BROOKE E. MASON

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EDUCATION

PhD in Civil Engineering, Intelligent Systems
University of Michigan – Ann Arbor, MI (Sept. 2018–Present)
Advisor: Dr. Branko Kerkez

MS in Electrical and Computer Engineering, Signal Processing & Machine Learning
University of Michigan – Ann Arbor, MI (Sept. 2018–Present)

MS in Civil Engineering, Environmental Focus
University of Toledo – Toledo, OH (Jan. 2017–Aug. 2018)
*Thesis Title: "*Real-Time Control of a Bioretention Cell for Enhanced Phosphorus Capture"
Advisor: Dr. Cyndee Gruden

BS in Environmental Engineering
Summa Cum Laude, University of Toledo – Toledo, OH (May 2015–Dec. 2016)

BA in Environmental Policy & Analysis
Summa Cum Laude, Bowling Green State University – Bowling Green, OH (Aug. 2008–May 2012)

RESEARCH EXPERIENCE

Graduate Research Assistant
University of Michigan – Ann Arbor, MI (Sept. 2018–Present)
Advisor: Dr. Branko Kerkez

- Developing a water quality toolbox that seamlessly interfaces with PySWMM, a Python-wrapper for the U.S. EPA Stormwater Management Model (SWMM). The toolbox provides the ability to model any pollutant using any pollutant generation or treatment method.
- Developing system scale control algorithms to maximize total suspended solids (TSS) removal while minimizing overflow and downstream erosion. These control algorithms are tested on real-world inspired stormwater networks in PySWMM.
- Collaborating with the Huron River Watershed Council (HRWC) on a surface water quality monitoring project. Developed a small, low-cost, data node to collect real-time data, make automated decisions, and allow for remote triggering of the samplers. The node sends data to a dashboard allowing a team to monitor the depth of water in the stream/creek, along with sampler information. In manual mode, the team can simply tap a "trigger" button on the dashboard to order a sample. In addition to manual mode, to improve data collection and reliability, an algorithm is being developed to trigger the sampler autonomously using weather forecast and stream condition data.
- Collaborating with the Detroit Sierra Club on a rain garden monitoring project. Developed a small, low-cost, data node to collect real-time data on soil moisture conditions and infiltration rates.

Graduate Research Assistant
University of Toledo – Toledo, OH (Jan.–May 2018)
Advisor: Dr. Cyndee Gruden; *Collaborators:* Xavier Gabarrell i Durany, Universitat Autònoma de Barcelona
Project Title: "Saving Water with Intelligent Irrigation Systems for Urban Agriculture"

- Quantified water savings and crop yield of an urban tomato garden for a real-time controlled intelligent irrigation system and a conventional irrigation system for various climatic conditions using FAO's CROPWAT program.

Graduate Research Assistant
University of Toledo – Toledo, OH (May 2017–Aug. 2018)
Advisor: Dr. Cyndee Gruden; *Collaborators:* Dr. Branko Kerkez, Real-Time Water Systems Lab, University of Michigan

- Built a soil nutrient model in Python for green stormwater infrastructure that worked with MatSWMM, a Python-wrapper for SWMM, to quantify the impacts of real-time control on nutrient removal.
- Collaborated with UM to design, build, and install a real-time control system on a bioretention cell at the Toledo Zoo. The site was instrumented with sensors to measure water flow, infiltration performance, and quality. A control valve which included a gate valve, actuator, and safety overflow pipe was installed on the underdrain to provide the ability to hold and release flows on demand, thus improving exfiltration.

Undergraduate Research Assistant

University of Toledo – Toledo, OH (May 2015–Sept. 2016)

Advisor: Dr. Defne Apul

- Completed a cradle-to-gate ex-ante life cycle analysis using GaBi software for single-walled carbon nanotube (SWCNT) solar photovoltaic (PV) cells. Compared SWCNT PV impacts and energy payback with silicon PV and thin film PV technologies.

TEACHING EXPERIENCE

Teaching Assistant

University of Toledo – Toledo, OH (Jan. 2017–Dec. 2017)

- Teaching assistant for Civil & Environmental Engineering courses including Statics, Fluid Mechanics, Professional Development, and Freshman Orientation.
- Tasks included grading, Blackboard management, office hours, quiz creation, exam revisions, leading exam review sessions. Developed the lesson plans and taught several classes in the Freshman Orientation course.

