KATHLEEN A. BIERYLA, PH.D.

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EDUCATION:

Virginia Polytechnic Institute and State University, Blacksburg, VA
Ph.D., Mechanical Engineering (2009)
Dissertation: "An investigation of perturbation-based balance training as a fall prevention intervention for older adults"
Advisor: Michael L. Madigan

Virginia Polytechnic Institute and State University, Blacksburg, VA
M.S., Mechanical Engineering, Biomedical Engineering option (2006)
Thesis: "A preliminary study of trip recovery training in older adults for use as a fall prevention intervention"
Advisor: Michael L. Madigan

The University of Pittsburgh, Pittsburgh, PA
B.S., Bioengineering (2004)

PROFESSIONAL EXPERIENCE:

Assistant Professor **August 2017 – Present**
Mechanical and Biomedical Engineering Programs, University of Portland – Portland, OR
Curricular expertise:
- Planned and currently executing curricular revision for the master of biomedical engineering program.
- Implemented a course to teach students how to repair medical technology in an under-resourced setting and led students on a 3-week trip to the Dominican Republic to work in hospitals and repair equipment.
- Coordinated and advised design teams working with clinical mentors from OHSU, Legacy Medical Group, Micro Systems Engineering, Inc..

Assistant Professor **August 2009 – May 2017**
Biomedical Engineering Department, Bucknell University – Lewisburg, PA
Curricular expertise:
- Developed laboratory and hands-on skills for undergraduate biomedical engineers including EMG, ECG, force plate, high speed video, spirometry, analog and digital circuits, anthropometry, COMSOL, motion analysis.
- Coordinated and advised senior design teams working with clinical mentors from Geisinger Health System, PA.
- Mentored 21 undergraduate research students on a variety of research projects.
- Developed and delivered curricular content related to FDA pathways, medical device classifications, human subjects testing, intellectual property, safety and liability, sustainability, standards, and entrepreneurism.
- Completed strategic planning for the biomedical engineering department to stay competitive in the field of undergraduate biomedical engineering education.
- Planned and executed curricular revision for the biomedical engineering department.

Courses taught:
- ENGR 100 – Exploring Engineering, Biomedical Engineering Seminar: Introductory seminar for majors/non-majors, 3 week seminar class with lab.
- BMEG 210 – Fundamentals of Biomedical Engineering: Introductory course, including labs: EMG, ECG, force plate, high speed video, viscosity, and spirometry.
- BMEG 250 – Fundamentals of Biomechanics: Statics and mechanics of material with emphasis on biomechanics, including link segment modeling. Lab component: anthropometry, dynamic link segment modeling using Vicon motion analysis and force plates, experimental and computer modeling (COMSOL) of beam bending with lab.
- BMEG 220 – Introduction to Engineering Computing: Computing skills using MATLAB.
- BMEG 205 – Bioinstrumentation I: Analog and digital circuit analysis with lab.
- BMEG 408 – Medical Device Assessment and Development: FDA pathways, medical device classifications, human subjects training, intellectual property, safety and liability, environmental, standards.
- BMEG 401 – Biomedical Engineering Capstone I: Course coordinator, established mentors in anesthesiology, cardiology, dermatology, emergency department, otolaryngology from Geisinger Medical Center, Danville, PA, taught the engineering design process.
- BMEG 452 – Human Factors: Project based coursed including: anthropometry, visual displays, workplace design, device design, NIOSH lifting.

- Senior Capstone Faculty Adviser to Design Team – Advised senior design teams working with physicians in orthopedics, otolaryngology, emergency department and the clinical innovation and process transformation group at Geisinger Medical Center, Danville PA.
- ENGR290 – Engineering in a Global and Societal Context: 3-week study abroad experience for 33 Bucknell engineering undergraduates in Chile.

Select research projects:

- Step mechanics in young and old adults – recruited all subjects, collected EMG, motion capture data, force plate data, anthropometry. Inverse dynamic analysis through MATLAB, statistical analysis using JMP.
- Wii Fit and Xbox Kinect balance – tested clinical measures of balance before and after training old adults at senior living community with Wii Fit and Xbox Kinect.
- Simulated colon model using force sensing resistors, data collected with LabVIEW.
- NCAA field hockey athlete physiology – heart rate monitoring during practices and games, pre/post season fitness measures, drop jump testing to measure neuromuscular fatigue, rate of perceived exertion, daily sleep data. Worked as a team with field hockey coach and chemical engineering professor to design experiments to help understand and improve team performance.
- Summer medical device design projects with Geisinger – mentored student teams collaborating with emergency room physician, head of general surgery, neurologist.

