

Mohammad I. Al Kilani

**Ph.D., M.Sc., M.Eng., B.Sc.
Mechanical Engineering**

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BIOGRAPHICAL INFORMATION

- Birth Date: **December 2, 1963**
- Birth Place: **Amman, Jordan**
- Nationality: **Jordanian**

SYNOPSIS

An Associate professor at the Mechatronics Engineering Department of the University of Jordan, currently on a Sabbatical leave in the Mechanical Engineering Department of King Faisal University, Saudi Arabia. Holding a Ph.D. degree in Mechanical Engineering (Microelectromechanical Systems, MEMS) from Florida State University, 2002, an M.Eng. degree in Mechanical Engineering (Engineering Design) from Carnegie Mellon University, 1991, an M.Sc. degree in Mechanical Engineering (Computer Integrated Manufacturing Systems) from George Washington University, and a B.Sc. degrees with honor from the University of Jordan. Research interest and contributions are in mechanical design, mechatronics, microfluidics and MEMS.

EDUCATION

- **Ph.D. 2002**, Mechanical Engineering, Florida State University, Tallahassee, Florida USA. Dissertation Title "Development of a surface micromachined spiral-channel viscous pump".
- **M.Eng. 1991**, Mechanical Engineering, Carnegie Mellon University, Pittsburgh, Pennsylvania, USA. M.Eng Project: "Design for Assembly Analysis of Part Features and Interactions".
- **M.S. 1988**, Mechanical Engineering, George Washington University, Washington, D.C. USA. MS Thesis: "Force Control of Robotic Manipulators".
- **B.Eng. 1986**, Mechanical Engineering, University of Jordan, Amman, Jordan.

ADVANCED COURSES INCLUDE:

Continuum Mechanics, Advanced dynamics, Fluid Mechanics, Advanced Control Systems, Microelectromechanical Systems (MEMS), Microsensors and Microactuators, Computational Mechanics, Finite Element Method.

WORK SUMMARY

- **Associate Professor**, Mechanical Engineering Department, King Faisal University – Al-Ahsa, Saudi Arabia, September 2008 – present.
- **Associate Professor**, Mechatronics Engineering Department, University of Jordan, December, 2007 – present.
- **Assistant Professor**, Mechatronics Engineering Department, University of Jordan, February, 2007 – December, 2007.
- **Assistant Professor**, Mechanical Engineering Department, University of Jordan, Amman 11942 Jordan, September, 2002 – February, 2007.
- **Visiting Research Scientist**, Institute of Microtechnology, Braunschweig, Germany, through DFG research scholarship, June, 2005 – August, 2005.
- **Postdoctoral Research Associate**, Microsystems Laboratory, Florida State University, Tallahassee, 32310 Florida, USA. 2002
- **Teaching and Research Assistant**, Microsystems Laboratory, Florida State University, Tallahassee, 32310 Florida, USA. 1998 – 2002
- **Instructor of Mechanical Engineering**, Mechanical Engineering Department, University of Jordan, Amman 11942 Jordan, 1991 - 1998
- **Research Assistant**, Engineering Design and Research Center, Carnegie Mellon University, Pittsburgh 15213 Pennsylvania, USA, 1988 – 1991.

TRAINING COURSES DELIVERED:

More than 15 training courses conducted in Jordan, Saudi Arabia, Dubai and Abu Dhabi under the following titles:

- Control Valves and Actuators
- Control Valves, Actuators and Pumps
- Safety Relief Valves: Operation, Testing and Maintenance
- Pressure Vessel Inspection and Testing

TEACHING EXPERIENCE:

Undergraduate Courses: Control System, Microelectromechanical Systems (MEMS), Engineering Mechanics – Statics, Engineering Mechanics – Dynamics, Theory of Machines, Design of Machine Elements, Design of Industrial Machines, Mechanics of Materials, Computer Aided Design, Engineering Graphics and Descriptive Geometry, Machine Drawing, Vibrations Lab, Strength of Materials Lab, Control Systems Lab.

Graduate Courses: Micotechnology and Nanotechnology, Ph.D. level, Mechanical Engineering Department, The University of Jordan, Microelectromechanical Systems (MEMS), M.Sc. Level, Mechatronics Engineering Program, Jordan University of Science and Technology.

