DEVIN R. BERG, Assistant Professor

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Education

PhD Mechanical Engineering Expected 2012
University of Minnesota – Twin Cities, GPA: 3.8/4.0, Advisors: Perry Y. Li, PhD and Arthur G. Erdman, PhD

MS Mechanical Engineering, minor in Biomedical Engineering February 2011
University of Minnesota – Twin Cities, GPA: 3.8/4.0, Advisor: Perry Y. Li, PhD

BS Mechanical Engineering May 2008
University of Wisconsin – Madison, GPA: 3.7/4.0, Graduated with Honors

Research Experience

University of Minnesota – Twin Cities, Minneapolis, Minnesota
Research Assistant (PhD Thesis), January 2009 – present
Advisors: Perry Y. Li, PhD and Arthur G. Erdman, PhD

- Researched and designed a novel robotic, hydraulic, multi-articulated surgical platform for use with various forms of surgical procedures.
- Designed a novel hydraulic valve capable of low-flow rate, high-pressure operation within restrictive size constraints.
- Planned and fabricated prototypes for various components of the proposed surgical platform for validation and testing design effectiveness.
- Developed analytical and numerical models to describe system kinematics and test operation.

University of Wisconsin – Madison, Madison, Wisconsin
Research Lab Assistant, *Bone and Joint Biomechanics Laboratory*, May – August 2008
Advisor: Heidi-Lynn Ploeg, PhD

- Conducted an experimental study evaluating the accuracy, precision, and repeatability of an Optotrak motion capture camera system.
- Prepared computer models of human bones and joint implants using image processing software, Mimics.
- Performed data analysis, interpreted results, and summarized findings in preparation for submission to a peer-reviewed journal for publication.

University of Wisconsin – Madison, Madison, Wisconsin
Undergraduate Researcher, *Neuromuscular Biomechanics Laboratory*, January – May 2008
Advisor: Darryl G. Thelen, PhD

- Designed and fabricated mounting plates to rigidly attach a six degree-of-freedom load cell between a bicycle saddle and seat tube.
- Conducted an experimental study evaluating the dynamic loads and moments to which the saddle is subjected during normal operation of the bicycle.
- Analyzed resulting data and prepared an internal report to validate previous findings obtained using pressure sensitive mats to measure saddle pressure distributions.

Cummins Emission Solutions, Stoughton, Wisconsin
Thermal and Fluid Sciences Intern, *Research and Development*, January 2007 – May 2008
Supervisor: Z. Gerald Liu, PhD, PE

- Collected and analyzed chemical speciation data from diesel engine emissions.

- Interpreted experimental results and prepared manuscripts for both internal report and external publication.

Teaching Experience

Engineering and Technology Department, University of Wisconsin – Stout, Menomonie, Wisconsin
Assistant Professor, August 2012 – Present

Medical Devices Center, University of Minnesota – Twin Cities, Minneapolis, Minnesota
Lab Supervisor, July 2011 – August 2012

- Co-founded an undergraduate internship program.
- Mentored various undergraduate and graduate engineering design groups in the medical device development process and general engineering design.
- Designed, maintained, and enforced safety protocols for a multi-function laboratory space.
- Trained students in the use of advanced prototyping and development equipment.
- Developed and maintained an up-to-date design environment through equipment acquisition, skills training, and needs analysis.

School of Engineering, University of St. Thomas, St. Paul, Minnesota
Adjunct Faculty, January 2012 – May 2012

- Led a laboratory class covering the topics of statics and dynamics.
- Helped students to make the connection between classical theory and the real-world applications through the use of hands-on projects.
- Introduced students to the basics of manufacturing by teaching wood and metal machining skills.

Department of Mechanical Engineering, University of Minnesota – Twin Cities, Minneapolis, Minnesota
Teaching Assistant, *Senior Design Projects*, September 2011 – present

- Provided project support for 47 industry sponsored student senior design groups.
- Assisted students through the design experience and provided feedback through project reviews.
- Located on-campus resources and equipment to meet various project needs.

Teaching Assistant, *Design and Manufacturing I*, January 2010 – August 2011

- Instructed students in both a small group lecture format and laboratory format.
- Covered topics including statics, stress analysis, machine component design, mechanics, fatigue, manufacturing processes, and computer aided design/analysis.
- Supervised laboratory sessions on basic machining, numerically controlled machining, injection molding, rolling, and welding.
- Developed a new laboratory machining exercise designed to expose students to a variety of machining processes in a more cost-efficient manner than the existing exercise.

Teaching Assistant, *Design and Manufacturing II*, January 2010 – May 2010

- Led a discussion section of approximately 50 students weekly.
- Lectured on topics including graphical and analytical synthesis of mechanisms, mechanism analysis, machine component selection, and kinematics.
- Mentored student groups in the design and analysis of mechanism based projects.

