Jesse Pentzer

2222 Concord Drive
State College, PA 16801
United States of America
+1 (208) 669-0266
jlp5573@psu.edu

Education

2010–2014 **Doctor of Philosophy in Mechanical Engineering**, *The Pennsylvania State University*, University Park, PA.
GPA: 4.0/4.0
Thesis: Utilization of ICR kinematics in estimation, control, and energy-aware mission planning for skid-steer vehicles

2008–2010 **Master of Science in Mechanical Engineering**, *University of Idaho*, Moscow, ID.
GPA: 4.0/4.0
Thesis: Navigation and collaboration of autonomous underwater vehicles when measuring magnetic fields

2004–2008 **Bachelor of Science in Mechanical Engineering**, *University of Idaho*, Moscow, ID.
GPA: 4.0/4.0, Summa Cum Laude

Interests

Teaching Kinematics, Dynamics, System Modeling, Feedback Control, Vibrations, Mechatronics, Estimation

Research Robotics and Control, System Identification, Applied Linear and Nonlinear Control, Mechatronics, Automation

Experience

Research

2010-2014 **Research Assistant**, *Pennsylvania State University*, University Park, PA.
Research in the modeling and design of ground robot powertrains. Prediction of skid-steer robot motion through on-line estimation of track/wheel instantaneous centers of rotation. Sensor integration and fusion for the detection of sensor and powertrain faults. Prediction of skid-steer robot power usage through on-line estimation of terrain-related parameters.
Additional work:

- Developed and maintained two advanced skid-steer robot platforms for field testing.
- Assisted the Penn State Applied Research Lab with work on model-based fault detection and intelligent repair diagnostics for ground robots.
- Continued prior research on robot power train design and modeling.
- Mentored honors undergraduate students and master's degree students.

2008–2010 **Research Assistant**, *University of Idaho*, Moscow, ID.

Research on the measurement of the magnetic signature of surface naval vessels using autonomous underwater vehicles.

- Aided in the design and construction of five autonomous underwater vehicles.
- Designed and implemented Kalman filtering algorithms for underwater localization.
- Installation, calibration, and data reduction for advanced magnetic sensors.
- Collaborated with research scientists through research sponsored by the Office of Naval Research.

Teaching/Mentorship

2010-2014 **Research Assistant**, *Pennsylvania State University*, University Park, PA.

Mentored honors undergraduate students and master's degree students. Provided research guidance in the areas of estimation, control, and system modeling. Assisted with the development of testing equipment and complex sensor integration. Developed lecture material in the areas of DC electric motor modeling and modeling of skid-steer ground robots.

Miscellaneous

2004–2007 **Fire Fighter Type I, Helicopter Crewmember**, *Idaho Department of Lands*, Craigmont, ID.

Worked to maintain state timber land and suppress wildfires in the Craig Mountain District. Also gained training and experience in leadership and decision making in high stress situations.

Computer Skills

Analysis	MATLAB, Simulink, Mathcad, Python, Open Modelica, EES
Integration	Linux, ROS, C++, Python, xPC Target
Design	SolidWorks, SketchUp
Writing	Word, LaTeX

Honors and Awards

2014	Gabron Graduate Fellowship, Penn State
2012–2014	Walker Graduate Fellowship, Applied Research Lab, Penn State
2010–2013	University Graduate Fellowship, Penn State
2012	IEEE Oceans Student Poster Participant, Hampton Roads, VA
2008	Outstanding Senior Mechanical Engineering Student, University of Idaho
2008	Jesse Buchanan Award, University of Idaho

Outreach

2014 **Penn State Artificial Intelligence vs. Science-U Summer Camp**.

Developed demo allowing high school students to program research skid-steer robot. Assisted with teaching programming and ground robot control algorithms to students.

2014 **Penn State IEEE Robotics Competition**.

Served as judge for robotics competition. Interviewed competitors to provide feedback on robot design and presentation skills. Provided demonstrations of larger ground robots used in university research.

2011 & 2012 **Higher Achievement at Penn State**.

Provided a hands-on robotics demonstration for youth attending as part of the Higher Achievement visit to Penn State University. Students were provided the opportunity to cooperatively operate a large ground robot.

Leadership

2012 President, Mechanical and Nuclear Engineering Graduate Student Council

2012–2013 President, Penn State Club Disc Golf

References

References available on request.

