

# Curriculum Vitae

**Gregory Steven Mason**

mason@seattleu.edu

## Education

*Ph.D. Mechanical Engineering*

University of Washington, Seattle, Washington, 1992

Area of Specialization: Design and analysis of multirate digital control systems, focusing on synthesis of low order multirate control laws via numerical optimization, and analysis via structured singular values

*M.S. Mechanical Engineering*

Georgia Institute of Technology, Atlanta, Georgia, 1984

Area of Specialization: Computer Integrated Manufacturing

*B.S. Mechanical Engineering*

Gonzaga University, Spokane, Washington, 1983

*Licensed Professional Engineer, Washington State, 1989*

## Work Experience

*Professor*

Mechanical Engineering, 1993-present

Seattle University, Seattle, Washington

Department Chair, 2007-2012

- Developed the curriculum for the Manufacturing Engineering Program at Seattle University
- Courses Taught
  - Manufacturing Automation with Emphasis on Digital Controls
  - Data Acquisition and Instrumentation
  - Computer Aided Design using Parametric Solid Modeling
  - Engineering Methods/Programming for Engineers
  - Manufacturing Processes
  - Statics
  - Computer Integrating Manufacturing
  - Control Systems & Robotics
- Research
  - Engineering Education
  - Controls Systems and Data Acquisition

*Affiliate Associate Professor, University of Washington 2000-2018*

*Adjunct Faculty, Seattle Pacific University, Seattle, Washington 1993*

### *Research Assistant & Post Doctorate Research 1989-1993*

University of Washington, Seattle, Washington

- Developed software for synthesizing low order multirate digital control laws
- Designed a digital control law for an aircraft yaw-damper/modal suppression system
- Designed a multirate flutter suppression system for NASA's Benchmark Models wing

### *Mechanical Engineer, Robotics Laboratory, 1984-1988*

Naval Undersea Warfare Engineering Station (NUWES), Keyport, Washington

- Designed and implemented a robotic system for MIG welding sheet aluminum
- Designed a robotic fueling system which used feedback from six axis force/torque sensor to modify the robot's path during part insertion procedures
- Developed a 3-D robot simulation software package for a HP workstation
- Developed communication software, based on the ISO reference model, which was used in both the welding robot and the fueling robot

### **Journal Publications (Peer Reviewed)**

1. R.P. McLaughlin, D.A. Parks, A.I. Grubb, G.S. Mason, A.L. Miller, "A predictive model for elemental carbon, organic carbon and total carbon based on laser induced breakdown spectroscopy measurements of filter-collected diesel particulate matter" *Spectrochimica Acta Part B: Atomic Spectroscopy*, Volume 168, June 2020, 105871
2. Han, Y.L., Cook, K., Shuman, T.R., Mason, G. "Enhance Engineering Design Education in the Middle years with Authentic Engineering Problems", *ASME Journal of Mechanical Design*, 2018; 140(12):122001-122001-9.
3. Cook, K., Han, Y.L., Shuman, T.R., Mason, G. "Effects of Integrating Authentic Engineering Problem Centered Learning on Student Problem" *Int. Journal of Engineering Edu.*, Vol. 33, No. 1(A), pp. 272-282, 2017.
4. Shuman, T.R., Mason, G., Han, Y.L., and Cook, K., "A novel approach to educating engineers: learning in an inverted classroom through problems designed by engineering professionals" *Journal of Applied Engineering Science*, Volume 14, Number 3, Pages 329-334, 2016.
5. R. P. McLaughlin, G. S. Mason, A. L. Miller, C. B. Stipe, J. D. Kearns\*, M. W. Prier\* and J. D. Rarick1\*, "Note: A portable laser induced breakdown spectroscopy instrument for rapid sampling and analysis of silicon-containing aerosols," *Review of Sci. Instruments*. 87, 056103, 2016.
6. Mason, G., Larson, M., R. Deng\*, D. Reed\*, M. Pahlmeyer\*, N. Wright\*, Z. Wu, J. Yahata\*, "A Robust Low Cost Device for Measuring Road Induced Vibrations," *Journal of Cycling and Science*, January, 2016.
7. Shuman, T. R., Mason, G., Reeve\*, D., Schacht\*, A., Goodrich\*, A., Napan, K., and Quinn, J. "Low-Energy Input Continuous Flow Rapid Pre-Concentration of Microalgae through Electro-Coagulation-Flocculation" *Chemical Engineering Journal*, January 2016.
8. Rutar Shuman, T., Mason, G., Marsolek, M., Lin\*, Y., Reeve, D. \*, Schacht, A. \*, "Rapid and Ultra Low-Energy Use Microalgae Pre-Concentration Method", *Bioresource Technology*, February, 2014.
9. Mason, G., Shuman, T., Cook, K., "Comparing the Effectiveness of an Inverted Classroom to a Traditional Classroom in an Upper Division Engineering Course", *IEEE Transactions on Education*, November 2013.

