

## **Kathryn J. De Laurentis, Ph.D.**

### **A. Contact Information**

Department of Mechanical Engineering  
University of South Florida  
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### **B. Education / Training**

State of New Jersey Entrepreneurial Program; April 2007

Ph.D., Mechanical and Aerospace Engineering; May 2004

Rutgers, The State University of New Jersey, Piscataway, NJ

Dissertation Title: "Development of New Methodologies for the Fabrication and Actuation of Robotic Systems"

Dissertation Director: Constantinos Mavroidis, Ph.D., Professor

M.S., Mechanical and Aerospace Engineering; May 2002

Rutgers, The State University of New Jersey, Piscataway, NJ

Thesis Title: "Design of a Shape Memory Alloy Actuated Robotic Hand"

Thesis Director: Constantinos Mavroidis, Ph.D., Professor

B.S., Mechanical and Aerospace Engineering; May 1999

Rutgers, The State University of New Jersey, Piscataway, NJ

Dean's List: Spring 1998, Fall 1998, Spring 1999, Graduated with High Honors

A.S., Engineering Science & A.S., Chemistry; May 1997

County College of Morris, Randolph, NJ

Joseph H. Smith, Jr. '45 Engineering and Science Medal (RPI)

Member Phi Theta Kappa, Graduated with High Honors

B.A., Psychology; May 1981

Ashland University, Ashland, OH

Minors in Management Information Systems and Business Administration

Graduated Faculty Honors, Cum Laude

### **C. Positions and Honors**

#### **Experience Summary**

- Co-founder and senior partner for the start-up company Fourier Designs, LLC.
- Principal Investigator Phase II SBIR grant – NIDRR.
- Eight years experience in mechanical and electro-mechanical device design, assistive and rehabilitative technologies development, advanced actuation, rapid prototyping, robotics, and mechatronics.
- Twelve years previous experience in various mental health related positions.
- One patent in assistive devices; over 20 publications, 11 presented at national and international conferences. Member Rutgers University, MAE, Industrial Advisory Board.
- Established The Robotics and Mechatronics Laboratory II: Laboratory for the Development of Mechanisms and Robotic Systems Utilizing Smart Material Actuation and Rapid Fabrication, at Rutgers University.
- Outreach activity involvement, aimed at increasing youth interest in engineering and science.

## **Academic / Professional Appointments**

*Research Leader*, University of South Florida; May 2007 - Present

Rehabilitation Robotics Laboratory; Center for Rehabilitation Engineering & Technology

*Co-Founder, Senior Partner*, Fourier Designs, LLC, March 2006 - Present

*Project Lead Engineer*, Nian-Crae, Inc., Oct. 2004 - Nov. 2006

Principal Investigator: Phase II SBIR grant - U.S. Department of Education, National Institute on Disability Rehabilitation Research (NIDRR)

*Part Time Lecturer*, Mechanical & Aerospace Engineering (MAE), Rutgers Univ.; Jan. - May 2005

*AAUW Selected Professions Fellow*, MAE, Rutgers University; July 2003 - June 2004

*National Science Foundation Fellow*, MAE, Rutgers University; Sept. 2000 - Aug. 2003

*Rutgers University Graduate Fellow*, MAE, Rutgers University; Sept. 1999 - Aug. 2000

Center for Computational Design Summer Intern Program Fellow; July - Aug. 1999, 2000

*Research Assistant*, Robotics Laboratory, Rutgers University; Sept. 1997 - Aug. 1999

NASA Space Grant Undergraduate Summer Fellowship (NJSGC); July - Aug. 1998

*AutoCAD Draftsperson*, Engineering Department, TurboSonic Environmental Systems, Parsippany, NJ; 1996 - 1997

*Software Consultant*, Engineering Dept., Independent Enclosures, Wharton, NJ; 1996 - 1997

## **Honors**

Literati Club Award for Excellence - Outstanding Paper for 2005, April 2005

"Rapid Fabrication of a Non-Assembly Robotic Hand with Embedded Components" for the publication Assembly Automation Journal – Mechatronics

Dean's Award for Excellence in Research by a Graduate Student, 2004 – 2005; April 2003

Rutgers, The State University of New Jersey, Graduate School – New Brunswick

Willy Z. Sadeh Award in Space Sciences and Space Engineering; August 2003

American Institute of Aeronautics and Astronautics

National Science Foundation Fellowship; January 2004

Mentioned in the Graduate Education section of the National Science Foundation FY 2004 Budget Request to Congress – exemplifying the accomplishments of NSF Fellows

Third Place ASME Student Mechanism Design Contest, 1998 ASME Design Engineering

Technical Conference, Atlanta, GA. "A New Spherical Joint Actuated by Shape Memory Alloy Artificial Muscles."