Publications

J. Pentzer, S. Brennan, and K. Reichard, "Model-based prediction of skid-steer robot kinematics using on-line estimation of track instantaneous centers of rotation," *Journal of Field Robotics*, vol. 31, no. 3, pp. 455–476, 2014.

J. Pentzer, S. Brennan, and K. Reichard, "On-line estimation of vehicle motion and power model parameters for skid-steer robot energy use prediction," in *Proceedings of the American Control Conference*, (Portland, OR), 2014.

J. Pentzer, S. Brennan, and K. Reichard, "The use of unicycle robot control strategies for skid-steer robots through the icr kinematic mapping," in *Proceedings of 2014 IEEE/RSJ International Conference on Robots and Systems*, (Chicago, IL), 2014.

F. Maldonado, S. Oonk, K. Reichard, and J. Pentzer, "SOM with neighborhood step decay for motor current based diagnostics," in *Proceedings of the IEEE SMC International Conference on Systems, Man, and Cybernetics*, (San Diego, CA), 2014.

S. Oonk, F. Maldonado, Z. Li, K. Rieichard, and J. Pentzer, "Extended Kalmanfilter for improved navigation with fault awareness," in *Proceedings of the IEEE SMC International Conference on Systems, Man, and Cybernetics*, (San Diego, CA), 2014.

J. Pentzer and S. Brennan, "Investigation of the effect of continuously variable transmissions on ground robot powertrain efficiency," in *Proceedings of the American Control Conference*, (Montreal, Quebec), 2012.

J. Pentzer and E. Wolbrecht, "Improving autonomous underwater vehicle navigation using inter-vehicle ranging," in *Proceedings of the IEEE Oceans Conference*, (Hampton Roads, VA), 2012.

D. Logan, J. Pentzer, S. Brennan, and K. Reichard, "Comparing batteries to generators as power sources for use with mobile robotics," *Journal of Power Sources*, vol. 212, pp. 130–138, 2012.

J. Pentzer, B. Armstrong, J. Canning, T. Bean, D. Odell, D. Edwards, M. Anderson, E. Wolbrecht, and J. Frenzel, "Spatial sampling of magnetic field using collaborating autonomous underwater vehicles," in *Proceedings of the MSS Battlespace Acoustic and Seismic Sensing, Magnetic & Electric Field Sensors Symposium*, 2010.

D. Odell, J. Pentzer, J. Canning, and D. Edwards, "A versatile underwater tracking system for AUV testing," in *Proceedings of IEEE Oceans Conference*, (Sydney, Australia), 2010.

J. Pentzer, B. Crosbie, T. Bean, J. Canning, J. Frenzel, M. Anderson, and D. Edwards, "Measurement of magnetic field using collaborative auvs," in *Proceedings of IEEE Oceans Conference*, (Sydney, Australia), 2010.

J. Canning, M. Anderson, D. Edwards, M. O'Rourke, T. Bean, J. Pentzer, and D. Odell, "A low bandwidth acoustic communication strategy for supporting collaborative behaviours in a fleet of autonomous underwater vehicles," *U.S. Navy Journal of Underwater Acoustics*, vol. 59, no. 3, pp. 285–299, 2009.

J. Pentzer, B. Armstrong, D. Odell, T. Bean, J. Canning, M. Anderson, and D. Edwards, "On-the-fly measurement of surface ship acoustic and magnetic signature using multiple AUVs," in *Proceedings of MSS Battlespace acoustic and Seismic Sensin, Magnetic & Electric Field Sensors Symposium*, 2009.

B. Armstrong, J. Pentzer, D. Odell, T. Bean, J. Canning, D. Pugsley, J. Frenzel, M. Anderson, and D. Edwards, "Field measurement of surface ship magnetic signature using multiple AUVs," in *Proceedings of MTS/IEEE Oceans Conference*, (Biloxi, MS), 2009.

J. Pentzer, B. Armstrong, T. Bean, M. Anderson, D. Edwards, and N. Schmehl, "Preventing extended Kalman filter instabilities during two transponder long baseline navigation with real time fuzzy logic parameter adjustment," in *Proceedings of the IEEE Oceans Conference*, (Bremen, Germany), 2009.