

Karla Mossi

Curriculum Vitae

DEPARTMENT OF MECHANICAL ENGINEERING
VIRGINIA COMMONWEALTH UNIVERSITY
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EDUCATION

Ph.D. in Mechanical Engineering, Old Dominion University, Norfolk, VA (May, 1998)

Dissertation Title: "*Thin-Layer Composite Ferroelectric Driver and Sensor Characterization with Application to Separation Flow Control*"

M.S. in Mechanical Engineering, Old Dominion University, Norfolk, VA (May, 1992)

Thesis Title: "*Characterization of Trailing Line Vortices*"

B.S. in Mechanical Engineering, Universidad Nacional Autonoma de Honduras (May, 1988)

Thesis Title: "*Fabrication of Briquettes Using Rice Husk*"

APPOINTMENTS

Associate Professor of Mechanical Engineering

Virginia Commonwealth University Richmond, VA, July 2007–Present

Assistant Professor of Mechanical Engineering

Virginia Commonwealth University Richmond, VA, January 2001–June 2007

Consultant for Experimental Characterization Procedures

ICASE, NASA Langley Research Center, March 2001–December 2002

Director of Research and Development

Face International Corporation, January 1999–November 2000

Senior Engineer

Face International Corporation, July 1996–December 1998

Research Engineer

NASA Langley Research Center, Summer 1996

Lab Instructor

Old Dominion University, August 1994–May 1996

Lab Manager

Old Dominion University, Summer 1994

Teaching/ Research Assistant

Old Dominion University, Jan 1992–May 1994

Senior Computer Consultant

Old Dominion University, Jan 1992-May 1996

Data Analyst

CHROME, Summer 1993

Research Assistant

NASA Langley Research Center, Aug 1990-Dec 1991

AWARDS

- "Student Section Advisor Award for District F," American Society of Mechanical Engineers, 2007
- "Parents' Award for Excellence in Undergraduate Teaching," Virginia Commonwealth University, School of Engineering, May 2007
- "Outstanding Graduate Teaching Assistant Award for Laboratory Instruction," Old Dominion University, 1995-96
- "Special Doctoral Award," Spring 1996
- "Certificate of Appreciation (Academy Graduate Assistant)," CHROME, 1996 Young PhD's in Aeronautics, March 30, 1996
- "Graduate Teaching Assistantship," Summer 1996, Fall 1995, Summer 1995
- "Certificate of Appreciation," I. C. Norcom High School, Science Fair, March 1995, March 1994
- "Certificate of Excellence," CHROME, 1994 Young PhD's Program, November 1994.

PUBLICATIONS

Journal Articles

Mane, P., Mossi, K. and Bryant, R. (2008). "Piezoelectric Synthetic Jets in Quiescent Air: Experimental Design and Analysis." *Smart Materials and Structures*, **17**, (12pp) accepted.

Mane, P., Mossi, K., Rostami, A., Bryant, R. and Castro, N. (2007). "Piezoelectric actuators as synthetic jets: Cavity dimension effects." *Journal of Intelligent Materials Systems and Structures*, **18**(11), 221-232.

Mossi, K., Mouhli, M., Mane, P., Smith, B., and Bryant, R. (2006). "Shape modeling and validation of stressed biased piezoelectric actuators." *Smart Materials and Structures*, **15**, 1785-1793.

David, J., Castle, S., and Mossi, K. (2006) "Localization Tattoos: An Alternative Method Using Fluorescent Inks." *Radiation Therapist*, **15**(1), 1-5.

Mossi, K., Bryant, R., and Mane, P. (2005) "Piezoelectric composites as bender actuators." *Integrated Ferroelectrics*, **71**, 221-232.

Mossi, K., Castro, N. D., Bryant, R., and Mane, P. (2005) "Boundary condition effects on piezo-synthetic jets." *Integrated Ferroelectrics*, **71**, 257-266.

Bryant, R. G., Mossi, K. M., Robbins, J. A., and Bathel, B. F. (2005) "The correlation of electrical properties of prestressed unimorphs as a function of mechanical strain and displacement." *Integrated Ferroelectrics*, **71**, 267-287.