10. Mason, G. and Dragovich, J. "Program Assessment and Evaluation Using Student Grades Obtained on Outcome-Related Course Learning Objectives", *ASCE Journal of Professional Issues in Engineering Education and Practice*, October, 2010.
11. Mason, G and Cornwell, R, "A C++ Programming Shell To Simplify GUI Development in a Numerical Methods Course", *Computers in Education Journal*, Vol XVII, No 2, April-June 2007.
12. Rutar, T, and Mason, G., "A Learning Community of University Freshman Design, Freshman Graphics, and High School Technology Students: Description, Projects, and Assessment" *ASEE Journal of Engineering Education*. April, 2005.
13. Mason, G.S, and Berg, M.C. "Linear Time Invariant Milling Models Applicable to Chatter Suppression System Design", *Systems Analysis, Modeling, Simulation*, Volume 43, Issue 2, 2003.
14. Mason, G.S, "A Handheld Data Acquisition System for use in an Undergraduate Data Acquisition Course", *IEEE Transactions on Education*, Vol 45, No. 4, November 2002.
15. Mason, G.S., Propogogana, A., Berg, M.C., "Design of a Flexible Test Bed for Control System Testing and Verification", *Mechatronics*, 2002.
16. Mason, G.S., "Results of a Manufacturing Engineering Survey," *ASEE Journal of Engineering Education*, July 1998.
17. Mason, G.S. and Berg, M.C., "Multirate Flutter Suppression System for a Model Wing," *AIAA Jour. Guid. Contr. and Dynamics*, Nov 1994.
18. Mason, G.S. and Berg, M.C., "Robustness Analysis of a Multirate Flutter Suppression System," *AIAA Jour. Guid., Contr. and Dynamics*, Vol 16, No. 5 September-October 1993.
19. Mason, G.S. and Berg, M.C., "Reduced Order Multirate Compensator Synthesis," *AIAA Jour. Guid. Contr. and Dynamics*, Vol 15, No. 3 May-June 1992.
20. Berg, M.C., Mason, G.S., and Yang, G.S., "A New Multirate Sampled-Data Control Law Structure and Synthesis Algorithm," *AIAA Jour. Guid. Contr. and Dynamics*, Vol 15, No. 5 September-October 1992.
21. Berg, M.C. and Mason, G.S., "Progress in Multirate Digital Control System Design," *NASA Contractor Report 187561*.

\*student researcher

### **Conference Publications (Peer Reviewed)**

1. Han, Y.-L., Mason, G., Cook, K., Shuman, T.R., and Turns, J. "WIP: Integrating Electrical Engineering Fundamentals with Instrumentation and Data Acquisition in an Undergraduate Mechanical Engineering Curriculum" *Proceedings of 2020 Frontiers in Education (FIE) Conference*, Uppsala, Sweden: IEEE, 2020
2. Han, Y., Cook, K. E., Han, Y., Shuman, T. R., Mason, G., Turns, J., "Engineering with Engineers: Fostering Engineering Identity through Industry Immersion" *Proceedings of the ASEE Annual Conference (Virtual)*. June 2020.
3. Cook, K. E., Han, Y., Shuman, T. R., & Mason, G., Turns, J., "Engineering Identity across the Mechanical Engineering Major" *Proceedings of the ASEE Annual Conference, Mechanical Engineering Division Technical Session*. June 2019
4. Han, Y., Cook, K. E., Shuman, T. R., and Mason, G., Turns, J., "Engineering with Engineers: Revolutionizing Engineering Education through Industry Immersion and a Focus on Identity (year 3)" *Proceedings of the ASEE Annual Conference*, June 2019

