

Andrew Chio

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Research Interests

Internet-of-Things, Cyber-Physical Systems, Middleware, Machine Learning, Optimization

Education

- ◇ **Ph.D. in Computer Science** Sep 2019 – Present
University of California, Irvine
Advisor: Prof. Nalini Venkatasubramanian
GPA: 4.00/4.00
- ◇ **B.S. in Computer Science, specialization in Algorithms** Sep 2015 – Jun 2019
University of California, Irvine
Magna Cum Laude – Graduated in top 4% of class
GPA: 3.93/4.00

Professional Experience

- ◇ **Ph.D. Researcher, Irvine, CA** Sep 2019 – Present
Department of Computer Science, University of California, Irvine
 - Distributed Systems Middleware Group
- ◇ **Graduate Student Internship, Los Alamos, NM** Jun 2024 – Sep 2024
Theoretical Division, Los Alamos National Laboratory
 - T-5 Group: Applied Mathematics and Plasma Physics
- ◇ **Ph.D. Visiting Research Fellow, Los Alamos, NM** Apr 2022 – Apr 2024
Theoretical Division, Los Alamos National Laboratory
 - T-5 Group: Applied Mathematics and Plasma Physics
- ◇ **Undergraduate Research Assistant, Irvine, CA** Sep 2018 – Jun 2019
Department of Computer Science, University of California, Irvine
 - Individual Study, Distributed Systems Middleware Group (F18, W19, S19)
 - TIPPERS IoT Programming Project, Information Systems Research Group (W19, S19)

Academic Experience

- ◇ **Graduate Teaching Assistant** Sep 2019 – Jun 2021
Department of Computer Science, University of California, Irvine
 - ICS 46: Data Structures Implementation and Analysis (F19)
 - ICS 33: Intermediate Programming (W20, F20, W21, S21)
 - CS 143A: Principles of Operating Systems (S20)
- ◇ **Undergraduate Learning Assistant** Sep 2018 – Jun 2019
Department of Mathematics, University of California, Irvine
 - Math 1B: Pre-Calculus II (F18, W19)
 - Math 2B: Single-Variable Calculus II (S19)

Academic Experience (continued)

- ◇ **Undergraduate Learning Assistant** Sep 2017 – Jun 2019
Department of Physics and Astronomy, University of California, Irvine
 - Physics 7LC: Classical Physics Lab (F17, W18, S18, F18, W19, S19)
- ◇ **Undergraduate Reader** Sep 2017 – Dec 2018
Department of Computer Science, University of California, Irvine
 - ICS 46: Data Structure Implementation and Analysis (F17, W18, F17)

Awards & Achievements

- ◇ **NSF-ASI Japan Fellow** May 2024
Advanced Studies Institute, National Science Foundation
- ◇ **ARCS Foundation Scholar** Sep 2022 – Sep 2024
Orange County Chapter, ARCS Foundation
- ◇ **UC National Lab In-Residence Graduate Fellowship** Apr 2022 – Apr 2024
Los Alamos National Laboratory, University of California Research Initiatives
- ◇ **Mark Weiser Best Paper Award** Mar 2022
20th IEEE International Conference on Pervasive Computing and Communications (PerCom)
- ◇ **Dean's Honor Roll** Sep 2015 – Jun 2019
University of California, Irvine
- ◇ **SURF-IoT Summer Fellowship** Jun 2018 – Aug 2018
Undergraduate Research Opportunities Program, University of California, Irvine
- ◇ **Most Startup Potential: MediPal** Nov 2016
Med AppJam, University of California, Irvine

Research Projects

Principle Investigator

- ◇ **LFRP In-Residence National Laboratory Graduate Fellows**, UCRI RGPO (L22GF4561)
Budget: \$129,200.00, (2022 – 2024)
PIs: Andrew Chio, Nalini Venkatasubramanian, Russell Bent
Project Title: *Integrating Model and Data-Driven Methods in IoT-enabled Resilient Infrastructure*
Description: Explore different approaches for addressing issues of resilience in pipeline-based utility infrastructure, specifically in stormwater systems and gas-electric grid networks.
 - Examining a more realistic variant of the N-k interdiction problem where temporal delays exist between attackers and defenders in an electric grid infrastructure
 - Exploring derivation of human mobility maps through coarse-grain temperature sensor observations and physics-based thermal models
 - Developed a physics-informed source identification tool for observations of dry weather flows introduced in a stormwater infrastructure system

Graduate Student Researcher

- ◇ **NSF SWADE: Smart Water Data Exchange**, NSF S&CC (1952247)
PIs: Nalini Venkatasubramanian, Sharad Mehrotra, Shangping Ren, David Feldman, Ronald Eguchi
 - Developed a physics-informed source identification tool for observations of dry weather flows introduced in a stormwater infrastructure system
 - Constructed a sensor placement tool to propose and refine ideal locations for instrumentation in stormwater systems using topological and empirical network properties

Research Projects (continued)

- ◇ **Privacy Cognizant IoT Environment for the Brandeis Program**, DARPA (FA8750-16-2-0021)
PIs: Sharad Mehrotra, Alfred Kobsa, Nalini Venkatasubramanian
 - Developed simulation of human trajectories in a navy ship during mission-critical and daily operation use cases, as part of the Trident Warrior exercise in 2019 and 2020

Publications

Journal Articles

- [J-3] **Andrew Chio**, Jian Peng, and Nalini Venkatasubramanian. “STEP: Towards a Semantics-Aware Framework for Instrumenting Community-Scale Infrastructure”. In: *Data Centric Engineering (DCE)* (2024). (Accepted for publication) *JIF: 3.6 JCR2022*.
- [J-2] **Andrew Chio**, Daokun Jiang, Peeyush Gupta, Georgios Bouloukakis, Roberto Yus, Sharad Mehrotra, and Nalini Venkatasubramanian. “SmartSPEC: A framework to generate customizable, semantics-based smart space datasets”. In: *Pervasive and Mobile Computing (PMC)* (2023), p. 101809. *JIF: 4.3 JCR2023*.
- [J-1] Yiming Lin, Daokun Jiang, Roberto Yus, Georgios Bouloukakis, **Andrew Chio**, Sharad Mehrotra, and Nalini Venkatasubramanian. “LOCATOR: Cleaning Wifi Connectivity Datasets for Semantic Localization”. In: *Proceedings of the VLDB Endowment* 14.3 (Nov. 2020), pp. 329–341. ISSN: 2150-8097. *JIF: 2.5 JCR2022*.

