Alben Rome B. Bagabaldo

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RESEARCH INTERESTS

- Scalable Spatial Analytics
- Digital Twins
- Data Science
- Network Science
- Human-Centered Mobility
- Transportation Systems

EDUCATION

Ph.D. Civil and Environmental Engineering, August 2024
University of California, Berkeley
Labs: Mobile Sensing Lab/Berkeley AI Research (BAIR) Lab
& HumNet Lab
Dissertation: "Navigating Urban Traffic: From Data to Simulations to Real-World Impacts"
Adviser: Prof. Alexandre M. Bayen Committee: Prof. Marta C. Gonzalez, Prof. Joan Walker

M.S. Civil Engineering (Transportation Engineering), August 2016
Mapúa University
Thesis: "Determination of Barriers towards Addressing Mobility and Accessibility through Traffic Simulation: Case of Intramuros, Manila" (Adviser: Dr. Francis Aldrine Uy)

B.S. Civil Engineering (cum laude), March 2012
Southern Luzon State University

ACADEMIC APPOINTMENTS

2025– **Rutgers University** (Piscataway, NJ)
Postdoctoral Associate, Center for Advanced Infrastructure and Transportation (with Prof. Hao Wang
Developing data-driven methods to integrate resilience into NJ TRANSIT's battery-electric bus rollout. This involves building a garage-level resilience index and an optimization framework that couples GTFS blocks, state-of-charge constraints, charger siting and sizing, distributed energy resources, and outage/flood scenarios to minimize cost and unmet service.

2024–25 **Princeton University** (Princeton, NJ)
Postdoctoral Research Associate, Complex Infrastructure Systems Group (with Asst. Prof. Jürgen Hackl)
Lead research on digital twins for intelligent intersections, with emphasis on urban mobility, safety, and infrastructure resilience; cross-institution collaboration with Rutgers and the Municipality of Princeton; co-develop competitive proposals.
Professional development: GradFutures Sustainability Learning Cohort (Spring 2025)

2019–24 **University of California, Berkeley** (Berkeley, CA)
Graduate Student Instructor (multiple courses; see *Courses Taught*); Reader/Grader for IE 242 – Applications in Data Analysis (Fall 2019–Fall 2021)

2014–19 **Mapúa University** (Manila, Philippines)
Instructor/Lecturer (see *Courses Taught*)
Program Chair (Aug 2018–Jan 2019): Led curriculum review; faculty hiring/teaching assignments; industry and accreditation liaison; data-informed assessment.
Senior Science Research Specialist (Sep 2016–May 2017): DOST-funded Mapúa Phil-LiDAR 1 – Flood Hazards Modeling for Cavite, Batangas, Rizal, and Quezon; mentored LGUs and coordinated official turnover of hazard maps.
Research Associate (Jun 2013–Aug 2016): Full-time GIS specialist producing terrain models from LiDAR for national flood-hazard mapping.

2013–14 **Southern Luzon State University** (Quezon, Philippines)
Contract of Service Instructor, College of Engineering

PUBLICATIONS

Peer-Reviewed Journal Articles

5. **Bagabaldo, A. R.**, & Hackl, J. (Under review, 2025). *Digital twins for intelligent intersections: A literature review*. Manuscript under review at *Transportation Research Interdisciplinary Perspectives*. *arXiv preprint* arXiv:2510.05374. https://arxiv.org/abs/2510.05374

4. Tang, Y., Alhadlaq, A., **Bagabaldo, A. R.**, & Gonzalez, M. C. (2025). Designing transit routes based on vehicle routing behavior determined through location-based services data. *EPJ Data Science*, *14*, Article 45. https://doi.org/10.1140/epjds/s13688-025-00559-5

3. **Bagabaldo, A. R.**, Gan, Q., Bayen, A. M., & Gonzalez, M. C. (2024). Impact of navigation apps on congestion and spread dynamics on a transportation network. *Data Science for Transportation*, *6*, Article 12. https://doi.org/10.1007/s42421-024-00099-w