ENGINEERING EXPERIENCE

Engineering Intern

Brendle Group – Denver, CO (June 2016–Aug. 2017)

- Quality control and analysis of greenhouse gas data submitted by ski resorts for the National Ski Area Association (NSAA) Climate Challenge. Wrote the 2016 Climate Challenge report and an article for the NSAA Journal.
- Organized and hosted three educational seminars for the ski resorts on a variety of topics including setting and meeting realistic targets, emission reduction projects, funding opportunities, and program logistics.
- Drafted the annual contract, project budget, project timeline, marketing timeline, and more for the 2017 Climate Challenge.

Sustainability Specialist

University of Toledo – Toledo, OH (Aug. 2012–May 2015)

- Coordinated the utility rebate program and other sustainability and energy reduction projects. Secured over $435,000 in rebates, $25,000 in recycling revenue, and $96,000 in grants.
- Completed the first comprehensive greenhouse gas inventory and a plan to reduce emissions by 7% with savings of $1 million.
- Managed the processing of over 1 million pounds of recycling with one full-time and nine student employee direct reports.

PUBLICATIONS

- **Mason, B. E.**, Mullapudi, A., and Kerez, B. (In progress). "*StormReactor*: An open-source Python package for modelling water quality in urban drainage systems." *Environmental Modelling & Software*.
- **Mason, B. E.**, and Kerez, B. (In progress). "Using real-time control to revision watersheds as distributed water treatment plants." *Environmental Science & Technology*.
- **Mason, B. E.**, Rufí-Salís, M., Parada, F., Gabarrell, X., and Gruden, C. (2019). "Intelligent Urban Irrigation Systems: Saving Water and Maintaining Crop Yields." *Agricultural Water Management* 226. doi:10.1016/j.agwat.2019.105812.
- Celik, I., **Mason, B. E.**, Phillips, A., Heben, M. J., and Apul, D. (2017). "Environmental Impacts from Photovoltaic Solar Cells Made with Single Walled Carbon Nanotubes." *Environmental Science & Technology* 51 (8): 4722–4732. doi:10.1021/acs.est.6b06272.

BOOK CHAPTERS

- **Mason, B. E**. (2017). "A Comprehensive Overview of University and College Recycling Programs." In *Sustainability Practice and Education on University Campuses and Beyond*, edited by Ashok Kumar and Dong-Shik Kim, 29–49. Sharjah, United Arab Emirates: Betham Science Publishers.

NATIONAL CONFERENCES

- McCaffery, R., Montgomery, J., Bartos, M., **Mason, B. E.**, Love, N., and Kerkez, B. (2019). "A first-year college course on smart water systems" AESSP Education & Research Conference, Tempe, AZ.
- **Mason, B. E.**, Celik, I., Phillips, A., Heben, M., and Apul, D. (2017). "Life cycle environmental impacts of single-walled carbon nanotube PV cells." 20th Annual Green Chemistry & Engineering Conference, Portland, OR.

LOCAL CONFERENCES

- **Mason, B**. **E.**, Mullapudi, A., and Kerkez, B. (2020). "Improving pollutant removal with real-time control of stormwater networks." Borchardt Conference: 25th Triennial Symposium on Advancements in Water & Wastewater, Ann Arbor, MI.
- **Mason, B. E.**, Mullapudi, A., Kerkez, B. and Gruden, C. (2018). "Pollutant treatment with real-time control of rain gardens." Ohio Stormwater Conference, Sandusky, OH.
- **Mason, B. E.**, Mullapudi, A., Kerkez, B. and Gruden, C. (2017). "Real-time control of bioretention cells for enhanced phosphorus removal." Research & Education Symposium, Michigan State University, East Lansing, MI.
- **Mason, B. E.**, Ilke, C., Phillips, A., Heben M., and D. Apul, D. (2017). "Life cycle environmental impacts of single-walled carbon nanotube PV cells." Choose Ohio First Scholar Showcase, Columbus, OH.
- **Mason, B. E.**, Ilke, C., Phillips, A., Heben M., and Apul, D. (2016). "Life cycle analysis of carbon nanotube photovoltaic cells." Undergraduate Research Showcase, University of Toledo, Toledo, OH.
- **Mason, B. E.**, Ilke, C., Phillips, A., Heben M., and Apul, D. (2015). "Life cycle analysis of carbon nanotube photovoltaic cells." GreenUp: Michigan Green Chemistry and Engineering Conference, University of Michigan, Ann Arbor, MI.

