

Sanghoon Jun

Ph.D. Candidate

Department of Civil and Architectural Engineering and Mechanics

The University of Arizona

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Education

Ph.D. Candidate. Civil and Architectural Engineering and Mechanics (2019.01-present)

The University of Arizona, Tucson, AZ

Dissertation: Water Distribution Burst Detection and Localization Using Smart Data Collection Systems (*tentative*)

Advisor: Prof. Kevin E. Lansey

M.E. Civil, Environmental, and Architectural Engineering (2017.03-2019.02)

Korea University, Seoul, Korea

Thesis: Development of a New Approach for Analyzing Missing AMI Data on Burst Detectability in Water Distribution Systems

Advisor: Prof. Joong Hoon Kim

B.S. Civil and Architectural Engineering (2011.03-2017.02)

Korea University, Seoul, Korea

Research interests

Leakages and Bursts Detection and Localization in Water Distribution Systems (WDS)

WDS Smart Meter (e.g., AMI) Data Control and Management

Machine Learning and Deep Neural Networks

Uncertainty Analysis and Calibration of WDS model

Metaheuristic Optimization Algorithms

Digital Twin Model for WDS Operation and Management

Supervisory Control and Data Acquisition (SCADA) systems

Water Supply and Drainage Systems

Urban Water Sustainability

Green Infrastructure & Low Impact Development

Honors, Scholarships, and Affiliations

- Roots for Resilience Scholarship Program (Fall 2021)
- Salt River Project Scholarship (Summer 2019, Fall 2020, Spring 2021)
- Brain Korea 21+ Scholarship for Graduate Students, Korea University (Spring & Fall 2017)
- Research Assistant Scholarship for Graduate Students, Korea University (Spring & Fall 2017)
- Korea Society of Civil Engineering Student Chapter (2016)
- Work-study Scholarships, Korea University (Fall 2016)
- Semester High Honors, Korea University (Fall 2015, Spring 2016)
- Korea University Alumni Association Scholarship (2013)

Research experience

Graduate Research Assistant (January 2019-present)

Water and Wastewater Infrastructure Research Group, The University of Arizona

Advisor: Prof. Kevin E. Lansey

Project: Fusing Data Analytics with Hydraulics in a Hydroinformatics Approach for Water Distribution System Monitoring (National Science Foundation)

- Developed a new approach for analyzing the impact of missing AMI data on burst detection
- Investigated the effectiveness of machine learning technique on burst detection using spatial characteristics of Water Distribution Network
- Examined the shape and convexity of WDS response surfaces under different network topology and several uncertainties

Graduate Research Assistant (January 2017-December 2018)

Hydrosystems Laboratory, Korea University

Advisor: Prof. Joong Hoon Kim

Project: Development of Design and Management Approaches for Safe Water Distribution System (Project of Ministry of Environment)

- Analyzed the damage range and ability of water by abnormal condition of WDS
- Investigated the relationship between damage range and resilience design factor on the abnormal condition in WDS
- Developed practical technique for optimum design of WDS

Project: Development of Advanced Techniques in Combined Inland-River Systems for Reducing Urban Inundation (Project of Korea Agency of Infrastructure Technology Advancement)

- Developed a new pump operation technique to reduce urban inundation
- Developed pump station operating system considering combined inland-river in real-time scale
- Investigated the effectiveness of early pump operation in urban reservoir considering the downstream monitoring node

Project: Establishment of Original Technology and Globalization Strategy of Harmony Search Algorithm (Project of National Research Foundation of Korea)

- Developed improved versions of Harmony Search Algorithm for improving optimization performance
- Analyzed the optimization performance among Meta-heuristic Algorithms
- Improved the original technology of Harmony Search Algorithm
- Applied engineering benchmark problems for the improved Harmony Search Algorithms in Water Resources Engineering

Teaching experience

Graduate Teaching Assistant, Korea University (January 2017-December 2018)

Instructor: Prof. Joong Hoon Kim

- Fluid Mechanics and Laboratory (Spring 2018)
- Computer Applications in Water Resources Engineering (Fall 2017)

Instructor: Dr. Young Hwan Choi

- Computer Applications in Water Resources Engineering (Fall 2018)

Instructor: Dr. Donghwi Jung

- Urban Water Supply and Drainage (Spring 2017)

Research Mentor, Korea University (September 2017– June 2018)

Advised undergraduate students – basis of hydraulics and optimization algorithms and coding

Development

Research Proposals, authored on behalf of Prof. Joong Hoon Kim

Prepared a proposal titled ‘Development of Advanced Techniques in Combined Inland-River Systems for Reducing Urban Inundation’, submitted to Project of Korea Agency of Infrastructure Technology Advancement (KAIA) (2017)

Software

Developed ‘Flood & Drainage Control’ program (March 2017)

Patent

Published ‘Conjunctive Operation System & Method of Pump Station Considering Urban Drainage Facilities (PN.10-2018-0021856) (February 2018)

Journal publications

1. **Jun, S.**, Jung, D., Liu, J., Lansey, K.E. (Writing). “Deep Learning for Water Distribution Burst Detection in Smart Data Collection Systems.” *TBD*
2. **Jun, S.** and Lansey, K.E. (Submitted). “Linear Programming Models for Burst Detection and Localization in Water Distribution Systems.” *Journal of Water Resources Planning and Management*
3. **Jun, S.**, Arbesser-Rastburg, G., Fuchs-Hanusch D., and Lansey, K. (2022). “Response Surfaces for Water Distribution System Pipe Roughness Calibration.” *Journal of Water Resources Planning and Management*, 148(3), 04021105.

