Alben Rome B. Bagabaldo

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RESEARCH INTERESTS

Intelligent Transportation Systems
Digital Twin Modeling
Data Science
Network Science
Human-Centered Mobility

EDUCATION

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

EXPERIENCE

2024– **Princeton University** (Princeton, New Jersey)
Postdoctoral Research Associate, Complex Infrastructure Systems Group (with Prof. Jürgen Hackl)
- Leading research on Digital Twins for Intelligent Intersections, focusing on the development of next-generation traffic management systems to enhance urban mobility, safety, and infrastructure resilience. - Collaborating with interdisciplinary researchers and stakeholders from Princeton University, Rutgers University, and the municipality of Princeton, New Jersey. Contributing to the development and writing of competitive research proposals for external funding.
Co-curricular/Professional Development Activity: GradFutures Sustainability Learning Cohort (Completed, Spring 2025)

2019–24 **University of California, Berkeley** (Berkeley, California)
Graduate Student Instructor (GSI) for multiple courses (see courses taught)
Reader/Grader for IE 242 – Applications in Data Analysis (Fall 2019-Fall 2021 semesters)

2014–19 **Mapúa University** (Manila, Philippines)
Instructor/Lecturer (see courses taught)

Program Chair (August 2018 – January 2019)
- Led a comprehensive curriculum review to align academic offerings with current industry practices and accreditation standards.
- Oversaw faculty recruitment, teaching assignments, and course scheduling.
- Served as the primary liaison to industry partners and accreditation bodies.
- Managed student recruitment, advising, and program assessment, driving continuous improvement through data-informed feedback mechanisms.

Senior Science Research Specialist (September 2016 – May 2017)
- Reported directly to the Chief Science Research Specialist and Project Leader on the administration and policy aspects of the Department of Science & Technology (DOST)-funded research project, "Mapúa Phil-LiDAR 1 – Flood Hazards Modeling for the Provinces of Cavite, Batangas, Rizal, and Quezon."
- Led key project completion activities, including mentoring sessions with local government units (LGUs) and coordinating the official turnover of hazard maps.
- Engaged extensively with LGUs to support the execution and practical application of research outputs.

Research Associate (June 2013 – August 2016)
- Served as a full-time Geographic Information System (GIS) specialist.
- Primarily responsible for producing terrain models from pre-processed Light Detection and Ranging (LiDAR) data as part of national floor hazards mapping initiatives.

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

PUBLICATIONS

Journal Articles

In-press [J4] Y. Tang, A. Alhadlaq, **A.R. Bagabaldo**, M.C. Gonzalez. "Designing Transit Routes based on Vehicle Routing Behavior Determined through Location-Based Services Data." *EPJ Data Science*. Preprint: doi.org/10.21203/rs.3.rs-5891341/v1

2024 [J3] **A.R. Bagabaldo**, Q. Gan, A. Bayen, M.C. Gonzalez. "Impact of Navigation Apps on Congestion and Spread Dynamics on a Transportation Network." *Data Science for Transportation*. doi:10.1007/s42421-024-00099-w

2022 [J2] F.-C. Chou, **A.R. Bagabaldo**, A. Bayen. "The Lord of the Ring Road: A Review and Evaluation of Autonomous Control Policies for Traffic in a Ring Road." *ACM Trans. on Cyber-Physical Systems*. doi:10.1145/3494577

2017 [J1] **A.R. Bagabaldo**, J. Anosa, J. Gapusan, K. Soriano, F. Uy, R. Bacero. "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*. doi:10.11175/easts.12.489

Conference Proceedings

2025 [CP2] **A.R. Bagabaldo** & J. Hackl. "Improving Pedestrian Safety at Intersections Using Probabilistic Models and Monte Carlo Simulations." *International Conference on Transportation and Development 2025.* (Oral, accepted). Preprint: arXiv:2503.07805

2022 [CP1] **A.R. Bagabaldo** & M.C. Gonzalez. "Predicting Traffic Flow on Faulty Traffic Detectors Using Machine Learning Techniques." *International Conference on Transportation and Development 2022.* doi:10.1061/9780784484319.019

In preparation/Forthcoming Publications

2025 [F2]**A.R. Bagabaldo** & J. Hackl. "Digital Twins for Intelligent Intersections: A Literature Review"

2025 [F1] **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"

CONFERENCE PRESENTATIONS/INVITED TALKS

Conference Presentations

2023 [C4] **A.R. Bagabaldo**, Q. Gan, A. Bayen, M.C. Gonzalez. "Price of Information and the Spread of Congestion." Oral presentation at ASCE International Conference on Transportation and Development.

2023 [C3] **A.R. Bagabaldo**, Q. Gan, Junghwan Lee, A. Bayen, M.C. Gonzalez. "Large-scale Simulation-based to Understand Selfishness in Routing" Poster presentation at ASCE International Conference on Transportation and Development.

2023 [C2] **A.R. Bagabaldo**. "Research Highlights for PhD Students." Panel speaker at ASCE International Conference on Transportation and Development.