Fellowships/Grants

3M Science and Technology Fellowship, 2008 – present

University of Minnesota – Medical Devices Center Project Grant, 2009

Memberships

American Society for Engineering Education

American Society of Mechanical Engineers
Product Development and Management Association
Pi Tau Sigma (Honorary Mechanical Engineering Society)
Tau Beta Pi (Honorary Engineering Society)

Publications

Journal Papers

Berg, D.R., Li, P.Y., and Erdman, A.G., 2012. Optimized selection of McKibben artificial muscle actuators. *Journal of Mechanisms and Robotics.* In preparation.

Liu, Z.G., **Berg, D.R.**, Vasys, V.N., Dettmann, M.E., Zielinska, B., and Schauer, J.J., 2010. Analysis of C_1, C_2, and C_{10} through C_{33} particle-phase and semi-volatile organic compound emissions from heavy-duty diesel engines. *Atmospheric Environment.* Vol. 44, pp. 1108-1115.

Liu, Z.G., **Berg, D.R.**, Swor, T.A., Schauer, J.J., and Zielinska, B., 2009. A study on the emissions of chemical species from heavy-duty diesel engines and the effects of modern aftertreatment technology. *SAE Technical Paper 2009-01-1084 (SP-2254).*

Schmidt, J., **Berg, D.R.**, Ploeg, L., and Ploeg H.-L., 2009. Precision, repeatability and accuracy of Optotrak® optical motion tracking systems. *International Journal of Experimental and Computational Biomechanics.* Vol. 1, No. 1, pp. 114-127.

Liu, Z.G., **Berg, D.R.**, and Schauer, J.J., 2008. Effects of a zeolite-selective catalytic reduction system on comprehensive emissions from a heavy-duty diesel engine. *Journal of the Air and Waste Management Association.* Vol. 58, No. 16, pp. 1258-1265.

Liu, Z.G., **Berg, D.R.**, Swor, T.A., and Schauer, J.J., 2008. Comparative analysis on the effects of diesel particulate filter and selective catalytic reduction systems on a wide spectrum of chemical species emissions. *Environmental Science and Technology.* Vol. 42, No. 16, pp. 6080-6085.

Liu, Z.G., **Berg, D.R.**, and Schauer, J.J., 2008. An analysis of methods for measuring particulate matter mass emissions. *SAE Technical Paper 2008-01-1748 (V117-4).*

Liu, Z.G., **Berg, D.R.**, and Schauer, J.J., 2008. Detailed effects of a diesel particulate filter on the reduction of chemical species emissions. *SAE Technical Paper 2008-01-0333 (V117-4).*

Conference Proceedings

Berg, D.R., Harder, L.A., and Erdman, A.G., 2012. Generating interest in technology and medical devices through an interactive educational game. In *Proceedings of the 2012 ASEE Annual Conference and Exposition*, San Antonio, TX. *Submitted*.

Berg, D.R., Kinney, T.P., Li, P.Y., and Erdman, A.G., 2011. Determination of surgical robot tool force requirements through tissue manipulation and suture force measurement. In *Proceedings of the 2011 Design of Medical Devices Conference*, Minneapolis, MN.

Berg, D.R., Carlson, A., Durfee, W.K., Sweet, R.M., and Reihsen, T., 2011. Low-cost, take-home, beating heart simulator for health-care education. In *Proceedings of Medicine Meets Virtual Reality 18*, Newport Beach, CA.

Poster Presentations

Berg, D.R., Kinney, T.P., Li, P.Y., and Erdman, A.G. *Determination of surgical robot tool force requirements through tissue manipulation and suture force measurement.* Design of Medical Devices Conference. Minneapolis, MN, 2011.

Berg, D.R., Carlson, A., Durfee, W.K., Sweet, R.M., and Reihsen, T. *Low-Cost, Take-Home, Beating Heart Simulator for Health-Care Education.* Medicine Meets Virtual Reality 18. Newport Beach CA, USA, 2011.

Berg, D.R., Li, P.Y., Erdman, A.G., Cui, T., and Kinney, T.P. *The Application of Fluid Power to Meet the Needs of Surgical Robotics.* LifeScience Alley Conference & Expo. Minneapolis MN, USA, 2010.

Berg, D.R., Li, P.Y., Erdman, A.G., Cui, T., and Kinney, T.P. *The Application of Fluid Power to Meet the Needs of Surgical Robotics.* 2010 North American Summer School in Surgical Robotics and Simulation. Seattle WA, USA, 2010.

Berg, D.R., Li, P.Y., Erdman, A.G., Cui, T., and Kinney, T.P. *Robotic Multi-Articulated Surgical Tools for NOTES*. Institute for Engineering in Medicine Innovation Showcase. Minneapolis MN, USA, 2009.