Mossi, K., Green, C., Ounaies, Z., and Hughes, E. (2005) "Harvesting energy using a thin unimorph prestressed bender: Geometrical effects." *Journal of Intelligent Material Systems and Structures*, **16**(3), 249-261.

Neiderer, K., Castle, S., Mossi, K., and Dempsey, T. (2005) "Lateral Scatter Effects on Dose Due to a Metal Prosthesis." *Radiation Therapist*, **14**(1), 51-54.

Mossi, K., and Bryant, R. (2004) "Pre-stressed circular actuators." *Ceramic Transactions*, **150**, 445-454. [cited 2 times as of 5/30/2006]

Mossi, K., Selby, G., and Bryant, R. (1998) "Thin-Layer Composite Unimorph Ferroelectric Driver and Sensor Properties." *Materials Letters*, **35**, 39-49. [cited 40 times as of 5/30/2006]

Refereed Conferences

Smith, B.F., Goo, N.S., Mossi, K. (2007) "Experimental development of power consumption in LIPCA-C2." Proceeding of the SPIE International Society for Optics Engineering, 6526.

Mane, P., Mossi, K., Green, C., Bryant, R. (2007) "Studying the effects of temperature on energy harvesting using pre-stressed piezoelectric diaphragms." Proceeding of the SPIE International Society for Optics Engineering, 6526.

Mane, P., Mossi, K., and Bryant, R. (2006) "Experimental design and analysis of bimorphs as synthetic jet diaphragms." ASME Proceedings of IMECE06, *ASME International Mechanical Engineering Congress and Exposition*, Chicago - Illinois, USA, **IMECE2006-14051**.

Green, C., Mossi, K., and Bryant, R. (2005) "Scavenging energy from piezoelectric materials for wireless sensor applications." ASME Proceedings of IMECE05, *ASME International Mechanical Engineering Congress and Exposition*, Orlando - Florida, USA, **IMECE2005-80426**.

Mane, P., Mossi, K., and Bryant, R. (2005) "Pressure loading of piezo composite Unimorphs." Materials and Devices for Smart Systems II Proceedings 888, *Material Research Society Fall Meeting*, Boston-Massachusetts, USA, **0888-V01-06**.

Mossi, K., and Bryant, R. (2003) "Piezoelectric Actuators for Synthetic Jet Applications." Materials and Devices for Smart Systems Proceedings 785, *Material Research Society Fall Meeting*, Boston-Massachusetts, USA, **D11.8**. [cited 6 times as of 5/30/2006]