Faculty Supervisor for the following Ph.D. dissertation projects:

- Numerical Simulation of fluid flow in a spiral-channel viscous micropump, Ala'aldeen Al-Halhoul, 2004 – 2007.

Faculty Supervisor for the following M.Sc. thesis projects:

- Numerical Simulation of a micro-fabricated double and triple hot wire, Malik Amayreh, 2005 – 2006.
- Design and simulation an integrated electromagnetic gentle pump, Amjad Sakarneh, 2005 – 2006.

Faculty supervisor for over 20 B.Sc. graduation projects in the areas of mechanical engineering design, mechatronics, pump design and testing, MEMS and CFD.

RESEARCH EXPERIENCE:

Principal Investigator or Co-investigator in the following funded research projects:

	Project Title	Sponsor	Funds (\$)
1	Development of a gentle pump for fluids with stress sensitive microparticles	Arab Science and Technology Foundation	50,000
2	Product design modernization and order management in Petra Engineering Industries	Higher Education Development Project through National Center from Human Resource Development	300,000
3	Numerical simulation of fluid flow in a spiral-channel micropump	Deanship for Scientific Research in the University of Jordan	5,000
4	Development of a CNC sheet metal cutting machine	Higher Council for Science and Technology	7,000
5	Development of an automated filling machine for bulk material	Innovation groups through the Center for Consultation and Training in the University of Jordan	8,000
6	Automation of the HCl production Unit at the Jordan Arab Company for Chemical Industries	Faculty for Factory (FFF) project, Outreach Center for Industrial Consultancy, University of Jordan	5,000
7	Layout alternatives for the refrigeration plant foam injection unit at the Middle East Complex for Engineering Industries	Faculty for Factory (FFF) project, Outreach Center for Industrial Consultancy, University of Jordan	5,000
8	Parametric design of the sheet metal parts of the air handling unit at Petra Engineering	Faculty for Factory (FFF) project, Outreach Center for Industrial Consultancy, University of Jordan	5,000
9	CFD simulation of a butterfly valve for vibration analysis and reduction	Center for Consultation and Strategic Studies, University of Jordan	3,000
10	Development of a multimedia toolkit for engineering graphics education	Deanship for Scientific Research, The University of Jordan	9,000

HONORS, AWARDS AND SCHOLARSHIPS:

- University of Jordan, College of Engineering Dean's Honor List, 1986.
- University of Jordan, Mechanical Engineering First Student Award, 1982, 1983, 1984, 1985, 1986.
- Fulbright Scholarship, 1986 – 1988.
- Carnegie Mellon University, Research Assistantship, 1988 – 1991.
- Florida State University, Research and Teaching Assistantship, 1998 – 2002.
- Jordan Engineering Association Graduation Project Award, 2004

SOCIETY MEMBERSHIPS

- Jordan Engineers Association, 1992
- American Society of Mechanical Engineers, 1998
- Engineering Society of Detroit, 1991

INVITED LECTURES:

- Surface Micromachining Technology, Presented at the First European Summer School in Mechatronics and Microsystems (MecMic '06), Gosslar, Germany, August, 2006.
- Microtechnology and Nanotechnology, Presented in the Scientific Day of Al-Tafeelah Technical University, Al-Tafeelah, Jordan, April 8, 2008.

PUBLICATIONS:

Books and Book Chapters

Essentials of Pro/Engineer, Co-author, Brooks/Cole 2002.

“Drafting and Modeling using AutoCAD” in *Engineering Design Packages (Arabic)* Al-Quds Open University Publications, 1995.

Journal Publications:

Kilani, M. I., Al Salaymeh, A., “Simple analytical expressions for the flow performance of a spiral channel viscous micropump,” *Journal of Fluid Dynamics Research*, online first, 7 March 2007, www.sciencedirect.com

Kilani, M. I., “Triangulation approximation modeling of developable transitions,” *Dirasat*, Vol. 34, No. 1, April 2007.

Kilani, M. I., Al Salaymeh, A. and Halhouli, A. T., “Effect of channel aspect ratio on the flow performance of a spiral channel viscous micropump,” *ASME Journal of Fluid Engineering*, Vol. 128, May 2006. pp. 618 - 627

Kilani, M.I. Haik, Y.S., Jaw, Y. and Chen C.J., “Numerical simulation of flow in a screw-type Blood Pump,” *Journal of Visualization*, Vol. 8, no. 1, 2005. pp. 33-40.