## **Committee Membership / Professional Affiliations**

Rutgers University, Department of Mechanical & Aerospace Engineering, Industrial Advisory Board; Machine Elements and Systems Subcommittee – ASME National Mechanisms Committee; American Society of Mechanical Engineers (ASME); Institute of Electrical and Electronics Engineers (IEEE); American Institute of Aeronautics and Astronautics (AIAA); American Association of University Women (AAUW); Florida Alliance for Health, Physical Education, Recreation, Dance and Sport (FAHPERDS)

## **D. Research Activities**

### **Primary Research Interests**

Design, Actuation, and Fabrication of Next-Generation Mechanisms, Robotic Systems, Assistive and Rehabilitation Devices; Robotic Systems for Space Applications; Smart Material Actuation

Schemes; Rapid Prototyping/Manufacturing Methods; Virtual Reality, Haptics, and Animation

### **Projects**

*Robotic Assistive Devices*; Jan. 1998 - Present

Robotic/Prosthetic Wrist; Robotic Hand (biomedical and space applications); Athletic Upper Limb Prosthesis for Youth; Tactile Navigation System for the Visually Impaired; Lower Limb Prosthesis/Orthosis

*Rehabilitation Devices*; Oct. 2004 - Nov. 2006

Hand/Arm Stroke Rehabilitation Mechanical Arm Support Tracker and Computer Guided Motion Feedback System

*Smart Material Actuation*; Sept. 1997 - May 2004

Shape Memory Alloys, Electroactive Polymers

*Rapid Prototyping Mechanism and Robotic System Fabrication*; Jan. 1999 - May 2004

Single-stage, non-assembly robotic systems with inserts

*MRI Compatible Robotic Systems*; April 2003 - May 2004

Robotic Arm, Catheter/Endoscope

*Computational Design and Rapid Prototyping of Robotic Systems*; June - Aug. 2001

### **Visiting Researcher / Postdoctoral / Graduate Assistant Advisees**

E. Veras, S. Carey, R. Swaminathan, P. Schrock, K. Khokar, M. Palankar, D. Lura, R. Berhane; June 2007-Present; M. Winger, N. Kim, T. Morris, Oct. 2004-Nov. 2006; G. Glossiotis (Visiting Researcher), Sept.-Dec. 2002.

### **Patents**

Pfeiffer, C., K. J. De Laurentis, M. J. Mosley, and C. Mavroidis. Prosthetic, Orthotic and other Rehabilitative Robotic Assistive Devices Actuated by Smart Materials. U.S. Patent No.: US 6,379,393 B1. (April 30, 2002)

## **E. Selected Peer-reviewed Publications**

Total Journal Papers: 4                      Book Contributions: 1                      Total Conference Papers: 19+

1. De Laurentis, K. J. and S. L. Phillips. "Design of a Powered Two Degree-of-Freedom Prosthetic Wrist." *Proceedings of the 12<sup>th</sup> World Congress of the International Society for Prosthetics and Orthotics*, Vancouver, Canada, August 2007.
2. Erickson, J. and K. J. De Laurentis. "A Novel Single Digit Manipulator for Prosthetic Hand Applications." *Proceedings of the 2007 IEEE Systems and Information Engineering Design Symposium*, Charlottesville, Virginia, April 2007.
3. Bouzit, M., A. Chaibi, K. J. De Laurentis, and C. Mavroidis. "Tactile Feedback Navigation Handle for the Visually Impaired." *Proceedings of the 2004 ASME International Mechanical Engineering Congress*, Anaheim, CA, Nov. 2004. Paper IMECE2004-60450.
4. De Laurentis, K. J. "Design of a Rapidly Fabricated, Smart Material Actuated Robotic Manipulator for Space Applications." *Proceedings of the 55th International Astronautical Congress*, Vancouver, Canada, October 2004. Paper IAC-04-IAF-I.4.11.
5. De Laurentis, K. J. and C. Mavroidis. "Rapid Fabrication of a Non-Assembly Robotic Hand with Embedded Components." *Assembly Automation Journal - Mechatronics*, **24.4** (October 2004): 394-405.
6. De Laurentis, K. J., C. Mavroidis, and F. Kong. "Rapid Robot Reproduction: Fabrication of Non-assembly Robotic Systems with Embedded Components Using a Rapid Prototyping System." *IEEE Robotics and Automation Magazine*, **11.2** (June 2004): 86-92.

