

# Mohammad Al Janaideh

Assistant Professor,

Address: Department of Mechatronics Engineering, Faculty of Engineering and Technology,  
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## Research Interests

- Nonlinear control of smart actuators;
- Modeling and compensation of hysteresis of micro/nano-positioning systems;
- Hysteresis models;
- Mechatronics.

## Education

Concordia University, Montreal, Canada.

Department of Mechanical and Industrial Engineering.

Ph.D. Mechanical Engineering (Mechatronics), September 2009.

**Thesis title:** Generalized Prandtl-Ishlinskii Hysteresis Model and its Analytical Inverse for Compensation of Hysteresis in Smart Actuators.

**Supervisors:** Professor Chun-Yi Su and Professor Subhash Rakheja.

Concordia University, Montreal, Canada.

Department of Mechanical and Industrial Engineering.

M.A.Sc., Mechanical Engineering (Mechatronics), January 2005.

**Thesis title:** Hysteresis Modeling and Experimental Verifications of Smart Materials based Piezoceramic Actuators.

**Supervisor:** Professor Chun-Yi Su.

Jordan University of Science and Technology, Jordan.

Department of Mechanical Engineering.

B.Eng., Mechanical Engineering, June 2002.

**Specialization:** Mechatronics.

## Work Experience

- Graduate Research Assistant (2004 – 2009),  
CONCAVE Research Centre, Department of Mechanical and Industrial Engineering, Concordia University.
- Graduate Research Assistant (2003 – 2004),  
Centre for Industrial Control (CIC), Department of Mechanical and Industrial Engineering, Concordia University.
- Graduate Computing Laboratory supervisor (2005 – date),  
CONCAVE Research Centre, Department of Mechanical and Industrial Engineering, Concordia University.

## Teaching Experience

- *Measurement and Instrumentation*,  
Fall 2009, Department of Mechatronics Engineering, University of Jordan.
- *Linear systems*,  
Fall 2009, Department of Mechatronics Engineering, University of Jordan.
- Teaching Assistant (2004 – 2009):
  - Tutorial sessions for undergraduate level courses.
    - Measurements and Instrumentation.
    - Modeling, Simulation and Analysis of Physical Systems.
    - Transform calculus and partial differential equations.
    - Analysis and fundamentals of control systems.
  - Laboratory Instructor (2004 – date):
    - Modeling, Simulation and Analysis of Physical Systems.
    - Industrial Electronics.
    - Mechatronics.
  - Laboratory Developer (2005 – 2008):
    - Mechatronics.
  - Ph.D. Seminar (12-Week Training) in University Teaching (Winter 2007 Semester, Concordia University): Theory of students leaning and motivation, learning and teaching styles and preferences; presentation skills and various teaching technologies; instructional design (course planning and teaching strategies), and lesson planning, critical

thinking, discussion techniques; assessment, ethical issues in teaching and classroom behavior.

- Taught the Main Components of the Course “ENGR 6311, Transform calculus and partial differential equations.” (Fall 2008, Concordia University, jointly with Dr. Chun-Yi Su).

### Professional activities and academic services

- Reviewer of IEEE/ASME Transactions on Mechatronic Systems;
- Reviewer of IEEE Transactions on Control Technology;
- Reviewer of Journal of Smart materials and Structures;
- Reviewer of Journal of Physics D: Applied Physics;
- Reviewer of American Institute of Aeronautics and Astronautics ;
- Reviewer of Physica B;
- Reviewer of Journal of Mechatronics;
- Reviewer of IEEE International Conference on Robotics and Automation;
- Reviewer of American Control Conference;
- Reviewer of IEEE Conference on Decision and Control;
- Reviewer of IEEE International Conference on Robotics and Automation.
- IEEE/ASME International Conference on Advanced Intelligent Mechatronics.

### Awards

- Award for conferences competition-Concordia University;
- Doctoral thesis completion award-Concordia University ;
- Concordia university teaching fellow-Concordia University
- King Hussein scholarship for undergraduate students;
- Best oral paper in automation award in 2009 IEEE International Conference on Automation and Logistics.

### Memberships

- Member, American Society of Mechanical Engineers (ASME).
- Member, Institute of Electrical and Electronics Engineers (IEEE).