2. Chou, F.-C., **Bagabaldo, A. R.**, & Bayen, A. M. (2022). The lord of the ring road: A review and evaluation of autonomous control policies for traffic in a ring road. *ACM Transactions on Cyber-Physical Systems*, *6*(1), 1–25. https://doi.org/10.1145/3494577

1. **Bagabaldo, A. R.**, Añosa, J., Gapusan, J., Soriano, K., Uy, F., & Bacero, R. (2017). Determining the potential effects of the proposed removal of south provincial buses along EDSA using commuters' perception. *Journal of the Eastern Asia Society for Transportation Studies*, *12*, 489–504. https://doi.org/10.11175/easts.12.489

Refereed Conference Proceedings

2. **Bagabaldo, A. R.**, & Hackl, J. (2025). Improving pedestrian safety at intersections using probabilistic models and Monte Carlo simulations. In *Proceedings of the International Conference on Transportation and Development (ICTD 2025)*. (Oral; accepted). Preprint: arXiv:2503.07805

1. **Bagabaldo, A. R.**, & Gonzalez, M. C. (2022). Predicting traffic flow on faulty traffic detectors using machine learning techniques. In *Proceedings of the International Conference on Transportation and Development 2022*. https://doi.org/10.1061/9780784484319.019

In preparation

2. **A.R. Bagabaldo**, N.S. Ahmad, B. Geng, P.J. Jin, & J. Hackl. Integrating Real-World Data with Probabilistic Models and Monte Carlo Simulations for Safer Intersections.

1. S. Jenks, G. Weissman, H. Wang, **A. R. Bagabaldo**, W. Berry, M. Tuozzolo. An Optimization Framework for Evaluating Energy Cost Reduction Strategies for Transit Electric Bus Fleets.

CONFERENCE PRESENTATIONS / INVITED TALKS

Conference Presentations

5. **Bagabaldo, A. R.**, Hackl, J. (2025, October). Digital Twins for Intelligent Intersections: Merging Real-World Data, Probabilistic Modeling, and Monte Carlo Simulations to Improve Safety. Online oral presentation at the DigiTwin Conference 2025: DT for Smart Construction and Cities.

4. **Bagabaldo, A. R.**, Gan, Q., Bayen, A. M., & Gonzalez, M. C. (2023, June). Price of information and the spread of congestion. Oral presentation at the ASCE International Conference on Transportation and Development.

3. **Bagabaldo, A. R.**, Gan, Q., Lee, J., Bayen, A. M., & Gonzalez, M. C. (2023, June). Large-scale simulation-based understanding of selfishness in routing. Poster presented at the ASCE International Conference on Transportation and Development.

2. **Bagabaldo, A. R.** (2023, June). Research highlights for PhD students. Panel speaker at the ASCE International Conference on Transportation and Development.

1. Cabannes, T., **Bagabaldo, A. R.**, Lee, J., Gan, Q., Jain, A., Blondel, A., & Bayen, A. M. (2023, January). Creating, calibrating, and validating large-scale microscopic traffic simulation. *Transportation Research Board 102nd Annual Meeting*. TRID: 2087449

Invited Talks / Guest Lectures

5. Bagabaldo, A. R. (2024, April 17). Guest lecture in CE 295 – Data Science for Energy: A review and evaluation of autonomous control strategies for traffic in a ring road. University of California, Berkeley.

4. Bagabaldo, A. R. (2017, May 31). Media interview – *The Service Road by James Deakin*. CNN Philippines (aired).

3. Bagabaldo, A. R. (2017, March 16). Mapúa Phil-LiDAR 1 Maps Turnover Ceremony: Big Data. Mapúa University.

2. Bagabaldo, A. R. (2017, March 2). Geospatial information and civil systems for a sustainable and inclusive transportation. Mapúa University.

1. Bagabaldo, A. R. (2017, February 17). Presenter, Intelligent Transportation Systems (ITS) Forum. De La Salle University–Manila.

