

# Abhiram Mullapudi

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## EXPERIENCE

**Senior Data Scientist** 2023-

*Xylem Inc.* Development of systems for timeseries forecasting

**Hydraulic Control and Optimization Engineer** 2020–2023

*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.

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## 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*

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## AWARDS

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

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## PUBLICATIONS

1. **Abhiram Mullapudi** and Branko Kerkez. Bayesian optimization for shaping the response of stormwater 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

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## WORKSHOPS AND SPECIAL SESSIONS

*Technical Workshop: Building the Next Generation of Intelligent Urban Water Systems: A Hands-on Workshop on Digital Twin-based Solutions* 2023

Organized and led a workshop session at the ASCE's EWRI conference on building digital water systems.

*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-source's sensing stack for the monitoring and control of stormwater systems.

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## CONFERENCES

1. **Abhiram Mullapudi**, Adam Erispaha, Bailey Johnston, and Sohil Manjiyani. Real-time monitoring and predictive maintenance of urban water networks using digital twins. EWRI, May 2023
2. **Abhiram Mullapudi**, Caleb Buahin, and Ruben Kertesz. A software framework for automating hydroinformatics-based workflows for real-world applications. EWRI, May 2022
3. **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
4. Brooke E. Mason, **Abhiram Mullapudi**, and Branko Kerkez. Extending swmm's water quality toolbox. EWRI, May 2021
5. 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

6. 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
7. Sara C. Troutman, Sara P. Rimer, **Abhiram Mullapudi**, and Branko Kerkez. A benchmarking library for making smart stormwater research accessible. AGU, 2019
8. **Abhiram Mullapudi**. Real-time monitoring and control of stormwater systems. Urban Flooding Open Knowledge Network, November 2019
9. **Abhiram Mullapudi**, Sara P. Rimer, Sara C. Troutman, and Branko Kerkez. A benchmarking framework for control of smart stormwater networks. Watermatex, September 2019
10. 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
11. Sara P. Rimer, **Abhiram Mullapudi**, Sara C. Troutman, and Branko Kerkez. A benchmarking framework for smart stormwater systems. EWRI, June 2019
12. Sara C. Troutman, **Abhiram Mullapudi**, Gregory Ewing, Branko Kerkez, Wendy Barrott, and Christopher Nastally. Open-storm detroit dynamics. Water at Michigan, June 2019
13. 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
14. **Abhiram Mullapudi** and Branko Kerkez. Bayesian optimization for control of stormwater networks. MICDE, May 2019
15. Gregory Ewing, **Abhiram Mullapudi**, Sara C. Troutman, Branko Kerkez, Wendy Barrott, and Christopher Nastally. Lift smartwater challenge : Open-storm detroit dynamics. Weftec, October 2018
16. **Abhiram Mullapudi** and Branko Kerkez. Autonomous control of urban storm water networks using reinforcement learning. HIC, July 2018
17. Branko Kerkez, **Abhiram Mullapudi**, Matthew D Bartos, and Brandon P. Wong. Characterizing a controllable urban watershed. HIC, July 2018
18. **Abhiram Mullapudi** and Branko Kerkez. Deep reinforcement learning based autonomous storm water networks. EWRI, June 2018
19. 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

20. 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
21. Branko Kerkez, **Abhiram Mullapudi**, and Brandon P. Wong. A modeling framework for the real-time control of distributed stormwater assets. AEESP, June 2017
22. **Abhiram Mullapudi**, Matthew Lewis, Cyndee Gruden, and Branko Kerkez. Real-time control of storm water using reinforcement learning. ICA, June 2017
23. **Abhiram Mullapudi**, Matthew Lewis, Cyndee Gruden, and Branko Kerkez. Control of large scale storm-water networks using reinforcement learning. RLDM, June 2017
24. **Abhiram Mullapudi**, Matthew Lewis, Cyndee Gruden, and Branko Kerkez. Real-time control of storm water using reinforcement learning. EWRI, May 2017
25. Branko Kerkez, **Abhiram Mullapudi**, and Brandon P. Wong. An optimization and simulation framework for smart stormwater systems. EWRI, May 2017
26. Branko Kerkez, **Abhiram Mullapudi**, and Brandon P. Wong. Toward city-scale water quality control: building a theory for smart stormwater systems. AGU, December 2016

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## PROGRAMMING AND SCIENTIFIC COMPUTING

- Proficient in Python, MATLAB, C/C++,  $\text{\LaTeX}$ , and bash.
- **Machine Learning Stack:** Experienced in using TensorFlow, PyTorch, Gpy-Opt 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.

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### PROFESSIONAL ACTIVITIES

- Member of ASCE-EWRI's Emerging and Innovative Technology Committee
- Peer reviewed research for the following journals:
  - *HardwareX*
  - *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*
  - *Journal of Water Resources Planning and Management*
  - *Environmental Science: Water Research & Technology*

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### MEDIA COVERAGE

- 2018 LIFT Challenge: [Grand Prize Winner](#)
- NSF Science Nation: [Smart stormwater solutions for aging infrastructure](#)

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### References

Available on request.