Graduate Research Assistant **September 2004 – July 2009**

Kevin P. Granata Musculoskeletal Biomechanics Laboratory, Virginia Polytechnic Institute and State University – Blacksburg, VA

- Formulated experimental design for a study on motor learning of a balance recovery task in old adults.
- Designed a pneumatically driven obstacle and moving platform for research purposes.
- Developed abilities in experimental design, human subjects testing, programming, troubleshooting, instrumentation.
- Supervised undergraduate students.

Undergraduate Research Assistant **May 2002 – August 2004**

Human Movement and Balance Laboratory, University of Pittsburgh – Pittsburgh, PA

- Conducted a study of the biomechanics of slips/falls in young and old adults.

SCHOLARSHIP:

PEER REVIEWED ARTICLES:

Buffinton CM, Buffinton EM, **Bieryla KA**, Pratt JE. "Biomechanics of step initiation after balance recovery with implications for humanoid robot locomotion." Journal of Biomechanical Engineering. 2016;138(3), DOI: 10.1115/1.4032468

Bieryla KA. "Xbox Kinect training to improve clinical measures of balance in older adults: a pilot study." Aging Clinical and Experimental Research 2016;28(3):451-457.

Bieryla KA, Buffinton CM. "Effects of age and step length on joint kinetics during stepping task." Journal of Biomechanics 2015;48(10):1679-1686.

Tranquillo J, Ebenstein D, Kennedy E, **Bieryla K**, Cavanagh D. "Product Archaeology: Unearthing Business Decisions." Journal of Engineering Entrepreneurship 2015;6(1):22-36.

Bieryla KA, Dold NM*. "Feasibility of Wii Fit training to improve clinical measures of balance in older adults." Clinical Interventions in Aging 2013;8:775-781.

Bieryla KA, Madigan ML. "Proof of concept for perturbation-based balance training in older adults at a high risk for falls." Archives of Physical Medicine and Rehabilitation 2011;92(5): 841-843.

Bieryla KA, Anderson DE, Madigan ML. "Estimations of relative effort during sit-to-stand increase when accounting for variations in maximum voluntary torque with joint angle and angular velocity." Journal of Electromyography and Kinesiology 2009;19(1):139-144.

Bieryla KA, Madigan ML, Nussbaum MA. "Practicing recovery from a simulated trip improves recovery kinematics after an actual trip." Gait and Posture 2007;26(2):208-213.

PEER REVIEWED CONFERENCE PROCEEDINGS (BASED ON FULL ARTICLE REVIEW):

Tranquillo J., Ebenstein D., Kennedy E., **Bieryla K**., and Cavanagh D., "Medical Device Design and Assessment: Unearthing Business Decisions" *Proceedings of the National Collegiate Inventors and Innovators Alliance (NCIIA) 2014 OPEN Conference*. Presented March 21, 2014 San Jose, CA

Radcliffe NR, Easterling DR, Wason, LT, Madigan ML, **Bieryla KA**, ``Results of two global optimization algorithms applied to a problem in biomechanics", in {\sl Proc. 2010 Spring Simulation Multiconference, High Peformance Computing Symp.}, A. Sandu, L. Watson, and W. Thacker (eds.), Soc. for Modelling and Simulation Internat., Vista, CA, 2010, 117--123.

Thor CP, **Bieryla K**, Gabler HC. "Estimating shoulder injury risk using low rate lateral impacts to dummies." Biomedical Sciences Instrumentation 2008;44:274-279.

REFEREED CONFERENCE PROCEEDINGS (BASED ON ABSTRACT REVIEW):

Jones M+, **Bieryla K**, Dillon H. "Construction of a Simplified Carotid Artery for Interactive Learning of Fluid Systems." *Biomedical Engineering Society Annual Meeting*, Atlanta, GA, October 17-20, 2018.

Bieryla K, Lowe A*, Cook J, Snyder R. "Quantifying fatigue and perceived levels of exertion in collegiate field hockey athletes during pre-season." *World Congress of Biomechanics*, Dublin, IE, July 8-12, 2018.

Buffinton C, Blaho R*, **Bieryla K**. "Biomechanics of single stair climb with implications for humanoid robot control." *World Congress of Biomechanics*, Dublin, IE, July 8-12, 2018.

Raeker-Jordan E*, Leung J*, Ha Hang*, **Bieryla K**, Thompson M. "Movement Detection with Smart Phone Accelerometers." *Biomedical Engineering Society Annual Meeting*, Tampa, FL, October 7-10, 2015.