Kilani M.I, Galambos PC, Haik YS, and Chen CJ, “Design and analysis of a surface micromachined spiral-channel viscous pump,” *ASME Journal of Fluid Engineering*, Vol. 125, March 2003. pp. 339-344.

Kilani M. I. and Sturges R. H. “Detection and evaluation of engineering features for computer aided design part models,” *Journal of Engineering Design*, Volume 2, Issue 3, 1991, Pages 231-245

Al-Halhouli A. T., Kilani M. I., Al-Salaymeh A., and Büttgenbach S. (2008). The Spiral Channel Viscous Micropump. *Dirasat*, 35(2), 120-128.

Al-Halhouli S. Demming, M. Feldmann, S. Büttgenbach, M.I. Kilani, A. Al-Salaymeh, “Performance characterization of a miniature spiral-channel viscous pump,” *Sens. Actuators, A. Physical* (2007)

Al-Halhouli, M. I. Kilani & A. Al-Salaymeh, S. Buttgenbach, “Investigation of the influence of design parameters on the flow performance of single and double disk viscous micropumps,” *Microsyst Technol* (2007) 13:677–687

Al-Halhouli, A. T., Al-Salaymeh, A., Kilani, M. I., and Büttgenbach, S., (2006). Numerical investigation of the effect of spiral curvature on the flow field in a spiral-channel viscous micropump,” *Microfluidics Nanofluidics*, online first, Jan. 2007, www.springerlink.com

Al-Halhouli, A., Kilani, M. I., Al-Salaymeh, A. and Büttgenbach, S. “Influence of geometrical design parameters on the flow performance of a spiral channel viscous micropump,” *WSEAS Transactions on Fluid Mechanics*, Issue 6, Volume 1, 2006, pp. 601 – 606.

Zheng P., Haik Y., Kilani M.I. and Chen C.J. “Force and torque characteristics for magnetically driven blood pumps,” *Journal of Magnetism and Magnetic Materials* 241 (2002)292 –302

Sturges R. H, O'Shaughnessy, K., Kilani, M.I., “Computational model for conceptual design based on extended function logic,” *AIEDAM*, v10, n4, Sep, 1996, p 255-274

Sturges R.H and Kilani M.I., “Towards and integrated design for an assembly evaluation and reasoning system,” *Journal of Computer Aided Design*, Vol. 24, No. 2, Feb. 1992.

Conference Proceedings:

Kilani M. I., Al-Halhouli A., Al-Salaymeh A. and Büttgenbach S. "Viscous Micropumps – A Review," International Conference on Bio-Nano Technology, November 18 - 21, 2006, Al Ain, UAE.

Kilani M.I, Galambos PC, Haik YS, and Chen CJ, "The Von Karman Viscous Effect in Surface Micromachined Pumps," 2nd International Conference on Thermal Engineering and its Applications, (ICTEA 2006), January 3-6, 2006, Al-Ain, UAE.

Kilani, M. I., Al Salaymeh, A. and Halhouli, A. T., M. Gad-el-Hak, "Effect of aspect ratio on the performance of spiral-channel viscous micropump," 58th Annual APS Meeting of Fluid Dynamics, DFD05, November 20–22, 2005; Chicago, IL.

Kilani, M. I., "CAD in surface micromachined mechanisms design," Proc. 11th Int. Conf. Machine Des. and Prod. (UMTIK 2004) 13-15 October 2004, Antalya, Turkey.

Kilani M.I., Galambos PC, Haik Y.S., and Chen CJ, "A surface micromachined Von-Karman pump," Proc. Of the 2003 ASME IMECE, November 2003, Washington, D.C., USA.

Kilani M.I., Galambos P.C., Haik Y.S., and Chen CJ, "Surface micromachined spiral-channel viscous pump," in The Nanotechnology Conference and Trade Show, San Francisco, Feb 23-27, 2003 Vol. 1, pp. 210-214

Kilani M.I., Galambos PC, Haik YS, and Chen CJ, "A surface micromachined spiral-channel viscous pump," in 2002 ASME IMECE, November 2002, New Orleans, LA. USA

Kilani M.I., Galambos PC, Haik YS, and Chen CJ, "Electrostatically Actuated Surface Micromachined Offset Planetary Gear Pump Design," Proceedings of the 2001 ASME IMECE, November 2001, New York, NY.