[https://doi.org/10.1061/\(ASCE\)WR.1943-5452.0001518](https://doi.org/10.1061/(ASCE)WR.1943-5452.0001518)

4. **Jun, S.**, Jung, D., and Lansey, K. E. (2021). “Comparison of Imputation Methods for End-User Demands in Water Distribution Systems.” *Journal of Water Resources Planning and Management*, 147(12), 04021080.
[https://doi.org/10.1061/\(ASCE\)WR.1943-5452.0001477](https://doi.org/10.1061/(ASCE)WR.1943-5452.0001477)

Domestic journal publications (Korean)

1. Park, G., Jung, D., and **Jun, S.** (2021). “A Study on the Practical Use of Smart Meter End-User Demand Data” *Journal of Korean Water Resources Association*, 54(10), 759-768.
2. **Jun, S.H.**, Choi, Y.H., Jung, D., and Kim, J.H. (2018). “Development of Copycat Harmony Search : Adapting Copycat Scheme for the Improvement of Optimization Performance.” *Journal of the Korea Academia-Industrial cooperation Society*, 19(9), 304-315.

Conference publications

1. **Jun, S. H.**, Choi, Y. H., Jung, D., & Kim, J. H. (2019). “Copycat Harmony Search: Considering Poor Music Player’s Followership Toward Good Player.” In *Harmony Search and Nature Inspired Optimization Algorithms*, (pp. 113-118). Springer, Singapore.
2. **Jun, S. H.**, Lee, E. H., & Kim, J. H. (2017). “Development of Dimensionless Index Assessing Low Impact Development in Urban Areas.” In *AGU Fall Meeting Abstracts*, (Vol. 2017, pp. H13B-1356).

Conference presentations

1. **Jun, S.** and Lansey, K.E. (2022). “Combining Hydraulic Knowledge with Deep Learning for Water Distribution Burst Detection.” In *2nd WDSA/CCWI Joint Conference, Valencia, Spain*.
2. **Jun, S.** and Lansey, K.E. (2022). “Linear Programming Constrained Models for Pipe Burst Detection and Localization in Water Distribution Systems.” In *2022 World Environmental & Water Resources Congress*, Atlanta, GA.
3. **Jun, S.**, Liu, J., and Lansey, K.E. (2022). “Tailoring Water Distribution Data Collection Systems to Improve Burst Detection.” In *AZ Water 2022 Conference Planning Committee Meeting*, Phoenix, AZ.
4. **Jun, S.**, Jung, D., Lansey, K.E. (2021). “Deep Learning Convolutional Neural Network for Pipe Burst Detection in Water Distribution System.” In *2021 World Environmental & Water Resources Congress*, Virtual Online.
5. **Jun, S.**, Jung, D., Kim, J.H. (2018). “Analysis of Individual Household Demands for Examining the Effect of Bad Measurements on System Hydraulics.” In *2018 Smart Water Grid International Conference*, Incheon, Republic of Korea.
6. **Jun, S.H.**, Lee, E.H., Choi, Y.H., and Kim, J.H. (2018). “Evaluation of the Green Infrastructure Performance for Urban Water Sustainability in Water Supply and Drainage Systems.” In *15th Asia Oceania Geosciences Society*, Honolulu, Hawaii.
7. **Jun, S.H.**, Choi, Y.H., Jung, D., and Kim, J.H. (2018). “Copycat Harmony Search: Considering Poor Music Player’s Followership Toward Good Players.” In *4th International Conference on*

Harmony search, Soft computing and Applications, Gurgaon, India.

8. **Jun, S.H.**, Lee, E.H., and Kim, J.H. (2017). “Development of Dimensionless Index Assessing Low Impact Development in Urban Areas.” *In American Geophysical Union 2017*, New Orleans, Louisiana.
9. **Jun, S.H.**, Lee, E.H., and Kim, J.H. (2017). “Development of Reliability Index for the Evaluation of Low Impact Development.” *In Korean Society of Civil Engineers 2017 Convention*, Busan, Republic of Korea (in Korean).
10. **Jun, S.H.**, Lee, E.H., Kwon, S.H., Jo, D.J., and Kim, J.H. (2017). “Determination of Optimal LID Location Considering Runoff and Pollutant Load.” *In Korea Water Resources Association 2017 Convention*, Changwon, Republic of Korea (in Korean).

Magazine paper publications

1. **Jun, S.**, Jung, D., Kim, J.H., Lansey, K. (2019). “State of the Art Review in Deep Learning Algorithm: Applications in Civil Engineering.” *Korean Society Civil Engineers*, 67(12), 90-94.

Additional skills

Computer & software skills

EPANET

EPASWMM

Language proficiency

TOFEL iBT – total score 96 (26th August 2018)

Programming language

MATLAB

PYTHON

VISUAL BASIC