Haxo A*, **Bieryla K,** Geist E, Diehl D. "Use of Force Sensing Resistors to Determine Position Within a Gastrointestinal Model." *Biomedical Engineering Society Annual Meeting*, Tampa, FL, October 7-10, 2015.

Bieryla K, Buffinton C. "Joint torques differ in old and young during maximum stepping task." *25th Congress of the International Society of Biomechanics Meeting*, Glasgow, Scotland, July 12-16, 2015.

Farnham M*, **Bieryla K**, Geist E, Diehl D. "Naive Endoscope Users Have Higher Forces on a Simulated Colon Model Compared to Experienced Endoscopist." *Biomedical Engineering Society Annual Meeting*, San Antonio, TX, October 22-25, 2014.

Farnham M*, McCoy Z*, Melo Y*, Geist E, **Bieryla K**, Diehl D. "Measurement of Endoscopist Grip Strength and Manual Dexterity during a day of Endoscopic Procedures." *Biomedical Engineering Society Annual Meeting*, San Antonio, TX, October 22-25, 2014.

Shui J*, **Bieryla K**, Geist E, Diehl D. "Quantifying the Effect of Different Colonoscope Techniques on a Simulated Colon Model." *Biomedical Engineering Society Annual Meeting*, Seattle, WA, September 25-28, 2013.

Koushyar H, **Bieryla K**, Madigan M. "Non-stepping balance recovery capability differs between young and older adults." *37th Annual Meeting of the American Society of Biomechanics*, Omaha, NE, September 4-7, 2013.

Shui J*, **Bieryla K**, Geist E, Diehl D. "Quantifying the Forces and Position of an Endoscope." *Biomedical Engineering Society Annual Meeting*, Atlanta, GA, October 24-27, 2012.

Talbot S*, **Bieryla K**, Geist E, Diehl D. "Construction of a Translucent Upper GI Model for Endoscopic Testing." *Biomedical Engineering Society Annual Meeting*, Atlanta, GA, October 24-27, 2012.

Matteson D*, Moats A*, Shute K*, Shabahang M, Woll N, Baish J, **Bieryla K**, Cavanagh D. "Development of a surgical simulator for open, abdominal training procedures." *Biomedical Engineering Society Annual Meeting*, Atlanta, GA, October 24-27, 2012.

Bieryla K, Balaban E*. "Xbox kinect training may improve balance measures in older adults." *8th World Congress on Active Ageing*, Glasgow, Scotland, August 13-17, 2012.

Balaban E*, **Bieryla KA**. "Improving clinical measures of balance using Kinect for Xbox 360." *Biomedical Engineering Society Annual Meeting*, Hartford, CT, October 13-15, 2011.

Dold NM,* Barnett NJ*, Baish JW, **Bieryla KA**, Cavanagh DP, Gerhard GS, Ledbetter DH. "A novel device to collect saliva from children for DNA analysis." *Biomedical Engineering Society Annual Meeting*, Hartford, CT, October 13-15, 2011.

Bieryla KA, Dold NM*. "Wii Fit training to improve balance in older adults: a feasibility study." 35*th Annual Meeting of the American Society of Biomechanics*, Long Beach, CA, August 10-13, 2011.

Bost S*, Long M*, Gilliam F, **Bieryla K**, Tranquillo J. "Design and Implementation of Novel Silicone Cup Attachment for Ambulatory EEG Electrode." *Biomedical Engineering Society Annual Meeting*, Austin, TX, October 6-9, 2010.

Dold NM*, **Bieryla KA**. "Improving clinical balance measures in older adults via Wii Fit training." *Biomedical Engineering Society Annual Meeting*, Austin, TX, October 6-9, 2010.

Bieryla KA, Madigan ML. "Perturbation-based balance training in older adults at increased risk for falls." *34th Annual Meeting of the American Society of Biomechanics*, Providence, RI, August 18-21, 2010.

Bieryla KA, Madigan ML. "Age-related differences in balance after task-specific training." *33rd Annual Meeting of the American Society of Biomechanics*, State College, PA, August 26-29, 2009.

Matrangola SL, **Bieryla KA**, Madigan ML. "Preliminary investigation of balance recovery from a trip in overweight and normal weight older adults." *33rd Annual Meeting of the American Society of Biomechanics*, State College, PA, August 26-29, 2009.

Bieryla KA, Davidson BS, Madigan ML. "Repeated exposure to small postural perturbations leads to improvements in balance recovery." *North American Congress on Biomechanics*, Ann Arbor, MI, August 5-9, 2008

Bieryla KA, Anderson DE, Madigan ML. "Comparison of two methods of determining relative effort during sit-to-stand." *31st Annual Meeting of the American Society of Biomechanics*, Stanford, CA, August 22-25, 2007.

