94

Ministry of Culture and Higher Education Scholarship 1991

The third-best/600 student in the competitive examination for continuing education abroad; six-year scholarship toward Ph.D. studies.

Publications:

3 books, 20 Journal papers, and 94 Conference papers.

Full publications available @ <http://saba.kntu.ac.ir/eecd/aras/publications.htm>

Books:

1. H.D. Taghirad, *An Introduction to Automation an Industrial Process Control*, K.N. Toosi University of Technology Publication, 2002 (In Persian).
2. H.D. Taghirad, *An Introduction to Modern Control*, K.N. Toosi University of Technology Publication, 2004 (In Persian).
3. H.D. Taghirad, *An Introduction to Automation an Industrial Process Control, with Presentation of Siemens Step7 PLC, 2nd Edition*, K.N. Toosi University of Technology Publication, 2009 (In Persian).

Selected Journal Papers:

1. S. Ozgoli and H.D. Taghirad, *Fuzzy error governor: A practical approach to counter actuator saturation on flexible joint robots*, *Mechatronics*, 19 (2009) 993–1002.
2. H. Taghirad and M. Nahon, *Dynamic Analysis of A Macro-Micro Redundantly Actuated Parallel Manipulator*, *Advanced Robotics*, Vol. 22 No. 3, pp 949–981, Sept. 2008.
3. H.D. Taghirad and E. Jamei, *Robust Performance Verification of IDCARC Controller for Hard Disk Drives*, *IEEE Transactions on Industrial Electronics*, Vol. 55, No. 1, pp 448-456, Jan. 2008.
4. S. Ozgoli and H.D. Taghirad, *A Survey on the Control of Flexible Joint Robots*, *Asian Journal of Control*, Vol. 8, No. 4, pp. 1-15, December 2006.
5. H. Sadjadian and H.D. Taghirad, *Kinematic, Singularity and stiffness analysis of the hydraulic shoulder: a 3-dof redundant parallel manipulator*, *Advanced Robotics*, Vol. 20, No. 7, pp. 763–781, 2006.
6. H.D. Taghirad and M.A. Khosravi, *Robust stability analysis of composite controller synthesis for flexible joint robots*, *Advanced Robotics*, RSJ, Vol 20, No. 2, pp 181-211, Feb. 2006.
7. M. Tavakoli, H. D. Taghirad and M Abrishamchian, *Identification of a Rotational/Translational Actuator for Model-based and Robust H_∞ Controls*, *International Journal of Control, Automation, and Systems*, 3(3) pp 387-396, Sept. 2005.
8. H.D. Taghirad and P.R. Belanger, *H_∞ -based robust torque control of harmonic drive systems*, *Journal of Dynamic Systems, Measurements, and Control*, ASME Pub., 123(3) pp 338-345, Sept. 2001
9. H.D. Taghirad and P.R. Belanger, *Intelligent built-in torque sensor of harmonic drive systems*, *IEEE Transactions on Instrumentation and Measurements*, Vol. 48, No. 6, pp 1201-1207, Dec 1999.
10. H.D. Taghirad and P.R. Belanger, *Modeling and parameter identification of harmonic drive systems*, *Journal of Dynamic Systems, Measurements, and Control*, Vol. 120, No. 4, pp 439-444, ASME Pub., Dec. 1998.

Selected Conference Publications:

1. Hossein Beikzadeh, Hamid D. Taghirad, *Robust H_∞ Filtering for Nonlinear Uncertain Systems Using State-Dependent Riccati Equation Technique*, in the proceedings of IEEE CDC 09, Shanghai, China, Dec. 2009.
2. Azadeh Zarif Loloie, Mohamad M. Aref, and Hamid D. Taghirad, *Wrench Feasible Workspace Analysis of Cable-Driven Parallel Manipulators Using LMI Approach*, in the proceedings of IEEE/ASME AIM 09, Singapore, 2009.
3. A. R. Norouzzadeh Ravari, H. D. Taghirad, A. H. Tamjidi, *Vision-Based Fuzzy Navigation of Mobile Robots in Grassland Environments*, in the proceedings of IEEE/ASME AIM 09, Singapore, 2009.
4. Y. Babazadeh, H. D. Taghirad and M. M. Aref, *Dynamics Analysis of a Redundant Parallel Manipulator Driven by Elastic Cables*, in the proceedings of the IEEE 10th International Conference on Control, Automation, Robotics & Vision, ICARCV 2008, Dec. 2008, Hanoi, Vietnam.
5. A. A. Aghamohammadi, A. H. Tamjidi, H. D. Taghirad, *LSLAM: SLAM Based on the LRF Information As the Only Data Source*, in the proceedings of 17th IFAC World Congress, Korea, July 2008.
6. H. Taghirad and P. Sheykholeslam, *Adaptive Robust Controller Design for Dual-Stage Hard Disk Drives*, In the proceedings of the IEEE conference on Advanced Intelligent Mechatronics, Zurich, Switzerland, Sept 2007.
7. H. Taghirad and M. Nahon, *Dynamic Analysis of A Redundantly Actuated Parallel Manipulator: A Virtual Work Approach*, Accepted for publication in 15th Int. Iranian Conference on Electrical Engineering, May 2007, Tehran.
8. H. Sadjadian and H.D. Taghirad, *Impedance Control of the Hydraulic Shoulder: A 3-DOF Parallel Manipulator*, *IEEE International Conference on Robotics and Biomimetics*, pp 526-531, China, Dec. 2006.
9. H. Sadjadian and H.D. Taghirad, *Kinematic and Singularity Analysis of the Hydraulic Shoulder: A 3-DOF Redundant Parallel Manipulator*, *The International Conference on Informatics in Control, Automation and Robotics*, pp 125-131, Barcelona, Spain, Sept. 2005.
10. H.D. Taghirad and M. Shaterian, *Nonlinear H_∞ Controller Design for Flexible Joint Robots*, *IEEE Conference on Control Application*, pp 1391-1396, Toronto, Canada, Sept. 2005.