5. Han, Y., Cook, K. E., Shuman, T. R., and Mason, G., Turns, J. "Engineering with Engineers: Revolutionizing Engineering Education through Industry Immersion and a Focus on Identity" *Proceedings of the ASEE Annual Conference*, June 2018
6. Cook, K. E., Han, Y., Shuman, T. R., & Mason, G., Turns, J. "Engineering Identity across the Mechanical Engineering Major" *Proceedings of the ASEE Annual Conference*, Mechanical Engineering Division Poster Session + Paper. June 2018
7. Cook, K. E., Han, Y., Mason, G., Shuman, T. R., and Turns, J., "Revolutionizing Engineering Education through Industry Immersion and a Focus on Identity" *AERA 2018 Annual Meeting*, New York City, NY, April 13-17, 2018.
8. Han, Y., & Cook, K. E., & Shuman, T. R., & Mason, G., "Development of Authentic Engineering Problems for Problem-centered Learning" *Proceedings of the ASEE Annual Conference*, June 2016, New Orleans, Louisiana. 10.18260/p.26821
9. Shuman, T.R., Mason, G., Han, Y.L., and Cook, K., "Facilitating Problem-Based Learning with an Inverted Classroom" *Proceedings of the 6th International Symposium on Industrial Engineering – SIE 2015*, Plenary Session, Belgrade, Serbia, September 24-25, 2015.
10. Mason, G. S., Shuman, T. R., Han, Y. L., and Cook, K. E., "Facilitating Problem-Based Learning with an Inverted Classroom" *Proceedings of the ASEE Annual Conference*, June 2015, Seattle, Washington. 10.18260/p.24089
11. Mason, G.S., Shuman, T., Cook, K., "Inverting (Flipping) Classrooms – Advantages and Challenges", *Proceedings of the ASEE Annual Conference*, June 2013. Best Paper in Division.
12. Shuman, T., Mason G.S., "Novel Approach to Conducting Labs in an Introduction to Thermodynamics Course", *Proceedings of the ASEE Annual Conference*, June 2012, San Antonio, TX, Best Paper Award for PIC III – one of top five papers in the conference out of approximately 1400 papers.
13. Shuman, T., Mason G.S., "Description of Three Algae-Related Interdisciplinary Senior Design Projects in Mechanical Engineering and Their Impact on Students", *Proceedings of the ASEE Annual Conference*, June 2011, Vancouver BC. Best Paper in Division.
14. Shuman, T., Mason G.S., "Design of Experiments in Introduction to Thermodynamics Course", *Proceedings of the ASEE Annual Conference*, June 2011, Vancouver BC.
15. Mason, G., Shih, F., Dragovich, J., "Real-Time Access to Experimental Data Using Tablet PC's", *Proceeding of the ASEE Annual Conference*, June 2007, Honolulu Hawaii, AC 2007-1240, Best Paper in Division.
16. Rutar, T, and Mason, G. , "Three Freshman Team Design Projects", *Proceedings of the ASEE Annual Conference*, June 2005, Portland, Oregon.
17. Rutar, T. and Mason, G., "Assessing Student Design Team Performance in a Learning Community of University Freshman and High School Students." *Proceedings of the ASEE Annual Conference*, 2004.
18. Mason, G.S., Shuman, T., "Creating a Learning Community in a Freshman Design Course with a Senior High-School Class and a Freshman Graphics Class", *Proceedings of the ASEE Annual Conference*, Session 3553, June 2002.
19. Shuman, T., Mason, G.S., "Short-Term Course Assessment, Improvement, and Verification Feedback Loop" *Proceedings of the 2001 ASEE Annual Conference*, Session 1566, June 2001.
20. Evers, S.D., Berg, M.C., and Mason, G.S., "Simultaneous Control-Law Synthesis of an Aircraft Yaw-Damper and Modal Suppression System Using Parameter Optimization," *1991 AIAA Guid. and Contr.Conference*.