7. De Laurentis, K. J., F. Kong, and C. Mavroidis. "Rapid Fabrication of Non-Assembly Mechanisms with Embedded Components." *Proceedings of the 2003 NSF Design, Service, Manufacture and Industrial Innovation Research Conference*, Birmingham, Alabama, January 2003.
8. De Laurentis, K. J., F. Kong, and C. Mavroidis. "Procedure for Rapid Fabrication of Non-Assembly Mechanisms with Embedded Components." *Proc. of the 2002 ASME Design Engineering Tech. Conf., 27<sup>th</sup> Biennial Mechanisms and Robotics Conf.*, Montreal, Canada, Sept. 2002. Paper DETC2002/MECH-34350.
9. De Laurentis, K. J., J. Nikitczuk, A. Fisch, and C. Mavroidis. "Design and Experimentation of Shape Memory Alloy Wire Bundle Actuators." *Proceedings of the 14<sup>th</sup> CISM-IFTOMM Symposium on Robotics, RoManSy 2002*, Udine, Italy. New York: Springer Wien, July 2002.
10. De Laurentis, K. J., A. Fisch, J. Nikitczuk, and C. Mavroidis. "Optimal Design of Shape Memory Alloy Wire Bundle Actuators." *Proceedings of the 8th International Conference on New Actuators, Actuator 2002*, Messe Bremen GMBH, Bremen, Germany, June 2002.
11. De Laurentis, K. J., A. Fisch, J. Nikitczuk, and C. Mavroidis. "Optimal Design of Shape Memory Alloy Wire Bundle Actuators." *Proceedings of the 2002 IEEE International Conference on Robotics and Automation*, Washington, DC, May 2002.
12. De Laurentis, K. J. and C. Mavroidis. "Mechanical Design of a Shape Memory Alloy Actuated Prosthetic Hand." *Technology and Health Care*, **10.2** (2002): 91-106.
13. Mavroidis, C., K. J. De Laurentis, J. Won, and M. Alam. "Fabrication of Non-Assembly Mechanisms and Robotic Systems Using Rapid Prototyping." *Transactions of the ASME Journal of Mechanical Design*, **123** (December 2001): 516-524.
14. Won J., K. J. De Laurentis, and C. Mavroidis. "Fabrication of a Robotic Hand Using Rapid Prototyping." *Proceedings of the 2000 ASME Design Engineering Technical Conference, 26<sup>th</sup> Biennial Mechanisms and Robotics Conference*, Baltimore, MD, September 2000. Paper DETC2000/MECH-14203.
15. De Laurentis K. J., C. Pfeiffer, and C. Mavroidis. "Development of a Shape Memory Alloy Actuated Hand." *Proceedings of the 7th International Conference on New Actuators, Actuator 2000*, Messe Bremen GMBH, Bremen, Germany, June 2000. 281-284.
16. Won J., K. J. De Laurentis, and C. Mavroidis. "Rapid Prototyping of Robotic Systems." *Proceedings of the 2000 IEEE International Conference on Robotics and Automation*, San Francisco, CA, April 2000.
17. Mavroidis C., J. Misuraca, K. J. De Laurentis, M. Badescu, and Y. Bar-Cohen. "Human Muscle Enhancement Using Advanced Actuators." *Proceedings of the DARPA Workshop on Exoskeletons for Human Performance Augmentation (EHPA)*, Washington, D.C., March 1-3, 2000.
18. Pfeiffer C., K. J. De Laurentis, C. Mavroidis, and M. J. Mosley. "Shape Memory Alloy Robot Prosthesis: Initial Prototypes." *Proceedings of the 1999 ASME International Mechanical Engineers Congress and Exposition, Biomedical Engineering Division*, Nashville, TN, November 1999.
19. Pfeiffer C., K. J. De Laurentis, and C. Mavroidis. "Shape Memory Alloy Robot Prostheses: Initial Experiments." *Proc. of the 1999 IEEE International Conference on Robotics and Automation*, Detroit, Michigan, May 1999.

## **F. Outreach Activities**

- University of South Florida Research Experience for Undergraduates, June 2007-Present
- Instructor, The Academy at Rutgers for Girls in Engineering & Technology, Summers 2000-2005
- Instructor/Project Supervisor, Governor's School of Engineering and Technology (Rutgers University), July 2004

- Mentor, Minority Academic Careers Undergraduate Program (Rutgers University), March-Sept. 2003
- Mentor, Ronald E. McNair Program (Rutgers University), June 2002-Aug. 2003
- Speaker, County College of Morris Women Who Dare Program, May 2003, 2004
- Mentor, County College of Morris Mentor Program, 2000-2002
- Instructor, Introduction of Women in Science and Engineering (Rutgers University), July 2001
- Supervisor/Mentor, Douglass Science Institute, (Rutgers University), June-Aug. 2000
- Instructor/Mentor, For Inspiration and Recognition of Science and Technology (New Brunswick High School, NJ) 1999-2000
- Advocate, Rutgers University Graduate Student Advocacy Day on Capitol Hill (Washington, DC), May 2002, Oct. 2003

### **G. Recent Research Support**

HI33SO4OI40 De Laurentis (PI)	10/01/04-11/10/06
DOE/NIDRR (Phase II SBIR)	
Grant Title: HARI: The Hand-Arm Rehabilitation Interface for Training the Hand Following Paralysis	
Role: Principal Investigator	
American Association of University Women	7/01/03-6/30/04
Selected Professions Engineering Dissertation Fellowship Program (Dr. Judith Resnik Fellowship)	
Title: Development of New Methodologies for the Fabrication and Actuation of Robotic Systems	
Role: Researcher	
National Science Foundation	9/01/00-8/31/03
Graduate Research Fellowship Program	
Title: Development of New Methodologies for the Fabrication and Actuation of Robotic Systems	
Role: Researcher	
Rutgers, The State University of New Jersey	9/01/99-8/31/00
Graduate School Fellowship	
Title: Design of a Shape Memory Alloy Actuated Robotic Hand	
Role: Researcher	