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

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.

AWARDS

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

PUBLICATIONS

1. **Mullapudi, Abhiram** and Branko Kerkez. Bayesian optimization for shaping the response of stromwater networks. *Water Research X*, 2020 (*in preparation, poster*)

2. 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 review*)

3. Brooke E. Mason, **Mullapudi, Abhiram**, 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

4. **Mullapudi, Abhiram**. *Statistical Learning Approaches For The Control Of Stormwater Systems*. PhD thesis, University of Michigan, Ann Arbor, 2020

5. 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

6. **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

7. 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

8. **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

9. **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

CONFERENCES

1. Jennifer Wu, Caleb Buahin, Bryant E. McDonnell, **Mullapudi, Abhiram**, 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 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

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.

PROGRAMMING AND SCIENTIFIC COMPUTING

- Proficient in Python, MATLAB, C/C++, OpenMP, CUDA, 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.

PROFESSIONAL ACTIVITIES

- Peer reviewered research for the following journals:
  - *Water Science and Technology*
  - *Environmental Science: Water Research & Technology*
  - *Journal of Hydroinformatics*
  - *Journal of Computing in Civil Engineering*
  - *IEEE-CDC 2020*
  - *Water Resources Research*
  - *Journal of Open Source Software*

- Member of International Water Association's working group on real time control of urban drainage systems.

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.