## Invited Presentations, Posters and Publications

1. Design and created all interactive online content for textbook: Introduction Applied Digital Controls, G Starr, Springer Publishing 2020.
2. Cook, K. E., Han, Y., Shuman, T. R., & Mason, G., Turns, J. Implicit Association Test (IAT) - Measuring the unconscious mind. NSF RED Workshop, 2019
3. ASEE Workshop – using BasysMX3 in a Mechanical Engineering Data Acquisition Course, June 2018.
4. Design and created interactive content for e-book version of: Modern Control Systems, Bishop and Dorf, Pearson, 2017, 2020.
5. ASEE NSF Workshop – using AEPCL in a Heat Transfer Class, June 2016
6. Implementing a flipped classroom. Workshop for local high school teachers. summer 2016
7. Rutar Shuman, T., Mason, G., and Kathleen Cook, “Experimental Design in Thermodynamics Lab. Inverting the Classroom in a Control Systems Course.” Seminar, Faculty of Mechanical Engineering, University of Belgrade, Serbia, December 16, 2015
8. Rutar Shuman, T., and Mason, G., “Rapid and Ultra-low Energy-use Pre-Concentrating of Microalgae” to be presented at 2014 Algae Biomass Summit, San Diego, CA, September 29-October 2, 2014. Poster with peer reviewed abstract.
9. Mason, G., Shuman, T, Cook, C. “Experiences with Inverting a Classroom”, webinar speaker, sponsored by PTC, 2014. Invited speaker (Mason).
10. Rutar Shuman, T. and Mason, G., “Novel Approach to Conducting Labs in an Introduction to Thermodynamics Course.” Presenter at the Main Plenary II, ASEE Annual Conference, Atlanta, GA, June 25, 2013. Invited speaker.
11. Rutar Shuman, T., Mason, G., and Hudson, M., “Rapid Microalgae Concentration and Settling In Low-Energy Use Batch and Continuous Flow Systems” 1st International Conference on Algal Biomass, Biofuels and Bioproducts, St. Louis, MO, July 17-20, 2011. Poster with peer reviewed abstract.
12. Hohn, G., Berg, M., Mason, G. “Fuel Management System”, Presented to Foss Maritime, 2010.
13. Rutar Shuman, T., Hudson, M., Mason, G., and students: Bratzel, Beach, Chang, De Vitis, and Umagat, “Settling of Microalgae Using Low Energy Input” 2010 Algae Biomass Summit, Phoenix, AZ, September 27-30, 2010 Poster with peer reviewed abstract.
14. Mason, G. “Real-Time Access to Experimental Data Using Tablet PC's “ Hewlett Packard Computers in Education Conference, San Jose CA, 2008. Poster and invited speaker.
15. Mason, G. and Dragovich, J, “A Computer-Based Management System for Program Assessment and Evaluation”, Presented at the ABET Best Practices Annual Symposium, April 2008. Invited speaker.
16. Rutar, T., and Mason, G. “A Learning Community of University Freshman Design, Freshman Graphics, and High School Technology Students - Description, Projects, and Assessment; article summary and reflective essay on lessons learned.” Annals of Research on Engineering Education, Vol. 2, No. 1, Winter 2006.
17. Mason, G. “Professor Dad says: Read the direction”. Front page, The Seattle Times, Northwest Life, Dec 24, 2005.
18. Mason, G., Rutar, T., and Adamson, J. “Creating a Learning Community in a Freshman Design Course through Curriculum Coordination.” Keynote address at WCERTE Conference, Seattle, WA, April 2004.

19. Rutar, T., Mason, G., and Adamson, J. "Creation of a Learning Community through Curriculum Coordination – Phase Two." NSF Grantee Poster Session presentation at the 2003 American Society of Engineering Education Annual Conference & Exposition, Nashville, TN, 2003.

### **Seattle University Presentations and Posters**

1. Jeimmy Barbosa, J\*, Cordano, A.\*, Lee, D.\*, Tamura, C.\*, Mason, G. McLaughlin, Chemistry Laser Induced Breakdown Spectroscopy, Presented at the Seattle University summer research poster session, 2019.
2. Goodman, E.\*, Noorfeshan, S.\*, Mason, G., McLaughlin, R. "An Aerosol Chamber for Measuring Airborne Contaminants using Laser Induced Breakdown Spectroscopy (LIBS)". Presented at the Seattle University summer research poster session, 2018.
3. Mason, G., Rutar Shuman, T., and Adamson, J. "Creating a Learning Community in a Freshman Design Course through Curriculum Coordination - Examples of Three Design Projects/ Teamwork Assessment/ Student Interviews." Poster at the 2005 Celebration of Faculty Research Day.
4. Mason, G., Rutar Shuman, T., and Adamson, J. "Creating a Learning Community in a Freshman Design.
5. Rutar, T. and Mason, G. "Creation of a Learning Community through Curriculum Coordination" Poster at the 2004 Celebration of Faculty Research Day.
6. Rutar, T. and Mason, G. "Short-Term Course Assessment, Improvement, and Verification Feedback Loop." Poster at the 2003 Celebration of Faculty Research Day.
7. Mason, G., "Using Hand Held Devices in a Data Acquisition Course" Science and Engineering Faculty Seminar, 2000.