2023 [C1] T. Cabannes, **A.R. Bagabaldo**, J. Lee, Q. Gan, A. Jain, A. Blondel, A. Bayen. "Creating, Calibrating, and Validating Large-Scale Microscopic Traffic Simulation." *Transportation Research Board 102nd Annual Meeting*. https://trid.trb.org/view/2087449

Invited Talks/Guest Lecture

2024 [T5] A.R. Bagabaldo. "Guest Lecture in CE 295 - Data Science for Energy: A review and evaluation of autonomous control strategies for traffic in a ring road (Spring 2024)" UC Berkeley, April 17, 2024.

2017 [T4] A.R. Bagabaldo. "Media Interview – The Service Road by James Deakin." CNN Philippines, *aired* May 31, 2017.

2017 [T3] A.R. Bagabaldo. "Mapúa Phil-LiDAR 1 Maps Turnover Ceremony: Big Data." Mapúa University, March 16, 2017.

2017 [T2] A.R. Bagabaldo. "Geospatial Information and Civil Systems for a Sustainable and Inclusive Transportation." Mapúa University, March 2, 2017.

2017 [T1] A.R. Bagabaldo. "Presenter at the Intelligent Transportation Systems (ITS) Forum: An event by the De La Salle University-Manila co-presented by the Transportation Science Society of the Philippines" De La Salle University - Manila, February 17, 2017.

AWARDS/FELLOWSHIPS

2024 Outstanding Graduate Student Instructor (GSI) Award, UC Berkeley
An award sponsored by the GSI Teaching and Resource Center, in recognition of exceptional achievements as a teacher. Approximately 10% of the GSIs serving at UC Berkeley campus earned this distinguished award.

2019–23 Ph.D. Overseas Scholarship, Commission on Higher Education – Philippine California Advanced Research Institutes
Recipient of a five-year fully-funded fellowship by the Philippine government to study Ph.D. at UC Berkeley

2016 Dean's Council Scholarship, Mapúa University
Recipient of the Dean's Council Scholarship as a student of Master of Science in Civil Engineering at Mapúa Institute of Technology (now Mapúa University)

2016 JSCE Study Tour Grant, Japan Society of Civil Engineers
This is a unique one-week program for young civil engineers to learn Japanese civil engineering technology and projects.

2016 Young Future Energy Leaders, Masdar Institute of Science and Technology
An outreach initiative of Masdar Institute of Science and Technology, is a key element of the annual World Future Energy Summit (WFES) that is held in Abu Dhabi.

COURSES TAUGHT

University of California, Berkeley *(as Graduate Student Instructor)*

As a Graduate Student Instructor (GSI) at Berkeley, I led weekly discussion sections, supported curriculum delivery, graded assignments and exams, and provided academic mentorship to the students, while developing my own teaching skills through formal pedagogy training.

Graduate-level courses:

– CE C263H/CP C257H – **Human Mobility and Network Science** (Fall 2023)
This course is dedicated to techniques for analyzing individual daily activities and travels both at urban and at global scale. The course is designed for graduate students interested in methods to analyze human dynamics, and their interactions with the built and natural environment.

– CE 295 – **Data Science for Energy** (Spring 2023, Fall 2021)
The course covers energy system management and the underlying control system tools. Applications of interest include batteries, electric vehicles, renewable energy, power systems, and smart buildings/homes. Technical tools include system modeling, state-space representations, stability, parameter identification, state observers, feedback control, and optimization.

– CE 263N/CP 257 – S**calable Spatial Analytics/Data Science for Human Mobility and Socio-technical Systems** (Fall 2022)
This course introduces modern methods of data analysis, spatial data handling and visualization technologies for engineers and data scientists. Theoretical coverage includes a selection of methods from spatial statistics, exploratory data analysis, spatial data mining, discriminative and generative approaches of machine learning.

– CE 259 – **Public Transportation Systems** (Spring 2022)
Analysis of mass transit systems, their operation, and management. Technology of transit vehicles and structures. Public policy and financing.

Undergraduate-level courses:

– PHYSICS 8A – **Introductory Physics** (Spring 2024, Summer 2023)
Introduction to forces, kinetics, equilibria, fluids, waves, and heat. This course presents concepts and methodologies for understanding physical phenomena, and particularly useful preparation for upper division study in biology and architecture.

– CE C88/CP C88 – Data Science for Smart Cities (Spring 2021)
This course provides an introduction to working with data generated within transportation systems, power grids, communication networks, as well as collected via crowd-sensing and remote sensing technologies, to build demand- and supply-side urban services based on data analytics.

Mapúa University *(as Instructor of Record)*

Undergraduate courses in Methods of Research, Transportation Engineering, and Engineering Economy

Supervision of undergraduate theses

Southern Luzon State University *(as Instructor of Record)*

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

SERVICE

Research Mentorship of students at UC Berkeley

Undergraduate Students:

– Arya Bakhtiar (EECS, 2023–2024; currently a Master's student at Stanford University)

– Preston Fu (EECS, 2022–2023)

– Qianxin Gan (EECS, 2022–2023; currently a Software Engineer at Google)

– John Lee (EECS, 2021–2022; currently a Software Engineer at Wing)

Graduate Student:

– Yuhan Tang (Systems Engineering (CEE), 2023–2024; currently a graduate student at MIT)

Leadership

2023–24	Vice President & Founding Member, Representation of Asian and Pacific Islanders in the Department of Civil and Environmental Engineering (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)

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 (Associate Member, 2024-present; Student Member, 2022-2024)

Updated June 2025