Non-Refereed Conferences

- Smith, B.F., Goo, N.S., Mossi, K. (2007) "Experimental development of power consumption in LIPCA-C2." *Proceeding of the SPIE International Society for Optics Engineering*, **6526**.
- Mane, P., Mossi, K., Green, C., Bryant, R. (2007) "Studying the effects of temperature on energy harvesting using pre-stressed piezoelectric diaphragms." *Proceeding of the SPIE International Society for Optics Engineering*, **6526**.
- Mane, P., Mossi, K., Green, C. (2007) "Vibration and temperature significance on energy harvesting using piezoelectric diaphragms." ASME Proceedings of IMECE07, ASME International Mechanical Engineering Congress and Exposition, Seattle-Washington, USA, IMECE2007-44018.
- Gaddy, C., Mossi, K., Castle, S. (2006) "Bite block cleaning solution: A comparative study." *Radiation Therapist*, 15 (2), 1-3
- Noras, M., Kieres, J., Mossi, K., and Leang, K. (2006) "The design of a high-voltage charge-feedback piezoamplifier." *Actuator*, Bremen, Germany.
- Maddox, J., Mane, P., Mossi, K., and Bryant, R. (2006) "Piezoelectric synthetic jets as virtual surfaces." *Actuator*, Bremen, Germany.
- Beck, J., Noras, M., Kieres, J., Speich, J., Mossi, K., and Leang, K. (2006) "Hysteresis characterization using charge-feedback control for a LIPCA device." *Proceeding of the SPIE International Society for Optics Engineering*, **6170**, 424-433.
- Mossi, K., Smith, B., Mouhli, M., and Bryant, R. (2005) "Characteristics of carbon reinforced piezoelectric composites." *ICEST Conference*, Seoul, Korea.
- Mane, P., Mossi, K., and Bryant, R. (2005) "Synthetic jets with piezoelectric diaphragms." *Proceeding of the SPIE International Society for Optics Engineering*, **5761**, 233-243.
- Mossi, K., Mane, P., and Bryant, R. (2005) "Velocity profiles for synthetic jets using piezoelectric circular actuators." *46th AIAA/ASME/ASCE/AHS/ASC Structures Structural Dynamics and Materials Conference*, Austin - Texas, USA, **AIAA-2005-2341**.
- Mossi, K., and Bryant, R. (2004) "Characterization of piezoelectric actuators for flow control over a wing actuator," *Actuator*, Bremen, Germany, 181-185. [cited 1 time as of 5/30/2006]
- Bryant, R., Kavli, S., Thomas, R., Darji, K., and Mossi, K. (2004) "Experimental characterization of piezoelectric radial field diaphragm for fluidic control." *Actuator*, Bremen, Germany, 565-575.
- Mossi, K., Costley, J., Ounaies, Z., and Bryant, R. (2004) "Piezoelectric behavior of pre-stressed curved actuators under load." *Proceeding of the SPIE International Society for Optics Engineering*, **5387**, 432-441. [cited 1 time as of 5/30/2006]
- Mossi, K., Scott, L., and Haran, S. (2003) "Characterization of loaded pre-stressed piezoelectric actuators." *Proceeding of the SPIE International Society for Optics Engineering*, **5053**, 453-459.
- Mossi, K., Ounaies, Z., and Smith, R. (2003) "Pre-stressed curved actuators: characterization and modeling of their piezoelectric behavior." *Proceeding of the SPIE International Society for Optics Engineering*, **5053**, 423-435. [cited 4 times as of 5/30/2006]

Hodges, C., Mossi, K., and Scott, L. (2003) "Adhesive characterization in pre-stressed piezoelectric laminates." *Proceeding of the SPIE International Society for Optics Engineering*, **5053**, 467–474.

Mossi, K., and Scott, L. (2002) "Sensor Measurements for Diagnostic Equipment." *First World Congress on Biomimetics and Artificial Muscles*, Albuquerque - New Mexico, USA.

Ounaies, Z., Mossi, K., Smith, R., and Berndt, J. (2001) "Low-field and high field characterization of Thunder actuators," *Proceeding of the SPIE International Society for Optics Engineering*, **4333**, 399–407. [cited 18 times as of 5/30/2006]

Mossi, K., Ounaies, Z., and Oakley, S. (2001) "Optimizing energy harvesting of a composite Unimorph pre-stressed bender." *American Society for Composites Sixteenth Technical Conference*, Blacksburg - Virginia, USA. [cited 4 times as of 5/30/2006]

Capozzoli, M., Gopalakrishnan, J., Hogan, K., Massad, J., Tokarchik, T., Wilmarth, S., Banks, H., Mossi, K., and Smith, R. (1999) "Modeling aspects concerning THUNDER actuators." *Proceeding of the SPIE International Society for Optics Engineering*, **3667**, 719–727. [cited 10 times as of 5/30/2006]

Mossi, K., Bishop, R., Smith, R., and Banks, H. (1999) "Evaluation criteria for THUNDER actuators." *Proceeding of the SPIE International Society for Optics Engineering*, **3667**, 738–743. [cited 3 times as of 5/30/2006]

Mossi, K., and Bishop, R. (1999) "Characterization of different types of high performance THUNDER actuators." *Proceeding of the SPIE International Society for Optics Engineering*, **3675**, 43–52. [cited 14 times as of 5/30/2006]

Bishop, R., and Mossi, K. (1998) "High displacement, high force piezoelectric actuator and sensor." *The Journal of the Acoustical Society of America*, **104**(3), 1828.

