Abhiram Mullapudi

Curriculum vitae (November 19, 2024)

Cyber-physical systems are a promising area of exploration for developing resilient urban water systems in the face of extreme weather events. I am interested in addressing knowledge gaps and building technologies to create a new generation of robust, equitable, and sustainable cyber-physical water infrastructure.

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Positions

2023– **Senior Data Scientist** at Xylem

I design and implement machine learning-based solutions that inform decision-making in urban water infrastructure systems.

Key Highlights:

- Spearheadeding development of statistical and AI-powered methodologies for time-series filtering and anomaly detection, enabling predictive maintenance strategies in water networks.
- Currently developing a Flyte-based MLOps platform to streamline end-to-end machine learning model development, deployment, and maintenance for Xylem's digital water products.

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

Spearheaded the design and implementation of cutting-edge digital water solutions that drive predictive maintenance, operational efficiency, and informed decision-making in cities and utilities worldwide.

Key Highlights:

- **Real-Time Flow Rate Prediction**: Developed a 1D-CNN model that leverages NOAA rainfall forecasts and near-real-time flow measurements to accurately predict 24-hour inflow to water treatment plants.
- **River Level Prediction**: Created an 1D-CNN-based model that filters and interpolates spatially-temporally distributed river levels for reporting to regulatory organizations.
- **Real-Time Data Processing**: Designed a high-performance real-time time series processing module that utilizes symbolic programming and statistical methodologies to detect anomalies in water networks handling over 600 data streams.
- **Inflow Prediction and CSO Event Detection**: Developed an AI-powered dashboard that predicts inflows to treatment plants, enabling informed decision-making, and a real-time dashboard identifying Combined Sewer Overflow (CSO) events.

Supportive Functions:

- Maintained and updated critical real-time services, ETL scripts, and internal databases to ensure seamless operation of Xylem Vue's Waste Water Network Optimization Solution.
- Collaborated with cross-functional teams to integrate digital water solutions into existing infrastructure, driving successful adoption and maximized benefits for clients.

Education

2017–2020 **Ph.D.** in Civil Engineering at University of Michigan, Ann Arbor, USA
Statistical Learning Approaches for the Control of Stormwater Systems
Advisor: Dr. Branko Kerkez

2015–2017 **M.Sc.Eng.** in Civil Engineering at University of Michigan, Ann Arbor, USA

2011–2015 **B.Tech** in Civil Engineering at Amrita Vishwa Vidyapeetham, Coimbatore, India

Publications

2023 **Abhiram Mullapudi** and Branko Kerkez. *Identification of stormwater control strategies and their associated uncertainties using Bayesian Optimization.*

2023 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

2022 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

2021 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

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

2020 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

2020 **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

2019 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

2018 **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

2017 **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

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

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

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

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.

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

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.

2017, 2019 *CUAHSI Open Source Urban Hydrology Sensor Bootcamp*

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

Skills

Professional Service

- Vice-chair of Emerging and Innovative Technologies subcommittee for American Socity of Civil Engneering's Environmental and Water Research Congress.
- Part of the organizing committee at 2024 NURAL-IPS Gaussian Processes workshop

Journal Review

- *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*

Conference

About this template

This document is modelled after the style of my own CV, which you can find here. It was originally inspired by the CV of Dario Taraborelli, but has since somewhat evolved—or so I like to tell myself—from the original template.

This document does not offer many special features, except for the `\years` macro, which can be used to typeset small notes in the margin of the document. I use them to indicate *durations*, but you could also repurpose it to have small annotations in the style of Edward Tufte. In addition, the template uses two special fonts for sans-serif typesetting and monospace typesetting. I do not tend to use the former for many things, but you might like it for typesetting the titles of publications. The latter font type, though, I often use in order to describe software projects or packages, such as `PyTorch` or `scikit-learn`.

That's all there is to it—enjoy the template & feel free to open tickets for comments or feedback.