Abhiram Mullapudi

Web : **randomstorms.net**
Email : abhiramm@umich.edu

EXPERIENCE

Hydraulic Control and Optimization Engineer 2020-
Xylem Inc.
Development of machine learning-based prediction models and analytical software for monitoring and optimization of stormwater and wastewater collection systems.

Graduate Student Research Assistant 2016–2020
Real-time Water Systems Lab, University of Michigan
Developed open source algorithms, simulation tools, and hardware solutions for monitoring and control of stormwater networks.

Research Assistant 2015
Love Biotechnology Group, University of Michigan
Aided in the characterization of influent and calibration of process model for Detroit's waste water treatment plant.

Research Assistant 2014
Department of Chemical Engineering, Amrita Vishwa Vidhyapeetham
Aided in the design, construction, and monitoring of a vertical flow constructed wetland.

EDUCATION

Ph.D in Civil Engineering (Intelligent Systems) 2020
University of Michigan, Ann Arbor, USA

M.Sc.Eng. in Civil Engineering (Intelligent Systems) 2017
University of Michigan, Ann Arbor, USA

B.Tech. (distinction) in Civil Engineering 2015
Amrita Vishwa Vidhyapeetham, Coimbatore, India

AWARDS

Grand prize winner, LIFT Intelligent Water Systems Challenge	2018
Academic Excellence, Amrita Vishwa Vidhyapeetham	2013, 2015

PUBLICATIONS

1. **Abhiram Mullapudi** and Branko Kerkez. Bayesian optimization for shaping the response of stromwater networks. *in preparation*, 2023 (*poster*)
2. Sara P. Rimer, **Abhiram Mullapudi**, Sara C. Troutman, Gregory Ewing, Jeffrey M. Sadler, Jonathan L. Goodall, Ruben Kertesz, Jon M. Hathaway, and Branko Kerkez. pystorms: a simulation sandbox for the design and evaluation of stormwater control algorithms. *Environmental Modelling and Software*, 2023
3. Brooke E. Mason, **Abhiram Mullapudi**, Cyndee Gruden, and Branko Kerkez. Improvement of phosphorus removal in bioretention cells using real-time control. *Urban Water Journal*, 19(9):992–998, 2022
4. Brooke E. Mason, **Abhiram Mullapudi**, and Branko Kerkez. StormReactor: An open-source Python package for the integrated modeling of urban water quality and water balance. *Environmental Modelling & Software*, 145:105175, 2021
5. **Abhiram Mullapudi**. *Statistical Learning Approaches For The Control Of Stormwater Systems*. PhD thesis, University of Michigan, Ann Arbor, 2020
6. Bryant E McDonnell, Katherine Ratliff, Michael E Tryby, Jennifer Jia Xin Wu, and **Abhiram Mullapudi**. PySWMM: The Python Interface to Stormwater Management Model (SWMM). *Journal of Open Source Software*, 5(52):2292, 2020
7. **Abhiram Mullapudi**, Matthew Lewis, Cyndee Gruden, and Branko Kerkez. Deep Reinforcement Learning for the Real Time Control of Stormwater Systems. *Advances in Water Resources*, 2020
8. Matthew D. Bartos, **Abhiram Mullapudi**, and Sara C. Troutman. rrcf: Implementation of the Robust Random Cut Forest algorithm for anomaly detection on streams. *The Journal of Open Source Software*, 4:1336, 2019
9. **Abhiram Mullapudi**, Matthew D. Bartos, Brandon P. Wong, and Branko Kerkez. Shaping Streamflow Using a Real-Time Stormwater Control Network. *Sensors*, 18(7):2259, Jul 2018
10. **Abhiram Mullapudi**, Brandon P. Wong, and Branko Kerkez. Emerging investigators series: building a theory for smart stormwater systems. *Environmental Science: Water Research & Technology*, 3(1):66–77, 2017

WORKSHOPS AND SPECIAL SESSIONS

Moving towards an open urban water modeling paradigm: perspectives from academia and industry 2022

Organized a special session at the Urban Drainage Modeling conference on the role of open-source software in ushering the era of smart urban water systems.

UDS-RTC 101: A hands-on workshop on the real-time control of the urban drainage systems 2022

Organized and led a pre-conference workshop at the Urban Drainage Modeling conference on the control of stormwater systems attended by an international group of researchers and practitioners.

CUAHSI Open Source Urban Hydrology Sensor Bootcamp 2017, 2019

Co-organized and led a three day workshop on the use open-storm's sensing stack for the monitoring and control of stormwater systems.

CONFERENCES

1. **Abhiram Mullapudi**, Caleb Buahin, and Ruben Kertesz. A software framework for automating hydroinformatics-based workflows for real-world applications. EWRI, May 2022
2. **Abhiram Mullapudi**, Brooke E. Mason, Jennifer Wu, Constantine Karos, Branko Kerkez, Caleb Buahin, and Bryant E. McDonnell. Enhancing the pollutant modeling capabilities of epa-swmm using pyswmm and stormreactor. International Conference on Water Management Modeling, March 2022
3. Brooke E. Mason, **Abhiram Mullapudi**, and Branko Kerkez. Extending swmm's water quality toolbox. EWRI, May 2021
4. Jennifer Wu, Caleb Buahin, Bryant E. McDonnell, **Abhiram Mullapudi**, and Ruben Kertesz. Pyswmm-v1.0 release: Advancing the python interface to stormwater management for now and into the future. International Conference on Water Management Modeling, March 2021
5. Brooke E. Mason, **Abhiram Mullapudi**, and Branko Kerkez. Improving pollutant removal with real-time control of stormwater networks. Borchardt Conference: 25th Triennial Symposium on Advancements in Water & Wastewater, March 2020
6. Sara C. Troutman, Sara P. Rimer, **Abhiram Mullapudi**, and Branko Kerkez. A benchmarking library for making smart stormwater research accessible. AGU, 2019