PROFESSIONAL SOCIETIES SERVICES

- ASME, American Association for Mechanical Engineers, Member and Symposium Organizer
- ACS, American Ceramic Society, Member and Symposium Organizer
- MRS, Materials Research Society, Member
- AAUP, American Association of University Professors, Member
- SPIE, Smart Materials and Structures Society, Member and Reviewer for the student paper competition.
- ASC, American Society for Composites, Member

INVITED TALKS

- "Harvesting Energy using Piezoelectric Materials," Stevens Institute of Technology, NJ 2006.
- "Characterization Of Piezoelectric Actuators for Flow Control Over a Wing," IEEE Student Chapter at Virginia Commonwealth University, 2006.

- “Design of Experiments for Piezoelectric Synthetic Jets,” INHA University, Korea 2005.
- “Characteristics of Carbon Reinforced Piezoelectric Composites,” Konkuk University, Korea 2005.
- “Woman in Engineering and the Workplace,” Virginia Commonwealth University, Fall 2005.
- “Piezoelectric Synthetic Jets,” Virginia Commonwealth University, April 2004.
- “Synthetic jets using smart materials,” University of Nevada, Las Vegas, March 2004.
- “Education and Smart Structures,” International Workshop on Smart Materials and Structures Technology, January 2004.
- “Pre-Stressed Actuators,” Delft University, the Netherlands, August 2003.
- “‘Smart’ Materials as Force Sensors and Their Applications”, Instrumentation Society of America, Richmond, VA 2003.
- “Smart Materials and Their Applications,” National Society for Engineers, Honduras, August 2003.
- “Piezoelectric Actuators for Sensor Applications,” Old Dominion University, Norfolk, VA, 2002.

INVITED WORKSHOPS

- Energy Harvesting Workshop, Sponsored by: Los Alamos National Labs (June 28-30, 2005).
- Prentice Hall Mechanics Focus Group, Statics and Dynamics, Sponsored by: Prentice Hall (2005).
- Multiscale Model Development and Control Design Closing Workshop, Sponsored by: North Carolina State University (September 27-28, 2004).
- National Workshop on Future Sensing Systems "Living, Nonliving, and Energy Systems" Sponsored by: NSF, DARPA, NIH, DOE, NIST, NASA, AFOSR,ONR, ARO,ARL, NRL, NSWCCD (8/26/02 - 8/28/02).
- Engineering Education Scholars Summer Workshop 2001, Sponsored by: NSF (July 29-August 1, 2001).

TEACHING EXPERIENCE

Undergraduate Level

- Engineering Statics (143 students, 462 contact hours, taught 5 times)
 - Taught multiple sections
 - Introduced Math review week through a grant
- Dynamics and Kinematics (120 students, 360 contact hours, taught 4 times)
 - Taught multiple sections

- Utilized tablet pc as a teaching tool
- Mechanics of Materials (154 students, 462 contact hours, taught 2 times)
 - Taught multiple sections
 - Introduced personal response systems for interactive learning
 - Utilized tablet pc as a teaching tool

Graduate Level

- Design of Experiments (32 students, 93 contact hours, taught 2 times)
 - Introduced the course to the graduate and undergraduate curriculum
 - Covered the basics of lean manufacturing, design of experiments, and six-sigma
 - Students wrote an SBIR as a final project
- Introduction to Aerodynamics - Independent study course (2 student, 6 contact hours, taught 1 time)
 - Developed a Wind Tunnel to become part of the Smart Materials Lab
- Piezoelectric Composite Actuators - Independent study (1 student, 3 contact hours, 1 time)
 - Experimentally analyzed mechanical and electrical behavior of piezo-composites
 - Student presented a paper at a conference
- Engineering Synthesis Lab - Independent study (1 student, 3 contact hours, taught 1 time)
 - Review basic filtering, data acquisition, instrumentation systems and applied to create a document on the use of data acquisition and evaluation of strain gauges.
 - Data from this class became a paper presented at a conference
- Smart Materials - Independent study (1 student, 3 contact hours, taught 1 time)
 - Introduction to different types of materials and their electrical behavior.
 - Developed set-ups to experimentally measure dielectric characteristics of different materials.
- Advanced Composite Actuators - Independent study (1 student, 3 contact hours, taught 1 time)
 - Introduced concepts of composite piezoelectric actuators for flow control, developed a prototype and tested in a high speed wind tunnel
 - Student presented results at an international conference.