Bieryla KA, Madigan ML, and Nussbaum ML. "A Feasibility Study of Trip Recovery Training as a Fall Prevention Intervention." *30th Annual Meeting of the American Society of Biomechanics*, Blacksburg, VA, September 6-9, 2006.

Bieryla KA, Madigan ML, and Lloyd E. "Age-related Joint Torque Analysis During Support Phase of Single Step Recovery." *XXth Congress of the International Society of Biomechanics and 29th Annual Meeting of the American Society of Biomechanics*, Cleveland, OH, July 31-Aug 5, 2005.

Bieryla KA, Chambers AJ, and Cham R. "Slip Anticipation Effects on Hip/Knee Kinematics Part 1: Gait on Dry Floors." *27th Annual Meeting of the American Society of Biomechanics*, Toledo, OH, September 25-28, 2003.

Chambers AJ, **Bieryla KA**, and Cham R. "Slip Anticipation Effects on Hip/Knee Kinematics Part 2: Gait on Glycerol Contaminated Floors." *27th Annual Meeting of the American Society of Biomechanics*, Toledo, OH, September 25-28, 2003.

Margerum S, Moyer B, **Bieryla KA**, and Cham R. "Kinematics of the Slipping Foot." *27th Annual Meeting of the American Society of Biomechanics*, Toledo, OH, September 25-28, 2003.

+ Indicates University of Portland undergraduate student researcher
* Indicates undergraduate student researcher

OTHER CONFERENCE PRESENTATIONS:

Buffinton CM, **Bieryla KA**, Caso TE*. "Analysis of Step Mechanics with Step Length Variation" *Dynamic Walking 2012*, Pensacola, FL, May 21-25, 20**12.**

Bieryla KA, Anderson DE, Madigan ML. "Joint angle and angular velocity affect estimations of relative effort." *The Mechanics Conference*, Blacksburg, VA, May 29-30, 2008.

Bieryla KA, Anderson DE, Madigan ML. "A new method of joint torque normalization during sit to stand." *2nd Annual Southeast Biomechanics Conference*, Durham, NC, April 19 – 21, 2007.

Bieryla KA, Madigan ML, and Nussbaum ML. "Trip Recovery: Can We Improve It Through Practice to Prevent Falls?" *84th Annual Meeting of the Virginia Academy of Science*, Blacksburg, VA, May 24-26, 2006.

Bieryla KA, Madigan ML, and Nussbaum ML. "Improvements and Retention of Trip Recovery Due to Repeated Exposures From a Simulated Trip." *1st Annual Southeast Biomechanics Conference*, Atlanta, GA, March 30 – April 1, 2006.

SKILLS:

Instrumentation:
Force plate/kinetic analysis
Motion analysis systems/kinematic analysis
Electromyography
Dynamometry
Basic electronics (e.g. potentiometers, accelerometers, load cells)
Anthropometry

Computer Skills:
MATLAB
LabVIEW
Vicon Nexus
JMP
Minitab
MaxTRAQ
SOLIDWORKS
Microsoft Office (Word, Excel, PowerPoint)

TECHNICAL REVIEWER:

Archives of Physical Medicine and Rehabilitation
Clinical Biomechanics
Clinical Interventions in Aging
Gait and Posture
Games for Health Journal
IIE Transactions on Occupational Ergonomics and Human Factors
Journal of Applied Biomechanics
Journal of Biomechanical Engineering
Journal of Biomechanics
Journal of Nutrition, Health and Aging
Medicine & Science in Sports & Exercise
Scientific Reports
Smart Health

RESEARCH AND TRAVEL GRANTS:

Bieryla K, Travel to World Congress of Biomechanics, Dublin, Ireland, Arthur Butine Fund for Faculty Development, $1,400, July 8-13, 2018

Bieryla K, "Quantifying fitness of collegiate field hockey athletes during one season" Arthur Butine Fund for Faculty Development, $3000, Summer 2018

Thompson S, **Bieryla K**, Snyder R, "Monitoring Athletic Performance to Support Athlete Wellness" Joseph A. Ciffolillo'61 Healthcare Technology Inventors Program, $9849, May 2016-2017

Bieryla K, "The Kinematic Information Capture and Reporting (KICR) System" Scholarly Development Grant, Faculty Development Committee, Bucknell University, $4000, Summer 2015

Geist E, **Bieryla K**, Diehl D. "Characterization of Endoscopic Parameters Toward the Creation of an Automated Endoscope" Bucknell-Geisinger Research Initiative Seed Grant, $10000, May 2012-July 2013

