

# Abhiram Mullapudi

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## EDUCATION

- Ph.D in Civil Engineering** (Intelligent Systems) 2020  
*University of Michigan, Ann Arbor, USA*  
Dissertation: Statistical Learning Approaches for the Control of Stormwater Systems  
Advisor: Dr.Branko Kerkez
- 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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## EXPERIENCE

- Hydraulic Control and Optimization Engineer** 2020-  
*Xylem Inc.*  
Developing optimization and control strategies for the effective management of urban water systems.
- Graduate Student Research Assistant** 2016–2020  
*Real-time Water Systems Lab, University of Michigan*  
Development of algorithms, simulation tools, and open source hardware solutions for monitoring and control of stormwater networks.
- Research Assistant** 2015  
*Love Biotechnology Group, University of Michigan*  
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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## AWARDS

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

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## PUBLICATIONS

1. Sara P. Rimer, **Mullapudi, Abhiram**, 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*, 2020 (in preparation, [extended abstract](#))
2. **Mullapudi, Abhiram** and Branko Kerkez. Bayesian optimization for shaping the response of stormwater networks. *Water Research X*, 2020 (in preparation, [poster](#))
3. **Mullapudi, Abhiram**. *Statistical Learning Approaches For The Control Of Stormwater Systems*. PhD thesis, University of Michigan, Ann Arbor, 2020
4. Bryant E McDonnell, Katherine Ratliff, Michael E Tryby, Jennifer Jia Xin Wu, and **Mullapudi, Abhiram**. *PySWMM: The Python Interface to Stormwater Management Model (SWMM)*. *Journal of Open Source Software*, 5(52):2292, 2020
5. **Mullapudi, Abhiram**, Matthew Lewis, Cyndee Gruden, and Branko Kerkez. *Deep Reinforcement Learning for the Real Time Control of Stormwater Systems*. *Advances in Water Resources*, 2020
6. Matthew D. Bartos, **Mullapudi, Abhiram**, 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
7. **Mullapudi, Abhiram**, Matthew D. Bartos, Brandon P. Wong, and Branko Kerkez. *Shaping Streamflow Using a Real-Time Stormwater Control Network*. *Sensors*, 18(7):2259, Jul 2018
8. **Mullapudi, Abhiram**, 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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## CONFERENCES

1. Jennifer Wu, Caleb Buahin, Bryant E. McDonnell, **Mullapudi, Abhiram**, and Ruben Kertesz. *Pyswmm-v1.0 release: Advancing the python inter-*

face to stormwater management for now and into the future. International Conference on Water Management Modeling 2021, March 2021

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

15. Branko Kerkez, **Mullapudi, Abhiram**, 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
16. Sara P. Rimer, **Mullapudi, Abhiram**, and Branko Kerkez. Using Agent-Based Modeling to Enhance System-Level Real-time Control of Urban Stormwater Systems. (AGU), December 2017
17. Branko Kerkez, **Mullapudi, Abhiram**, and Brandon P. Wong. A modeling framework for the real-time control of distributed stormwater assets. AEESP, June 2017
18. **Mullapudi, Abhiram**, Matthew Lewis, Cyndee Gruden, and Branko Kerkez. Real-time control of storm water using reinforcement learning. ICA, June 2017
19. **Mullapudi, Abhiram**, Matthew Lewis, Cyndee Gruden, and Branko Kerkez. Control of large scale storm-water networks using reinforcement learning. RLDM, June 2017
20. **Mullapudi, Abhiram**, Matthew Lewis, Cyndee Gruden, and Branko Kerkez. Real-time control of storm water using reinforcement learning. EWRI, May 2017
21. Branko Kerkez, **Mullapudi, Abhiram**, and Brandon P. Wong. An optimization and simulation framework for smart stormwater systems. EWRI, May 2017
22. Branko Kerkez, **Mullapudi, Abhiram**, 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 programmer in Python, MATLAB, C/C++, OpenMP, CUDA,  $\text{\LaTeX}$ , 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 backends for streaming data from IoT devices.

- **Stormwater Modeling:** Creator of [pystorms](#), an open source python library for the design and evaluation of stormwater control algorithms. Contributor to 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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### WORKSHOPS

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.

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### PROFESSIONAL ACTIVITIES

- Peer reviewed research for the following journals:
  - *Journal of Hydrology*
  - *Journal of Hydroinformatics*
  - *Water Science and Technology*
  - *Journal of Computing in Civil Engineering*
  - *Environmental Science: Water Research & Technology*
  - *IEEE-CDC 2020*
  - *Water Resources Research*
- Member of International Water Association's working group on real time control of urban drainage systems.

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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.