

ALIREZA GHAFKHAH

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Education:

- **Ph.D. Candidate** (Started: January 2008), University of New Mexico, Albuquerque, NM, USA.
GPA (so far): 4.22/4.00.
- **Master of Science in Electrical Engineering**, Sharif University of Tech., Tehran, Iran, July 2007.
Thesis: Decentralized Control of Cooperative Multi-Manipulator Systems.
GPA: 17.3/20.
- **Bachelor of Science in Electrical Engineering**, Sharif University of Tech., Tehran, Iran, July 2005.
Thesis: Design and Development of the Sharif CEDRA Humanoid Robot (Hardware, Software and Control).
GPA: 17.00/20.

Research Interests:

- **Control Systems and Robotics:** Nonlinear Control, Dynamical Systems, Distributed Robotic Networks, Motion Planning of Multi-Robotic Systems, Wireless Communication and Communication-Aware Motion Planning, Estimation Theory and Stochastic Control, Robust Control.
- **Industrial Automation:** Hardware and Software Design of Real-time Control and Robotic Systems, Embedded Systems, DSP Design, PC-based Automation Systems.

Research Projects:

- **Developing Communication-Aware Motion Planning Strategies for Robotic Networks (Part of the MAST CTA Multi-University Project)**, Cooperative Network Lab, Department of Electrical and Computer Engineering, University of New Mexico, Albuquerque, NM, USA, January 2008 - present.
- **Developing an Object Oriented Simulation Software for Control of Multi-Manipulator Robotic System under Windows**, Intelligent Systems Lab, Department of Electrical Engineering, Sharif University of Tech., Tehran, Iran, December 2005 - May 2007.
- **Hardware and Software Design of the Sharif CEDRA Humanoid Robot**, Center of Excellence, Design, Robotics and Automation, Sharif University of Tech., Tehran, Iran, April 2002 - July 2005.
- **Developing the Image Processing Unit of the Sharif CEDRA Humanoid Robot on a Pocket PC under Windows CE.Net**, Center of Excellence, Design, Robotics and Automation, Sharif University of Tech., Tehran, Iran, April 2005 - July 2005.
- **Designing and Developing a Real-time Microcontroller-based Servo Mechanism for Real-time Control of 18 Servomotors**, Center of Excellence, Design, Robotics and Automation, Sharif University of Tech., Tehran, Iran, April 2005 - July 2005.
- **Designing and Developing a Real-time PC-based Servo Mechanism for Controlling High DOF Robotic Systems (up to 24 DOF)**, Center of Excellence, Design, Robotics and Automation, Sharif University of Tech., Tehran, Iran, September 2004 - March 2005.
NOTE: The system consists of a PC-104 biscuit PC and 2 cards (designed for PC-104 bus). The selected OS is Redhat Linux 7.3 with RTLinux patch.
- **Developing The Stereo Vision Image Processing Unit of the Sharif Big Size Humanoid Robot under Windows and Linux**, Center of Excellence, Design, Robotics and Automation, Sharif University of Tech., Tehran, Iran, June 2003 - June 2004.
- **Writing a Full Functional Device Driver for a 100 MHz Ultra High Speed PCI A/D Card under Window 2000/XP**, Radar Systems Laboratory, Department of Electrical Engineering, Sharif University of Tech., Tehran, Iran, January 2004 - March 2004.
- **Designing and Developing a Real-time Hardware/Software Platform for Data Acquisition and Control of an Array of 128 Small Furnaces**, Heat Transfer Laboratory, Department of Mechanical Engineering, Sharif University of Tech., Tehran, Iran, February 2004.

- **Designing and Developing a 5-MHz 24-Channel Medium Speed A/D and D/A Card for ISA Bus with Device Driver under Windows and Linux**, Center of Excellence, Design, Robotics and Automation, Sharif University of Tech., Tehran, Iran, September 2003.
- **Designing and Developing an 8-Channel RS232/RS485 PCI card with Device Driver under Windows 2000/XP**, Center of Excellence, Design, Robotics and Automation, Sharif University of Tech., Tehran, Iran, June 2003.

Industrial Experiences:

- **Designing and Developing a Full Functional Microcontroller-based Handheld Vehicle Diagnostic Tool**, Rayan Khodro Engineering Design CO., Tehran, Iran, February 2006 - November 2006.
- **Designing and Developing a Full Functional PC-based OBD-II Vehicle Diagnostic Tool Under Windows XP**, Rayan Khodro Engineering Design CO., Tehran, Iran, May 2005 - January 2006.
Note: The proposed system is capable of scanning and diagnosing a large class of vehicles, such as Citroen Xantia and Xara, VW Golf and Gol, Kia Motors Pride and Rio, Peugeot 206 and 306 and etc.
- **Designing a Multi-functional FPGA-based PCI Interface Card**, Rastafann Engineering design CO., Tehran, Iran, May 2005 - December 2005.