Bieryla K, Scholarly Development Grant, Faculty Development Committee, Bucknell University, $4000, Summer 2012

Bieryla K, "An Investigation of a Balance Recovery Task" AAUW Selected Professions Fellowship, $20000, July 2008–June 2009

PROFESSIONAL HONORS:
Honorable Mention for the Torgersen Research Award in the MS poster category, March 2007
College of Engineering Deans Fellowship, Virginia Tech, August 2004 – August 2007
Cahill Fellowship, Virginia Tech, August 2006 – August 2007
John Lee Pratt Research Fellowship, Virginia Tech, August 2004 – August 2005
Tau Beta Pi, National Engineering Honor Society
Golden Key International Honor Society
National Society of Collegiate Scholars
Lambda Sigma Honor Society
Engineering Honors Scholarship, University of Pittsburgh, August 2000 – April 2004

PROFESSIONAL AFFILIATIONS:
American Society of Biomechanics
American Society of Engineering Education

PROFESSIONAL DEVELOPMENT:
KEEN (Kern Entrepreneurial Engineering Network) Winter Conference, Jan. 2014, Jan. 2016, Jan 2018
National Effective Teaching Institute (NETI), June 17-19, 2010
Bucknell Teaching Workshop, August 2009
Guest lecturer for Musculoskeletal Biomechanics class, Fall 2008
Assisted in conducting class laboratories for the Musculoskeletal Biomechanics class, Fall 2006-2008
Session chair, 23rd Annual Research Symposium and Exposition. Graduate Student Assembly, Virginia Polytechnic Institute and State University, March 2007
Biomechanics Journal Club (charter member) – student initiated group to provide a weekly platform for academic exchange and professional development, 2005-2009
Faculty Development Workshop: Writing Successful Grants, Blacksburg, VA, Sept 2005

SERVICE ACTIVITIES:
National Level:
- Paper Reviewer, Biomedical Engineering Division, American Society of Engineering Education Annual Meeting, Salt Lake City, UT, June 2018
- NSF review panel, February 2017
- Paper Reviewer, Biomedical Engineering Division, American Society of Engineering Education Annual Meeting, Columbus, OH, June 2017
- Poster Judge, MS-level, 2014 World Congress of Biomechanics Student Paper Competition, World Congress of Biomechanics, Boston, MA, July 2014
- Session Chair, American Society of Biomechanics Annual Meeting, Omaha, NE, Sept., 2013
- Abstract Reviewer, American Society of Biomechanics Annual Meeting, Omaha, NE, Sept., 2013
- Poster Judge, Biomedical Engineering Division, American Society of Engineering Education Annual Meeting, Atlanta, GA, June, 2013
- Paper Reviewer, Biomedical Engineering Division, American Society of Engineering Education Annual Meeting, Atlanta, GA, June, 2013
- Grant reviewer for the Health Research Council of New Zealand, 2012
- Paper Reviewer, Biomedical Engineering Division, American Society of Engineering Education Annual Meeting, San Antonio, TX, June, 2012
- Student Representative for the American Society of Biomechanics, Aug. 2006 – Aug. 2008

University Level:
- Innovation Plaza/Physical Plant Renovation Steering Committee, University of Portland, Fall 2018 – Present
- Faculty Colloquium Committee, Bucknell University, Spring 2015 – Spring 2016
- Faculty and Academic Personnel Committee, Bucknell University, Fall 2012 – Spring 2015
- Community Judicial Board, Faculty Member, Bucknell University, Fall 2012 – May 2017

College/School Level:
- Shiley School Scholarship Guidelines Committee, University of Portland, Fall 2018 – Present
- Representative to 2018 WE Local conference, Portland, OR, April 2018
- Advisor to the Biomedical Engineering Club, University of Portland, Fall 2017 – Present
- Instructional Facilities Committee, Bucknell University, Fall 2013 – Spring 2016

Engineering Curriculum Committee, Bucknell University, Fall 2009 – Spring 2013
Advisor to the Society of Women Engineers, Bucknell University, Fall 2010 – Spring 2016
Search committee for Mechanical Engineering visiting faculty members, Bucknell University, Spring 2013
Search committee for Mechanical Engineering visiting faculty members, Bucknell University, Spring 2011

Department/Program Level:
Junior Parents Weekend, University of Portland, Spring 2018
Admissions Open Houses, Bucknell University

Community Level:
Engineering outreach to high school students at the Science and Mathematics Academy at Aberdeen High School, Aberdeen MD – March 2013
Bucknell University Engineering Camp – June 2010-2016