Kilani M.I., Galambos PC, Haik YS, and Chen CJ, "University – National Laboratory Collaboration on MEMS Design Education," Proceedings of the 2001 ASME IMECE, November 2001, New York, NY.

Kilani M.I., Haik YS, Jaw S.Y. and Chen CJ, "Investigation of magnetically driven screw pumps for blood flow applications," Proc. of the 14th ASCE (EM2000), May 2000.

Kilani M.I., Haik Y.S., Jaw S.Y. and Chen C.J., "Numerical simulation of flow in a screw pump," Proc. of the 14th ASCE Engineering Mechanics Conference (EM2000), May 2000.

Kilani M.I., Haik YS, Pai V and Chen CJ, "Rectilinear dynamics of magnetically driven microsystems," *Proc. of the 2nd International Conference on Modeling and Simulation of Microsystems. (MSM 99)*, April 1999.

Kilani M.I. and Dado M.H, "Application of CAD/CAM system in the representation and flat generation of developable surfaces," *Proc. of the 1st Jordanian Mechanical Engineering Conference, June 1997.*

Al-Halhouli, A.T., Kilani, M. I., Amayreh, M., Al-Salaymeh A., and Büttgenbach S., "Parametric Study of Single Disk Viscous Micropump," International Conference on Bio-Nano Technology, November 18 - 21, 2006, Al Ain, UAE.

Al-Halhouli, A., Kilani, M. I., Al-Salaymeh, A. and Büttgenbach, "Numerical Simulations of the Flow Field in a Spiral-Channel Micropump," 2nd International Conference on Thermal Engineering and its Applications, (ICTEA 2006), January 3-6, 2006, Al-Ain, UAE.

Dado, M.H, Abdalla, M.H., and Kilani, M.I., "An Automatic Continuous Filling Machine for Dry Bulk Material: A Case Study in Mechatronics System Design," Accepted for Publication in The 2nd International Conference on Mechatronics (ICOM'05) 10 to 12 May 2005 , Kuala Lumpur, Kuala Lumpur, Malaysia

Haik Y, Hendrix J, Kilani M., Galambos P. and Ching- Jen Chen, "Characterization of Micropumps for Biomedical Applications," Proc. Of the 2004 Nanotechnology Conference and Trade Show, Boston, MA, Volume 1. pp 199 – 200

Chen, C.J., Haik Y.S., Jaw S.Y., Kanuri S., Chatterjee, J, and Kilani, M. I. "Fluid and particle motion in micro systems and biomedical applications," Proceedings of 3ICCHMT3 International Conference on Computational Heat and Mass Transfer, May 26–30, 2003, Banff, Canada

Dado M.H. and Kilani, M. I. "Design and construction of an automated sheet metal cutting machine, *Proc. of the 1st Jordanian Mechanical Engineering Conference, June 1997.*

Talhouni, B and Kilani, M.I, "Integrated CAD/DBase environment for interactive structural design," *Civil-Comp'93*, Part 1: Information Technology for Civil and, p 131. 1993

Sturges, R.H., and Kilani, M.I., "Detection and Evaluation of Orientation Features for CAD Part Models," *Proceedings of the 1992 NSF Design and Manufacturing Systems Conference*. GIT. Jan. 8-10, 1992, NSF Design and Manufacturing Systems Division, Washington DC 20550. pp. 1035-1041

Sturges R.H and Kilani M.I., "A function logic and allocation design environment, " *in Proceedings of the ESD DAC*, 1990.

Reports, user manuals and handouts

Sturges, R.H., O'Shaughnessy, K. and Kilani, M. I, "Representation of aircraft design data for supportability, operability, and producibility evaluations", EDRC Report No. 14513, Carnegie Mellon University Engineering Design Research Center, Pittsburgh, PA., 1990

M. I. Kilani, R. H. Sturges, "Detection and Evaluation of Orientation Features for CAD Part Models," Technical Report EDRC 24-66-91, Carnegie Mellon University Engineering Design Research Center, Pittsburgh, PA., 1991.