Academic Appointments:

- **Graduate Assistant**, Department of Electrical and Computer Engineering, University of New Mexico, Albuquerque, NM, USA, January 2008 - Present.
- **Laboratory Assistant**, Microprocessors Lab, Department of Electrical Engineering, Sharif University of Tech., Tehran, Iran, October 2006 - May 2007.
- **Guest Lecturer in an Educational Program on Robotics and Automation**, Center of Excellence, Design, Robotics and Automation, Sharif University of Tech., December 2005.

Skills:

- Programming Languages:

- Professional C/C++.
- Professional VC++ and VC++.NET.
- Professional VB and VB.NET.
- Professional .NET framework.
- Professional Borland Delphi.
- Professional GNU C Compiler (gcc) for Linux.
- Professional MATLAB.
- Good Background in Java.
- Professional Web Programming Languages (ASP, ASP.NET, PHP, JavaScript).
- Professional 8085/8086 Assembly Language.
- Professional Pentium Assembly Language.
- Good Background in Hardware Description Languages (VHDL and Verilog).

- Hardware Design:

- Professional MCS51 Microcontrollers (ASM and C).
- Professional AVR Family of Microcontrollers (ASM and C).
- Professional PIC Family of Microcontrollers (ASM and C).
- Good Background in ARM-Based Microcontrollers.
- Good Background in TI TMS320 Series of Digital Signal Processors(C/C++).
- Good Background in Hardware Design with Xilinx and Altera FPGAs and CPLDs.
- Professional Embedded Design.

- Professional PC Interfacing.
- Professional Hardware Design For the Famous Buses of the PCs (PCI, ISA, USB, LPT and COM).
- Good Background in PCB Design.
- **Operating Systems:**
 - Professional Windows.
 - Professional Linux.
 - Good Background in Real-time Operating Systems (RTOS).
- **Robotics and Automation:**
 - Professional Background in Control of Nonlinear Robotic Manipulators.
 - Professional Background in Designing and Developing Hardware/Software Platforms for Mobile Robots.
 - Good Background in Computer Vision and Image Processing.
 - Good Background in Control of Biped Robots and Humanoids.
 - Professional Background in Distributed and Cooperative Multi-Robotic Systems.
 - Professional Background in Sensor Fusion and Sensor Networks.
 - Professional Background in Navigation and Motion Planning of Robotic Networks.
- **Control Systems:**
 - Linear and Nonlinear Control.
 - Dynamical Systems.
 - Optimal Control and Optimization.
 - Robust Control.
 - Adaptive Control.
 - Probability and Stochastic Processes.
 - Stochastic Control and Estimation.
 - Distributed Control.
 - Motion Planning of Multi-Robotic Systems.
 - Intelligent Control (Fuzzy Modeling and Control, Neural Networks, Hybrid Fuzzy Control).
- **Communication Systems:**
 - Digital Communication Systems.
 - Wireless Communications.

Awards:

- **Certificate of Participation and Honor Diploma for Robocup International Competition**, June 27th 2004 - July 3rd 2004, Lisbon, Portugal.
- **Certificate of Participation and Honor Diploma for Robocup International Competition**, July 13th 2005 - July 19th 2005, Osaka, Japan.
- **Silver Medal Winner in National Physics Olympiad**, September 2000, Tehran, Iran.

Publications:

- A. Ghaffarkhah, Y. Mostofi and Chaouki T. Abdallah, "Decentralized Formation Control and Connectivity Maintenance of Multi-Agent Systems using Navigation Functions," submitted, International Conference on Intelligent Robots and Systems (IROS), St. Louis, Missouri, October 2009.
- A. Ghaffarkhah and Y. Mostofi, "Communication-Aware Target Tracking using Navigation Functions Centralized Case," to appear, International Conference on Robot Communication and Coordination (RoboComm), Odense, Denmark, 2009.

- A. Ghaffarkhah and Y. Mostofi, "Communication-Aware Navigation Functions for Robotic Networks," to appear, American Control Conference (ACC), St. Louis, Missouri, June 2009.
- N. Sadati and A. Ghaffarkhah, "Decentralized Impedance Control of Nonredundant Multi-manipulator Systems," International Conference on Networking, Sensing and Control, Sanya, China, Apr. 2008.
- N. Sadati, A. Ghaffarkhah and S. Ostadabbas, "A New Neural Network Based FOPID Controller," International Conference on Networking, Sensing and Control, Sanya, China, Apr. 2008.
- N. Sadati and A. Ghaffarkhah, "Decentralized Position and Force Control of Nonredundant Multi-manipulator Systems," International Conference on Control, Automation and Systems, Seoul, South Korea, Oct. 2007.
- N. Sadati and A. Ghaffarkhah, "POLYFILTER: A New State Estimation Filter for Nonlinear Systems," International Conference on Control, Automation and Systems, Seoul, South Korea, Oct. 2007.
- A. Ghaffarkhah and N. Sadati, "Fuzzy Gain Scheduling of a PID Controller: Designed for a Laboratory Twin Rotor MIMO System," Iranian National Conference of Electrical Engineering, Shiraz, Iran, March 2004.

References:

Available upon request.