GRADUATE STUDENT RESEARCH SUPERVISION

Doctoral Students

- Mane, Poorna, "Piezoelectric Synthetic Jets for Medical Applications." expected December 2007.

Masters Students

- Green, Christopher, "Energy Harvesting Using Clamped Pre-Stressed Unimorph Diaphragms for Wireless Sensor Applications." expected summer 2006.

- Smith, Byron F. "Application of Laminar Theory to Actuator Design." expected May 2008.
- Castro Nicolas, "Numerical Modeling of Synthetic Jets in Quiescent Air with Moving Boundary Conditions." 2005.
- Mouhli Makram, "Analysis and shape modeling of thin piezoelectric actuators." 2005.
- Mane Purna "Experimental Design and Analysis of Piezoelectric Synthetic Jets in Quiescent Air." 2005.

Thesis Committee Member or Co-Chair

- Abdelsayed, Ihab, M.S. Mechanical Engineering, 2006, "Characterization of Electrospayed PVDF and PVDF/CNT Nanocomposite."
- Finegan, Edward, M.S. Computer Science, 2005, "Intelligent Autonomous Data Categorization."
- Stutler, Richard A, M.S. Computer Science, 2005, "Analysis of Perturbation-based Testing Methodology as applied to a Real-Time Control System Problem."
- Miller, Lee, M.S. Mechanical Engineering, 2005, "Design and analysis of a compact, economical, multi-axis, multi-tasking, small part machine tool."
- Parulkar, Wrutu, M.S. Mechanical Engineering, 2005, "Electromechanical Characterization of Poly(Dimethyl Siloxane) Based Electroactive Polymers."
- Li, Jie, Ph.D. Mechanical Engineering, 2004, "Development of Control Algorithms to Enable the Implementaton of Robot-Assisted Hand Rehabilitation Therapy Modes."
- Banda, Sumanth, M.S. Mechanical Engineering, 2004, "Characterization of Aligned Carbon Nanotube/Polymer Composites Mechanical Engineering."
- Thompson, Chris, M.S. Mechanical Engineering, 2003, "Numerical Modeling of Pulsatile Flow in End-to-Side Anastomoses Subject to Steady Flow Side Entry."
- Deveney, Bridget, M.S. Chemical Engineering, 2002, "Tuning the sensitivity of polymer-coated saw sensors by vapor treatment."

UNDERGRADUATE STUDENT RESEARCH AND INTERNSHIP SUPERVISION

Senior Capstone Designs: A total of 14 projects with 40 students.

- The programmable Acoustic Guitar, 2001-2002 (2 students)
- The construction of a Hang-Glider Simulator, 2002-2003 (4 students)
- Development of a Wind Tunnel Testing for Aerospace Applications, 2002-2004 (1 student)
- Mark XVI Tray Filling Unit Improvement, 2003-2004 (2 students)
- Aqua Tunnel, 2003-2004 (3 students)
- New Wing Design, 2004-2005 (2 students)
- Rock Crawler, 2004-2005 (5 students)

- Aerial Platform, 2004-2005 (2 students)
- Magneto Rheological Brake, 2004-2005 (5 students)
- Harmonic Piezoelectric Pump, 2005-2006 (4 students)
- Energy Scavenging Tires for Hybrid Electric Cars, 2005-2006 (4 students)
- Overhead Air Entry Passage (Roof Scoop), 2005-2006 (2 students)
- Go-Cart for Disabled Children, 2005-2006 (2 students)
- Designing for Piezoelectric Power Generation Using Wind Energy, 2005-2006 (3 students)

Summer Internships at the Smart Materials Lab, VCU (A total of 29 students)

