

Alben Rome B. Bagabaldo

Postdoctoral Associate

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RESEARCH INTERESTS

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

EDUCATION

- Ph.D. **University of California, Berkeley**
Civil and Environmental Engineering, August 2024
Labs: Mobile Sensing Lab/Berkeley AI Research (BAIR) Lab
& HumNet Lab | Affiliate: Berkeley Institute of Transportation Studies
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. **Mapúa University**
Civil Engineering (Transportation Engineering), August 2016
Thesis: “Determination of Barriers towards Addressing Mobility and Accessibility through
Traffic Simulation: Case of Intramuros, Manila” (Adviser: Dr. Francis Aldrine Uy)
- B.S. **Southern Luzon State University**
Civil Engineering (cum laude), March 2012

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 I – 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

6. S. Jenks, G. Weissman, H. Wang, **A. R. Bagabaldo**, W. Berry, M. Tuozzolo. (Under review, 2025). An Optimization Framework for Evaluating Energy Cost Reduction Strategies for Transit Electric Bus Fleets. Manuscript under review at *IEEE Transactions on Transportation Electrification*.
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

4. **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.
3. **A.R. Bagabaldo**, H. Wang. Assessing and Mitigating Natural Hazard Impacts on Battery-Electric Bus Operations: A Garage-Level Resilience Index Approach.
2. **A.R. Bagabaldo**, H. Wang. A Review of the Resilience of Battery-Electric Buses to Natural Hazards and Future Research Directions.
1. C. Zhang, T. LaRock, **A.R. Bagabaldo**, J. Hackl. Rethinking the Sioux Falls Network: Insights from Path-Driven Higher-Order Network Analysis. *arXiv preprint arXiv:2508.06234*. <https://arxiv.org/abs/2508.06234>

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 i 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

- 2025 Google Cloud Platform (GCP) Credits (USD 10,000). In-kind cloud compute support to run AI experiments using Google Gemini for *Digital Twins for Intelligent Intersections*.
- 2024 Outstanding Graduate Student Instructor (GSI) Award - City and Regional Planning, UC Berkeley – campus-wide recognition (10% of GSIs). List of Recipients, AY 2023-2024
- 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:* Yuhang Tang (CEE Systems, 2023–2024; now graduate student at MIT)

Princeton University

- *Graduate:* Chen Zhang and Esteban Nocet-Binois (CEE Ph.D. students)

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)



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