

Arman Hajati

CONTACT

INFORMATION

Department of Electrical Engineering and Computer Science
Massachusetts Institute of Technology
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OBJECTIVE

Full-time entry level R&D engineer/scientist in the MEMS/NEMS sensor and transducer field (starting 06/2010).

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA

Ph.D., Electrical Engineering and Computer Science Exp. Graduation: May 2010

- Area: BioEECS/MEMS, Minor: Management
- Advisers: Profs. Sang-Gook Kim, Martin Schmidt, Anantha Chandrakasan
- Thesis: Wide-bandwidth MEMS-scale piezoelectric energy harvester.

University of Tehran, Tehran, Iran

M.Sc., Mechanical Engineering September 2003 to June 2005

- Adviser: Prof. Mansour Nikkhah-Bahrami
- Thesis: Nonlinear system identification using continuous wavelet transform.

University of Tehran, Tehran, Iran

B.Sc., Mechanical Engineering September 1999 to June 2003

- Adviser: Prof. Mansour Nikkhah-Bahrami
- Thesis: Dynamics and control of holonomic omnidirectional mobile robot.

SKILLS

- **Software** *MATLAB, Simulink, ANSYS, LabVIEW, C++, CADENCE, Supreme, SolidWorks*
- **Microfabrication** 3 years of experience at MTL (class 100-1000): Photolithography, thin film deposition, dry and wet etching, wafer dicing, soft lithography, wire-bonding, PZT processing, CNT growth, inkjet printing.
- **Testing and Measurement** SEM, XRD, IV & PV probe stations, ellipsometer, profilometer, electronic testing, laser vibrometer, modal analysis, RF telemetry, data acquisition.
- **Analytical** electro-mechanical system modeling and control, nonlinear dynamics, signal processing, mixed-signal electronics, wavelet analysis, robotics, quantum physics.
- **Language** English (fluent), German (intermediate), French (beginner), Farsi (fluent), Arabic (intermediate)

WORKING

AND

RESEARCH

EXPERIENCE

Micro & Nano Systems Laboratory, MIT, Cambridge MA 02139 September 2006 to Present
Graduate Research Assistant

- Designed, analyzed, fabricated, and tested the world's first wide-bandwidth MEMS-scale piezoelectric energy harvester that can generate up to 0.1mW electric power from 1g acceleration.
 - The novel device provides more than 10x improvement in bandwidth due to its internal nonlinearity.
 - Microfabricated the whole device based on thin-film PZT at MIT Micro Technology Labs (class 100-1000 cleanrooms).
 - Verified the PZT quality using XRD and P-V measurement.
 - Performed the electro-mechanical test to measure the motion and generate electrical charge as a function of frequency using laser vibrometer, electromagnetic shaker, and a charge amplifier.
- Designed the process to fabricate 1D and 2D metallo-dielectric Nano-scale high-temperature (up to 1500C) photonic crystals for TPV applications.
- Analyzed and designed an intravenous thin-film PZT ultrasonic transducer (early stage).

Mechanical Engineering Dept., Tehran University, Tehran, Iran September 2006 to Present

Graduate Research Assistant

- Developed a new method that identifies nonlinear dynamic systems using continuous wavelet based on free vibration and also forced-vibration responses in MATLAB.
- Designed and built omni-directional holonomic mobile robot and control circuit boards .
- Implemented Brain Emotional Learning Based Intelligent Controller for the first time to control a DC motor with backlash as a nonlinear system.
- Leader of the Tehran University's 5-member minesweeper mobile robot team: designed a rough-terrain robot with a novel suspension system (2WD/4WD convertible) and its required electronic PCBs (PWM servo controller, signal-processing and ADC for detection) and implemented a real-time global vision system in MATLAB.
- Developed a novel method to analyze ECG signals and extract features using CWT in MATLAB.
- Analytically solved and numerically simulated (using FFBP ANN) the response of cylindrical bores to excitations from moving loads.

Iran Khodro Co. (biggest car-maker in middle-east), Tehran, Iran Summer 2002, 2005

Summer Intern

- Measured the noise-level in press-shops I and II and suggested passive methods to reduce it by a 20-40dBA to the safe hearing levels.
- Studied of tube and sheet hydro-forming technology and its possible applications for automotive industries in Iran.

Institut für Maschinenwesen, Technische Universität Clausthal, Germany Summer 2004

Summer Intern

- Analyzed the measurement signals in time-frequency domain to extract the quadruple parameters of different types of ball bearings.

AWARDS AND HONORS

- Invited paper by PowerMEMS09 annual special issue in JMM (2010).
- Received IAESTED Scholarship for Research (2004)
- Ranked 8th in Mechanical Engineering Olympiad in Iran (2003)
- ISME Distinguished Researcher in Mechanical Engineering Dept. (2003)
- Received Scholarship of National Iranian Oil Company (1999-2005)
- Ranked 1st in the Intl. Khwarizmi Festival in Iran, "Techno Pump" (1999)
- Leader of Tehran University Robotics Team, Intl. Minesweeper Robot Contest (2002).

PUBLICATIONS

- S.G. Kim, A. Hajati, "Wide-bandwidth MEMS-scale piezoelectric energy harvester", *US Provisional Patent* 61/282,024.
- A. Hajati, S.G. Kim, "Wide-bandwidth MEMS-scale piezoelectric energy harvester", *Journal of Micro-mechanics & Microengineering* (invited).
- A. Hajati, S.G. Kim, "Wide-bandwidth MEMS-scale piezoelectric energy harvester", *PowerMEMS 2009*, #0163.
- A. Hajati, S.G. Kim, "Rectifier-less piezoelectric micro power generator", *Proc. SPIE* Vol 6928.
- M. Nikkhah-Bahrami, A. Hajati, O. Rohani, "Analysis of moving loads on the surface of a cylindrical bore using neural network", *Intl. Symp. on Neural Networks & Soft Computing in Structural Engineering*, Krakow, Poland, 2005.
- A. Hajati, M. Movassat, M. ShariatPanahi, "A neural net-based matching procedure for turbocharged SI engines", *2nd Intl. Conf. ATC.*, Istanbul, Turkey, 2005.
- A. Hajati, M. Nikkhah-Bahrami, "Nonlinear system modal identification using CWT", *1st Intl. Operational Modal Analysis Conf.*, Copenhagen, Denmark, 2005.
- M. Nikkhah-Bahrami, A. Hajati, "Response of an infinite elastic plate to moving load using neural network", *joint ASME/ASCE/SES MC-MAT*, Louisiana, USA, 2005.
- A. Hajati, M. Nikkhah-Bahrami, "Innovative design of a rough terrain nonholonomic mobile robot", *Intl. Conf. on multibody dynamics*, Madrid, Spain, 2005.