WILLIAM BARBOUR

Objective

To pursue a graduate degree in a multidisciplinary engineering field with research focus on applications of data, computational tools, and engineering insight to physical engineering problems.

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Education

University of Illinois at Urbana-Champaign (June 2017 - Present)

- pursuing Ph.D. in Civil Engineering
- Advisor: Daniel Work, Ph.D. (see references)

University of Illinois at Urbana-Champaign (June 2015 - May 2017)

- M.S. in Civil Engineering (Sustainable and Resilient Infrastructure Systems)
- Advisor: Daniel Work, Ph.D. (see references)

University of Tennessee, Knoxville (August 2011 - May 2015)

- B.S. in Biosystems Engineering with Honors
- Advisor: Paul Ayers, Ph.D. (see references)
- Overall GPA: 3.97; In Major: 3.98

Katholieke Universiteit Leuven, Belgium (Summer 2013)

- Study abroad program with Texas A&M University
- GPA: 4.0

Experience

Graduate Research Assistant, Civil and Environmental Engineering Department (May 2015-present)

- Supervisor/Advisor: Dan Work, Ph.D. (see references)
- Current project involves application of large-scale data and machine learning to improve state estimation and prediction in transportation fields.
- Also assisted on projects (still in progress) involving novel use of sensors in traffic monitoring by assembling hardware and writing software for data collection.

Intern, Operations Research, Modeling, and Analytics, CSX Transportation (May - August 2016)

- Led integration of GIS referencing with network models and existing data streams
- Assisted in construction of partial-network simulation tools
- Gathered data from internal databases for calculation of operational metrics

Undergraduate Research Assistant, Biosystems Engineering Power and Machinery Laboratory (October 2011- May 2015)

- Supervisor: Paul Ayers, Ph.D. (see references)
- Assisted with numerous projects including kayak-based underwater and streambank video mapping, snorkel-based underwater video mapping, and terrain impact studies of wheeled vehicles (in cooperation with US Army Corps of Engineers)
- Led design project on prototype body-board stream mapping platform, participated in mapping of Manoa Stream with Hawaii Division of Aquatic Resources in Honolulu, Hawaii
- Continual work on Honors Thesis (Fall 2013 - Fall 2014)

Utilities Engineer, Oak Ridge National Laboratory (May - August 2014)

- Conducted various engineering studies concerning mechanical utilities infrastructure and support systems and provided formal reports on possible and recommended courses of action
- Reengineered antiquated GIS data to conform to global projection and facilitate infrastructure projects

Consultant, Hawaii Department of Land and Natural Resources, Division of Aquatic Resources (Summer 2014)

- Provided consultation on stream mapping equipment and techniques and demonstrated prototype mapping system

Teaching

Instructor, UNHO 102: Humanity and the Environment (Spring 2012)

- Designed and led seminar course taken by freshman honors students
- Taught under the Honors Enrichment Fellowship

Teaching Assistant, BSE 451: Instrumentation and Control (Spring 2015)

- Prepared lab materials and exercises and assisted students with completion
- Delivered abbreviated lectures to supplement laboratory exercises

Teaching Assistant, HSP 195: Summer Leadership Program (Summer 2012, 2013)

- Prepared and presented on undergraduate research at the University of Tennessee
- Assisted in program planning for entering freshman Haslam Scholars

Student Success Center Tutor (2013)

- Part-time position assisting students in a variety of subjects including calculus I-III, chemistry, and engineering fundamentals

Skills

- Project organization and execution
- Field work training and experience
- Industrial safety training from US DOE
- Technical report authorship and review
- Microsoft Excel, Word, and PowerPoint
- Engineering design, including AutoCAD and AutoDesk Inventor
- C, C++, Python and MATLAB language experience
- SQL database systems and query language
- Applied machine learning techniques and algorithm tuning
- Data mining and visualization techniques
- Mathematical programming (AMPL, CPLEX, Gurobi)
- Embedded systems (Arduino and Raspberry Pi) and electronic circuit design
- Fabrication in wood, metal, and plastic (3D printing)