AWARDS & FELLOWSHIPS

2024 Outstanding Graduate Student Instructor (GSI) Award, UC Berkeley – campus-wide recognition (10% of GSIs)

2019–23 Ph.D. Overseas Scholarship, Commission on Higher Education – Philippine California Advanced Research Institutes (CHED–PCARI)

2016 Dean's Council Scholarship, Mapúa University

2016 JSCE Study Tour Grant, Japan Society of Civil Engineers

2016 Young Future Energy Leaders, Masdar Institute of Science and Technology (Abu Dhabi, UAE)

TEACHING INTERESTS & COURSES TAUGHT

Teaching Interests (courses prepared to teach)

- Data Science for Smart Cities; Public Transportation; Network Science for Human Mobility; Optimization and Simulation for Infrastructure Systems; GIS for Transportation; Urban Analytics; Intro to GIS Programming (Python).

University of California, Berkeley (Graduate Student Instructor)

As a GSI at Berkeley, I led sections, supported curriculum delivery, graded assignments/exams, and mentored students while completing formal pedagogy training.

Graduate-level

- CE C263H/CP C257H – **Human Mobility and Network Science** (Fall 2023): Techniques for analyzing daily activities/travel at urban and global scales; interactions with built and natural environments.
- CE 295 – **Data Science for Energy** (Spring 2023, Fall 2021): Energy system management and control tools; batteries, EVs, renewables, power systems, and smart buildings/homes; modeling, state-space, observers, feedback control, and optimization.
- CE 263N/CP 257 – **Scalable Spatial Analytics / Data Science for Human Mobility and Socio-technical Systems** (Fall 2022): Spatial statistics, exploratory data analysis, spatial data mining, machine learning, and spatial data visualization.
- CE 259 – **Public Transportation Systems** (Spring 2022): Technology, operations/management, policy, and financing of transit systems.

Undergraduate

- PHYSICS 8A – **Introductory Physics** (Spring 2024, Summer 2023): Forces, kinetics, equilibria, fluids, waves, and heat; foundations for upper-division study.
- CE C88/CP C88 – **Data Science for Smart Cities** (Spring 2021): Working with data from transportation, power grids, communications, crowd- and remote-sensing; demand/supply-side urban services via analytics.

Mapúa University (Instructor of Record)

- Undergraduate courses in Methods of Research, Transportation Engineering, and Engineering Economy; supervised undergraduate theses.

Southern Luzon State University (Instructor of Record)

- Undergraduate courses in Traffic Engineering, Soil Mechanics, and Fluid Mechanics.

MENTORSHIP & SERVICE

Research Mentorship

UC Berkeley

- *Undergraduate:* Arya Bakhtiar (EECS, 2023–2024; now MS student, Stanford), Preston Fu (EECS, 2022–2023), Qianxin Gan (EECS, 2022–2023; now Software Engineer, Google), John Lee (EECS, 2021–2022; now Software Engineer, Wing)
- *Graduate:* Yuhan Tang (CEE Systems, 2023–2024; now graduate student at MIT)

Princeton University

- *Graduate:* Chen Zhang and Esteban Nocet-Binois (CEE)

Leadership

2023–24 Vice President & Founding Member, Representation of Asian and Pacific Islanders in CEE (RAPID-CEE), UC Berkeley

2016–18 Faculty Adviser, Transportation Science Society of the Philippines – Mapúa Student Chapter

2010–11 Vice President, College of Engineering Student Council, Southern Luzon State University

Referee Service

- *Transportation Research Board (TRB) Annual Meeting*; *IEEE Intelligent Transportation Systems Conference (ITSC), IEEE Intelligent Vehicles Symposium, IEEE Transactions on Intelligent Transportation Systems. IET Intelligent Transport Systems*

PROFESSIONAL MEMBERSHIPS

- Eastern Asia Society for Transportation Studies – Transportation Science Society of the Philippines (Regular Member, 2017–present; Associate Member, 2016–2017)
- Japan Society of Civil Engineers (Associate Member, 2016–present)
- American Society of Civil Engineers (Affiliate Member, 2024–present; Student Member, 2022–2024)

Alben Rome B. Bagabaldo, Ph.D.
Updated November 2025