- Arief, Isti, "Temperature Dependence of Piezoelectric Actuators," Summer '03
- Bass, David, "Field-Load Characterization," Fall '02
- Beck, James, "Current Control Hysteresis and Webmaster," Fall '05
- Bollbach, Melissa, "Synthetic Jet Characterization," Fall '05
- Bourassa, Andrew, "IT and Webmaster," Summer '04
- Carley, Jeff, "Analysis of Displacement Characteristics of Piezoelectric Devices," Summer '05
- Chou, Ritchthy, "3D maps for actuator under DC bias fields," Summer '04
- Costley, Justin, "Electromechanical Characterization of Thunder and Lipca," Spring '03
- Darji, Kavita, "RFD piezoelectric pumps characterization," Summer '03
- Gomez, Juan, "Filtering, Hot-wire Anemometry Calibration setup," Spring '03
- Graf, Greg, "DoE for PVDF Speaker," Fall '02
- Hodges, CA, "NASDRIV Characterization," Fall '01
- Howerton, Kyle, "LIPCA load-field dependence," Summer '04
- Iaquinto, Jonathan, "Energy Harvesting of Piezoelectric Composites," Summer '05
- Joseph, Leena, "Laboratory Manager and Administrative Assistant," Fall '04
- Kadec, Orr, "Synthetic Jet Characterization," Summer '04
- Kazmier, Matt, "Development of 3D surface topological maps," Spring '05
- Luck, Ben, "Analysis of Displacement Characteristics of Piezoelectric Devices," Spring '02
- Maddox, Justin, "Design and Construction of High Speed Wind Tunnel," Spring '04
- Moon, Jonathan, "Design and Setup of Hot-Wire Calibration Facility," Spring '03
- Nino de Leon, Carlo, "Stepper motor driver tests," Summer '04
- Robbins, Jonathan, "Strain mapping for Thunder devices," Spring '04
- Smith, Byron, "Strain measurements for Lipca devices," Fall '04
- Thatte, Suhas, "Development of Mathematical Module for Statics," Summer '04
- Valencia, Allen, "Energy Harvesting of Piezoelectric Composites," Spring '04

- Wolfe, Joanna, "Library Assistant," Spring '04
- Wolfe, Nick, "Displacement Characterization," Summer '03
- Schumacher, Cameron, "Circuitry Development of PVDF Speaker," Summer '05
- Anderson, Gregory, "Redesign and Distribution of High Speed Wind Tunnel," Summer '06

COMMITTEE SERVICE

University Level

- Freshman Book Selection Committee, member, 2005-2006 (University)
- Equity and Diversity Committee, member, 2002-2004 (University)
- Social Initiative task Committee, member, 2002-2003 (University)

School Level

- Faculty Senate, 2004
- Graduate Appeals Committee, member, 2004
- Honors Program Committee, member, 2003
- Strategic Planning Committee, member, 2003
- School of Engineering Lecture Program Committee, member, 2003

Departmental Level

- ME ABET Committee, member, 2006
- ME Advisor, senior students leader, 2006
- ME Faculty Search Committee, member, 2002, 2003, 2004, 2005, 2006
- ME Chair Search Committee, member, 2002

VOLUNTEER ACTIVITIES

- Advisor for ASME Student Chapter at Virginia Commonwealth University, 2005-present.
- Advisor for Zeta Phi Sigma Engineering Sorority 2001-present.
- Instructor, FE Review Class, School of Engineering, 2002, 2003, 2004, 2005, and 2006.
- Instructor, Engineering Open Houses (four a year), School of Engineering, 2002, 2003, 2004, 2005, and 2006.
- Advisor, STAR Training, School of Engineering, 2003, 2004, 2005, 2005, and 2006.
- Presenter-Recruiter, 2003 NASA SHARP College Day, School of Engineering, 2003.
- Presenter, First Robotics Open House, School of Engineering, 2004.
- Recruiting-caller, School of Engineering, 2003, 2004.

- Speaker, St Catherine's High-School for Girls, 2002-2004.
- Presenter, Boys and Girls Club, 2002-2004.
- Mentor, undergraduate and graduate students to participate in educational enhancing programs:
 - Los Alamos National Labs
 - Research for Undergraduate (NSF) Centers
 - NASA LARSS programs,
 - National Science Foundation Summer Abroad Program.
- Translator and Volunteer for Enhanced Oncology Services to Honduras.