Honors and Awards

- Roadway Safety Institute Student of the Year Award, 2016
- Federal Highway Administration Dwight David Eisenhower Transportation Fellowship, 2016-2017
- Civil and Environmental Engineering Graduate Student Fellowship, University of Illinois at Urbana Champaign, 2015-2016
- University of Tennessee Haslam Scholar (class of 2011)
    - University's premier undergraduate academic scholarship; one of fifteen students selected annually
    - Exclusive academic program consisting of ten honors courses and summer study abroad experience in Costa Rica
- University of Tennessee Chancellor's Honors Program
    - Honors Peer Mentor (2013-2014)
    - Honors Study Abroad Scholarship (Summer 2012)
- Honors Research Grant (Spring 2013)
    - Proposal: Integration of Continual Water Parameter Measurement with Existing Aquatic Habitat and Streambank Mapping Systems

- Eph. C. Gose Agricultural Engineering Fund Scholarship (2013-2014)
- College of Engineering Academic Excellence Scholarship (2011-2012)
- Alcoa Fellowship Study Abroad Scholarship (Summer 2013)
- College of Agricultural and Natural Resources Outstanding Senior Award (2014)
- Department of Biosystems Engineering and Soil Science Outstanding Senior Award (2014)
- Tau Beta Pi Engineering Honor Society (Spring 2012-present)
- Phi Kappa Phi National Honor Society (Spring 2013-present)
- Gamma Sigma Delta Honor Society of Agriculture (Fall 2012-present)
- University of Tennessee Dean's List (Spring 2012, Fall 2012, Spring 2013, Fall 2013, Spring 2014)

Activities and Involvement

- Invited participant at ThinkChicago: Chicago Ideas Week 2016
- Mentoring Undergraduate Students in Engineering Program
    - Graduate student mentor, 2016-2017
- American Society of Agricultural and Biological Engineers, Southeastern Region
    - Parliamentarian (Fall 2014-Spring 2015)
- American Society of Agricultural and Biological Engineers, University of Tennessee chapter
    - President (Fall 2013-Spring 2014)
    - Treasurer (Fall 2014-Spring 2015)
    - Scribe (Fall 2012-Spring 2013)
- Founding member and Vice President of Finance and Fundraising of Net Impact, University of Tennessee chapter (Fall 2012-Spring 2013)
- Alternative Spring Break trip leader (Spring 2014)
    - Planned and led week-long service trip to Charleston, SC, involving twenty undergraduate students in environmental conservation-focused volunteer work
- Alternative Spring Break participant (Spring 2013)
    - Attended week-long service trip to Miami, FL, concerning aquatic habitat restoration
- Chair of Haslam Scholars Program Recruitment Committee (2013-2014)
- Member of Haslam Scholars Program Committee Restructuring Team
- College of Agricultural Sciences and Natural Resources study abroad ambassador (2013-present)
- Student speaker for new faculty orientation at the University of Tennessee (Summer 2014)
- Selection committee for Director of Chancellor's Honors and Haslam Scholars Program (Spring 2012)
- Volunteer at Knoxville Botanical Gardens and Arboretum (2012-present)

- Volunteer at Ijams Nature Center (2014-present)
- Volunteer at Ronald McDonald House (Knoxville, TN) (2013-present)

Publications

- W. Barbour, J. C. Martinez Mori, S. Kuppa, D. Work. "Estimating Arrival Times for US Freight Rail Traffic." submitted to *Transportation Research Part C: Emerging Technologies*, 2017.
- W. Barbour, J. McMillan, E. Moore. "Design of a Mobile Shade and Cooling Structure for Grazing Dairy Herds."
    - Winner of William Harris III Undergraduate Research Award
- W. Barbour, P. Ayers. "Multi-Pass Rut Volume and Applied Power Study." *Pursuit Journal of Undergraduate Research,* Volume 5: Issue 1, Article 5, 2014.
    - Available at: http://trace.tennessee.edu/pursuit/vol5/iss1/5/