### **Awards and Grants** (*\*externally funded awards*)

1. National Institute for Occupation Health and Safety, Mason, G. McLaughlin, R., "Developing a LIBS-based method for quantitation of DPM", \$10,000, 2018.\*
2. PACCAR Professor, "Monitoring Airborne Particulates using LIBS", approx. \$50,000 over 2 years, 2018.
3. National Science Foundation RED Grant, Cook, K., Han, Y., Mason, G., Shuman, T. (PI), "Revolutionizing Engineering Education through Industry Immersion and a Focus on Identity", \$1,860,000 over 5 years, 2017.\*
4. Murdock Charitable Trust, McLaughlin, R., Mason, G., "Characterization of elemental and organic carbon for the in situ monitoring of diesel particulate matter (DPM) using laser-induced breakdown spectroscopy (LIBS)", Submitted fall 2017.
5. National Institute for Occupation Health and Safety, Mason, G. McLaughlin, R., "Developing a LIBS-based method for quantitation of DPM", \$8,000, 2017.\*
6. PACCAR Professor, "Instrumenting a LIBS/Raman Microscope", \$50,000 over 2 years, 2014.
7. National Science Foundation TUES Type I Grant, Mason, G (PI), Stipe, C, Shuman, T., Cook, K., "Facilitating Problem-Based Learning with an Inverted Classroom." \$171,306, 2013.\*
8. Fuel Management System Development Grant, Mason G, and Berg, M, joint proposal with University of Washington, \$40,000, 2010.\*
9. Fuel Management System Development Grant, Mason G, and Berg, M, joint proposal with University of Washington, \$100,000, 2009.\*
10. Hewlett Packard Leadership Grant, Mason, G., McLaughlin, R., \$120,000, 2007.\*

11. Hewlett Packard Computers in Education Grant, Mason, G., Dragovich, J., \$70,000, 2006.\*
12. Science and Engineering Bannan Chair, 2005-2006.
13. National Science Foundation CCLI, Shuman, T., Mason, G., "Development of a Learning Community", \$103,000, 2001.\*
14. Bannan Grant for Computer Equipment, \$2,000, 1997.
15. Norman Archibald Charitable Foundation Grant, \$10,000, 1995.\*
16. Seattle University Summer Faculty Fellowship, 1994.
17. Finalists Award for Windows Mobile Pocket PC and Smartphone Calculator, 2007, by PocketPC Magazine.
18. Best Software Award for Windows Mobile Pocket PC Calculator, 2006, by PocketPC Magazine.
19. Casio BE300 Best Software Award, \$30,000, 2002.\*

### **Academic Service**

1. University Academic Program Portfolio Review, 2020.
2. College of Science and Engineering Laboratory Safety Committee, 2019.
3. Department of Mechanical Engineering Tenure and Promotion review committee, various.
4. APR Scholarship Committee, 2019.
5. Sullivan Scholar Selection Committee, 2013-2018.
6. Coordinator for Kogakuin University exchange student program, 2011- 2014.
7. Department ABET and Assessment Coordinator, 2005-present.
8. Mechanical Engineering Hiring Committees - various, 2012-2014.
9. College of Science and Engineering Personnel Committee, 2011-2014.
10. System Engineering Graduate Program Committee, 2013-2014.
11. University Core Assessment Planning Committee – Chair, 2012-2013.
12. Project Center Coordinator Hiring Committee, 2012.
13. Mechanical Engineering Department Chair, 2007-2012.
14. Facilities Planning Committee Fall 2010.
15. CSSE Four Year Review Committee for Dr. Lirong (Annie) Dai, 2010.
16. University of Washington Master, advisor and committee member- Geoff Hohn, 2009-2011.
17. CSSE Tenure Review Committee for Dr. Eric Larson, 2009.
18. Academic Assembly, representative for College of Science and Engineering, 2004-2006.
19. Science and Engineering Curriculum Committee 1997-2004.
20. ASME Student Section Advisor 1998.
21. Acting Department Chair, Mechanical Engineering, summers 1996, 1999.

### **Professional Service**

1. ASEE Division of Experimentation and Laboratory Oriented Studies, Division Chair, 2014-2016.
2. ASEE Division of Experimentation and Laboratory Oriented Studies, Division Chair, 2014-2016.
3. ASEE Division of Experimentation and Laboratory Oriented Studies, Session Chair, 2012-2014.
4. ASEE Division of Experimentation and Laboratory Oriented Studies, secretary/ webmaster, 2010-2012.

5. Reviewer, Proceedings of the ASEE Annual Conference; IEEE Transactions on Education; ASEE Journal of Engineering Education.
6. Community service - Expanding Your Horizons, a program to expose Junior High girls to science and engineering, 1995-1997.

### **Affiliations**

1. American Society of Engineering Educators.
2. American Society of Manufacturing Engineers, Senior Member.