7. **Abhiram Mullapudi**. Real-time monitoring and control of stormwater systems. Urban Flooding Open Knowledge Network, November 2019
8. **Abhiram Mullapudi**, Sara P. Rimer, Sara C. Troutman, and Branko Kerkez. A benchmarking framework for control of smart stormwater networks. Watermatex, September 2019
9. Sara C. Troutman, **Abhiram Mullapudi**, Sara P. Rimer, and Branko Kerkez. A benchmarking framework for evaluating the performance of control algorithms in smart stormwater networks. CCWI, September 2019
10. Sara P. Rimer, **Abhiram Mullapudi**, Sara C. Troutman, and Branko Kerkez. A benchmarking framework for smart stormwater systems. EWRI, June 2019
11. Sara C. Troutman, **Abhiram Mullapudi**, Gregory Ewing, Branko Kerkez, Wendy Barrott, and Christopher Nastally. Open-storm detroit dynamics. Water at Michigan, June 2019
12. Sara P. Rimer, **Abhiram Mullapudi**, Sara C. Troutman, and Branko Kerkez. A benchmarking framework for control and optimization of smart stormwater networks. *Proceedings of the 10th ACM/IEEE International Conference on Cyber-Physical Systems - ICCPS '19*, 2019
13. **Abhiram Mullapudi** and Branko Kerkez. Bayesian optimization for control of stormwater networks. MICDE, May 2019
14. Gregory Ewing, **Abhiram Mullapudi**, Sara C. Troutman, Branko Kerkez, Wendy Barrott, and Christopher Nastally. Lift smartwater challenge : Open-storm detroit dynamics. Weftec, October 2018
15. **Abhiram Mullapudi** and Branko Kerkez. Autonomous control of urban storm water networks using reinforcement learning. HIC, July 2018
16. Branko Kerkez, **Abhiram Mullapudi**, Matthew D Bartos, and Brandon P. Wong. Characterizing a controllable urban watershed. HIC, July 2018
17. **Abhiram Mullapudi** and Branko Kerkez. Deep reinforcement learning based autonomous storm water networks. EWRI, June 2018
18. Branko Kerkez, **Abhiram Mullapudi**, Matthew D Bartos, and Brandon P. Wong. Results from the real-time control of an urban watershed: coordinating outflows to shape flows and water quality. EWRI, June 2018
19. Sara P. Rimer, **Abhiram Mullapudi**, and Branko Kerkez. Using Agent-Based Modeling to Enhance System-Level Real-time Control of Urban Stormwater Systems. (AGU), December 2017
20. Branko Kerkez, **Abhiram Mullapudi**, and Brandon P. Wong. A modeling framework for the real-time control of distributed stormwater assets. AEESP, June 2017

21. **Abhiram Mullapudi**, Matthew Lewis, Cyndee Gruden, and Branko Kerkez. Real-time control of storm water using reinforcement learning. ICA, June 2017
22. **Abhiram Mullapudi**, Matthew Lewis, Cyndee Gruden, and Branko Kerkez. Control of large scale storm-water networks using reinforcement learning. RLDM, June 2017
23. **Abhiram Mullapudi**, Matthew Lewis, Cyndee Gruden, and Branko Kerkez. Real-time control of storm water using reinforcement learning. EWRI, May 2017
24. Branko Kerkez, **Abhiram Mullapudi**, and Brandon P. Wong. An optimization and simulation framework for smart stormwater systems. EWRI, May 2017
25. Branko Kerkez, **Abhiram Mullapudi**, and Brandon P. Wong. Toward city-scale water quality control: building a theory for smart stormwater systems. AGU, December 2016

PROGRAMMING AND SCIENTIFIC COMPUTING

- Proficient in Python, MATLAB, C/C++, LaTeX, and bash.
- **Machine Learning Stack:** Experienced in using TensorFlow, PyTorch, GpyOpt for training large scale machine learning models in high performance clusters.
- **Embedded Systems:** Developer of Open-Storm's `perfect-cell`, an open source operating system for environmental monitoring. Experienced in using EAGLE and Cypress modules for designing customized hardware.
- **Cloud Computing:** Experienced in using cloud computing services (AWS, Google cloud, and Azure) for creating backend systems.
- **Stormwater Modeling:** Creator of `pystorms`, an open source python library for the design and evaluation of stormwater control algorithms. Maintainer of Open Water Analytics's SWMM and pyswmm, the industry standard for modeling stormwater systems.
- Contributor to `rrcf`, an open source implementation of an unsupervised learning algorithm for anomaly detection in live streaming data.

PROFESSIONAL ACTIVITIES

- Member of ASCE-EWRI's Emerging and Innovative Technology Committee
- Peer reviewed research for the following journals:

- *IEEE-CDC 2020*
- *Journal of Hydrology*
- *Water Resources Research*
- *Journal of Hydroinformatics*
- *Water Science and Technology*
- *Journal of Open Source Software*
- *Journal of Computing in Civil Engineering*
- *Journal of Irrigation and Drainage Engineering*
- *Environmental Science: Water Research & Technology*

MEDIA COVERAGE

- 2018 LIFT Challenge: Grand Prize Winner
- NSF Science Nation: Smart stormwater solutions for aging infrastructure

---

References

Available on request.