Presentations

- J. C. Martinez Mori, W. Barbour, S. Kuppa, D. Work. "Predicting Delay Occurrence at Freight Rail Sidings." *2018 Transportation Research Board Annual Meeting*, Washington, D.C., 2018.
- W. Barbour, S. Kuppa, D. Work. "Prediction of arrival times of freight traffic on US railroads using support vector regression." *INFORMS Annual Meeting 2017*, Houston, TX, 2017.
- W. Barbour, S. Kuppa, D. Work. "Prediction of arrival times of freight traffic on US railroads using machine learning regression." *Rail Infrastructure and Vehicle Inspection Technology Conference 2017*, University of Illinois at Urbana-Champaign, 2017.
- W. Barbour, S. Kuppa, D. Work. "Supporting automated operations with improved arrival time predictions on US freight railroads." *IRTL Conference on Integrated Transportation*, 2016.
    - Extended abstract available at: https://www.itrl.kth.se/polopoly_fs/1.709809!/Abstract_Barbour_kuppa_work_Cit16_10102016.pdf
    - Presentation available at: https://www.itrl.kth.se/polopoly_fs/1.709160!/KTH_IRTL_Barbour_publish.pdf
- W. Barbour, S. Kuppa, D. Work. "A machine learning framework for predicting arrival times of freight traffic on US railroads." W*orkshop on Data Quality in an Era of Big Data,* University of Indiana, 2016.
- W. Barbour, J. McMillan, E. Moore. "Design of a Mobile Shade and Cooling Structure for Grazing Dairy Herds." *Exhibition of Undergraduate Research and Creative Achievement*, 2015.
    - Available at: http://trace.tennessee.edu/utk_eureca/2015/agsciences/1/
- W. Barbour, P. Ayers. "Integration of Continual Water Parameter Measurement with Existing Aquatic Habitat and Streambank Mapping Systems." Honors Undergraduate Research Symposium, 2015.
    - Available at: http://trace.tennessee.edu/utk_biospubs/8/

- W. Barbour. “Design of an Underwater Video and GPS Mapping System for the Exploration of Streambed Aquatic Populations.” *Exhibition of Undergraduate Research and Creative Achievement*, 2013.
    - Winner of Agricultural Sciences and Natural Resources division
    - Available at: http://trace.tennessee.edu/utk_eureca/2013/agsciences/1/
- W. Barbour, P. Ayers. “Multi-Pass Rut Volume and Applied Power Study.” *Honors Undergraduate Research Symposium*, 2013.

References

- Daniel Work, Ph.D.
    - Associate Professor, Civil and Environmental Engineering, Vanderbilt University
    - Institute for Software Integrated Systems
    - Jacobs Hall 293; 400 24TH Ave. S, Nashville, TN 37240
    - dan.work@vanderbilt.edu
- Chris Barkan, Ph.D.
    - Professor, Civil and Environmental Engineering, University of Illinois at Urbana-Champaign
    - Executive Director of RailTEC, Director of National University Rail Center
    - 205 North Mathews Ave.; Office 1245; Urbana, IL 61801
    - dbwork@illinois.edu
- Shankara Kuppa, Ph.D.
    - CSX Transportation
    - Shankara_Kuppa@csx.com
- Paul Ayers, Ph.D., P.E.
    - Professor, Biosystems Engineering and Soil Science
    - 2506 E.J. Chapman Dr.; Office 314; Knoxville, TN 37996
    - (865) 974-4942; pdayers@utk.edu
- Daniel Yoder, Ph.D.
    - Professor, Biosystems Engineering and Soil Science
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- **Writing sample available upon request**