INVITED PRESENTATIONS

- "Building Smarter Stormwater Systems." (2020). ASCE EWRI Women Water Nexus Short Conference Session, Online.
- "Water + Tech = 'Smart' Water." (2020). University of Washington, Seattle, Washington.

FELLOWSHIPS & SCHOLARSHIPS

- DOW Sustainability Fellowship – University of Michigan (2020)
- Rackham Merit Fellowship – Rackham Graduate School, University of Michigan (2018–2019)
- Graduate Research Fellowship Program Honorable Mention – National Science Foundation (2018)
- William Rhodes and Jean Clark Rhodes Scholarship – College of Engineering, University of Toledo (2017– 2018)
- Engineering Alumni Affiliate Scholarship – College of Engineering, University of Toledo (2017–18)
- Special Dean Assistantship – College of Engineering, University of Toledo (2017)
- Gretchen Koo Memorial Fund Scholarship Award – College of Engineering, University of Toledo (2016– 2017)
- Building Ohio's Sustainable Energy Future Scholarship – University of Toledo (20152016)
- Second Degree Scholarship – Eberly Center, University of Toledo (2015–16)
- University Women's Club Nontraditional Student Scholarship – University of Toledo (2015–16)

HONORS & AWARDS

- 2nd Place Poster Award – Borchardt Conference: 25th Triennial Symposium on Advancements in Water & Wastewater (2020)
- NSF Research Exchange Travel Award – Rackham Graduate School, University of Michigan (2020)
- Dean's List & President's List – College of Engineering, University of Toledo (2015–2016)
- Ciba Travel Award in Green Chemistry – American Chemical Society (2015–2016)

PROFESSIONAL DEVELOPMENT

- Waterhackweek Attendee– University of Washington (2020)
- EWRI Women Water Nexus Short Conference Session Moderator – Online, ASCE (2020)
- NSF Research Exchange Attendee – University of Washington (2020)
- NextProf Pathfinder Workshop Attendee – College of Engineering, University of Michigan (2019)
- Professional Development Diversity, Equity, & Inclusion Certificate – Rackham, University of Michigan (2019–Present)
- Culture of Diversity Certificate – University of Toledo (2015)

PROGRAMMING & SOFTWARE SKILLS

- Python
- MATLAB
- Julia
- C
- ArcGIS
- EPA Stormwater Management Model (SWMM) / PCSWMM / PySWMM
- Inkscape

SERVICE

- Volunteer, Gleaners Community Food Bank (September 2020–Present)
- Control Group Member, Women Water Nexus Committee, Environmental & Water Resources Institute (EWRI) (July 2020–Present)
- Member, New Professionals Council, Environmental & Water Resources Institute (EWRI) (May 2020–Present)
- Group Leader, Women+ Excelling More in Math Engineering & Sciences (F.E.M.M.E.S.) (2020–Present)
- Graduate Student Advisory Council, College of Engineering, UM (Sept. 2019–Present)
- Lunch & Lab with a Grad Mentoring Program, College of Engineering, UM (Sept. 2019–Present)
- Graduate Student Advisory Council, Civil & Environmental Engineering Department, UM (June 2019–Present)
- Student Co-Chair, AEESP Research & Education Conference, University of Michigan (May–June 2017)
- Volunteer, Girl Power STEM, Toledo Imagination Station, Volunteer (Feb. 2016–May 2018)

PROFESSIONAL MEMBERSHIPS

- American Society of Engineering Education (2020–Present)
- Women Who Code (2020–Present)
- Association of Environmental Engineering and Science Professors (2017–Present)
- American Society of Civil Engineering (2016–Present)
- Chi Epsilon Civil Engineering Honor Society (2016–Present)