## Research Publications

### Articles accepted/submitted for publication in referred journals

- Mohammad Al Janaideh, Chun-Yi Su, and Subhash Rakheja, "Development of the rate-dependent Prandtl-Ishlinskii model for smart actuators", *Smart Materials and Structures*, 17(3), pp. 1-11, 2008.
- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, "Modeling rate dependent symmetric and asymmetric hysteresis loops of smart actuators", *International Journal of Advanced Mechatronic Systems*, 1(1), pp. 32 - 43, 2008
- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, "Experimental characterization and modeling of rate-dependent hysteresis of a piezoceramic actuator", *Journal of Mechatronics*, 19 (5), pp. 656-670, 2009.
- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, "A generalized Prandtl-Ishlinskii model for characterizing hysteresis nonlinearities of smart actuators", *Smart Materials and Structures*, 18 (4), pp.1-9, 2009.
- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, "Modeling and compensation of hysteresis nonlinearities in smart actuators for micro/nanopositioning with generalized Prandtl-Ishlinskii representation", *IEEE/ASME Transactions on Mechatronic systems*, 15(4), 2010.
- Mohammad Al Janaideh, Chun-Yi Su, and Subhash Rakheja, "Modeling and compensation of hysteresis nonlinearities in smart actuators for micro/nanopositioning with generalized Prandtl-Ishlinskii representation", in final stages for submission for *IEEE/ASME Transactions on Engineering Science and Automation*.
- Mohammad Al Janaideh, Chun-Yi Su, and Subhash Rakheja, "Analytical error of the inversion compensation of Prandtl-Ishlinskii operator", in final stages for submission for *IEEE Transactions on Automatic Control*.

### Articles published in refereed conferences proceedings

- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, "Compensation of Rate Dependent Hysteresis Nonlinearities in a Piezo Micro-Positioning Stage", accepted for publication in *the proceedings of the 2010 IEEE International Conference on Robotics and Automation*, Anchorage, Alaska, USA, May 2010.
- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, "Compensation of Symmetric and Asymmetric Hysteresis Nonlinearities in Smart Actuators with a Generalized Prandtl-Ishlinskii Presentation, submitted for publication in *the 2010 IEEE/ASME International Conference on Advanced Intelligent Mechatronics*, Montreal, Québec Canada, June 2010.
- Mohammad Al Janaideh, Ying Feng, Subhash Rakheja, Yonghong Tan, and Chun-Yi Su, "Generalized Prandtl-Ishlinskii Hysteresis: Modeling and Robust Control", *In the proceedings of 48th IEEE Conference on Decision and Control*, Shanghai, China, pp. 7279- 7284, 2009.

- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, “Generalized Prandtl-Ishlinskii hysteresis model: hysteresis modeling and inverse construction for compensation in smart actuators”, *In the proceedings of 47th IEEE Conference on Decision and Control*, Cancun, Mexico, pp. 5182 – 5187, 2008.
- Mohammad Al Janaideh, Ying Feng, Subhash Rakheja, and Chun-Yi Su, and Camille Alain Rabbath, “Control of smart actuators with hysteresis compensation using inverse generalized Prandtl-Ishlinskii model”, *In the proceedings of the 2009 American Control Conference*, St Louis (Missouri), USA, pp. 307-313, 2009.
- Mohammad Al Janaideh, Chun-Yi Su, and Subhash Rakheja, “Inverse generalized asymmetric Prandtl-Ishlinskii model for compensation of hysteresis nonlinearities in smart actuators”, *In the proceedings of the 2009 IEEE International Conference on Networking, Sensing and Control*, Okayama, Japan, pp. 834 – 839, 2009.
- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, “Compensation of hysteresis nonlinearities in smart actuators”, *In the proceedings of 2008 ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems*, pp. 454-462, Eliicott City (MD), USA, 2008.
- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, “Modeling and compensation of hysteresis nonlinearities of a piezoceramic actuator”, *In the proceedings of the 11th Cansmart Meeting–International Workshop on Smart Materials and Structures*, Montreal, Canada, pp. 121-129, 2008.
- Mohammad Al Janaideh, Chun-Yi Su, and Subhash Rakheja, “Development of rate independent Prandtl-Ishlinskii model for characterizing asymmetric hysteresis nonlinearities of SMA actuators”, *In the proceedings of the 2008 IEEE/ASME Advanced Intelligent Mechatronics Conference*, Xi’an, China, pp. 477– 481, 2008.
- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, “A generalized rate dependent play operator for characterizing asymmetric and symmetric hysteresis nonlinearities”, *In the proceedings of the 2008 American Control Conference*, Seattle, Washington, USA, pp. 1911–1916, 2008.
- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, “A generalized asymmetric Prandtl-Ishlinskii model for characterizing hysteresis nonlinearities”, *In the proceedings of the 2008 Earth & Space Conference-Intelligent Sensors and Actuators Symposium*, Long Beach, California, USA, pp. 312–320, 2008.
- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, “A generalized Prandtl-Ishlinskii model for characterizing rate dependent hysteresis”, *In the proceedings of the 22nd IEEE International Conference on Control Applications*, Singapore, pp. 343–348, 2007.

- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, “Characterization of rate dependent hysteresis of piezoceramic actuators”, *In the proceedings of the IEEE International Conference on Mechatronics and Automation*, Harbin, China, pp. 550–555, 2007.
- Mohammad Al Janaideh, Subhash Rakheja, and Chun-Yi Su, “Characterization of rate dependent hysteresis”, *In the proceedings of the 2006 IEEE International Conference on Advances in Dynamics, Instrumentation and Control*, Queretaro, Mexico, pp. 66–77, 2006.