Conference Proceedings

- [C-6] **Andrew Chio**, Russell Bent, Andrey Y. Lokhov, Jian Peng, and Nalini Venkatasubramanian. “Physics-informed Pollutant Source Identification in Stormwater Systems”. In: *Proceedings of the 22nd European Control Conference (ECC)*. 2024.
- [C-5] Guoxi Wang, Ryan Hildebrant, **Andrew Chio**, Nalini Venkatasubramanian, and Sharad Mehrotra. “BatchIT: Intelligent and Efficient Batching for IoT Workloads at the Edge”. In: *IEEE Network Operations and Management Symposium (IEEE NOMS 2024)*. 2024. *B CORE2023*.
- [C-4] **Andrew Chio**, Jian Peng, and Nalini Venkatasubramanian. “STEP: Semantics-Aware Sensor Placement for Monitoring Community-Scale Infrastructure”. In: *Proceedings of the 10th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation (ACM BuildSys 2023)*. 2023, pp. 189–197. *A CORE2018*.
- [C-3] **Andrew Chio**, Daokun Jiang, Peeyush Gupta, Roberto Yus, Georgios Bouloukakis, Sharad Mehrotra, and Nalini Venkatasubramanian. “SmartSPEC: Customizable Smart Space Datasets via Event-driven Simulations”. In: *Proceedings of the 20th International Conference on Pervasive Computing and Communications (IEEE PerCom 2022)*. 2022, pp. 1–10. (**Mark Weiser Best Paper Award**), *A* CORE2021*.
- [C-2] **Andrew Chio**, Daokun Jiang, Peeyush Gupta, Roberto Yus, Georgios Bouloukakis, Sharad Mehrotra, and Nalini Venkatasubramanian. “Artifact: SmartSPEC: Customizable Smart Space Datasets via Event-driven Simulations”. In: *Proceedings of the 20th International Conference on Pervasive Computing and Communications (IEEE PerCom 2022)*. 2022, pp. 1–2. *A* CORE2021*.
- [C-1] **Andrew Chio**, Georgios Bouloukakis, Cheng-Hsin Hsu, Sharad Mehrotra, and Nalini Venkatasubramanian. “Adaptive Mediation for Data Exchange in IoT Systems”. In: *Proceedings of the 18th Workshop on Adaptive and Reflexive Middleware (ARM 2019)*. 2019, pp. 1–6.

News and Media Mentions

- [N-3] Madeleine C. Lucas. *NSF ASI Japan, Student Blog*. <https://nsf-asi-japan.my.canva.site>. May 2024.

[N-2] Johnny Loc Nguyen. *ALOHA: Inside a UCI Mathematics Professor's Effort to Maximize Hybrid Learning*. <https://www.compass.uci.edu/aloha-story/>. Apr. 2024.

[N-1] Karen Phan. *Ph.D. Student Andrew Chio Named ARCS Scholar, UC National Lab In-Residence Fellow*. <https://ics.uci.edu/2022/12/06/ph-d-student-andrew-chio-named-arcs-scholar-uc-national-lab-in-residence-fellow/>. Dec. 2022.

Research Prototypes

- ◇ **STEP**: A dashboard for sensor placement, that leverages insights from structural, behavioral, and semantic aspects of a stormwater infrastructure for suitable deployments
More info: <https://github.com/andrewgchio/STEP>
- ◇ **SmartSPEC**: A smart space simulator and data generator that creates customizable smart space datasets using semantic models of spaces, people, events and sensors
More info: <https://github.com/andrewgchio/SmartSPEC>

Mentoring

- ◇ **IoT-SITY Graduate Student Mentor**
 - Miguel A Melo Ochoa, *San Diego State University*, 2024
 - Anton Dimitriev, *Washington University in St. Louis*, 2023 (Co-mentor: Ryan Hildebrant)
 - Christina Youn, *University of Notre Dame*, 2020 (Co-mentor: Praveen Venkateswaran)
- ◇ **Next Gen Pathways Mentor**
 - Gaurav Ghata, *University of California, Irvine*, 2023
 - Sushmitha Jagannath, *University of California, Irvine*, 2023
 - Aditya Karad, *University of California, Irvine*, 2023
 - Boying Lei, *University of California, Irvine*, 2023
 - Haowei Xiong, *University of California, Irvine*, 2023

Professional Service

- ◇ **Technical Program Committee Member**
 - IEEE International Conference on Pervasive Computing and Communications (PerCom): 2023
- ◇ **Artifact Evaluation Committee Member**
 - IEEE International Conference on Software Architecture (ICSA): 2024
- ◇ **Invited External Reviewer**
 - Journal of Ambient Intelligence and Smart Environments (JAISE): 2023

Skills

- ◇ **Programming**: C/C++, Python, Julia, Java, Bash, x86 Assembly, MIPS Assembly, \LaTeX
- ◇ **Tools**: Vim, Anaconda, Jupyter Notebooks, Grafana, AWS, GNS3, Linux, Windows, Raspberry Pi