

Symposium 2021 Breakout Session Title:

B208-Environmental, Economic, and Social Impacts of AV Use

Organizers: Thomas Krendl Gilbert, PhD candidate, UC Berkeley (session contact)
Michael Dennis, PhD candidate, UC Berkeley
Cathy Wu, Assistant Professor, MIT

Description: Automated vehicles (AVs) will generate diverse and potentially inequitable effects on congestion, pollution, and sustained economic development. Fortunately, we are at an early stage of the evolution of AV development, and this community has an immense opportunity to shape that evolution. Emerging AV simulation tools can control both inter-vehicle behaviors and network operations to manage AV externalities. However, the bulk of research focuses on an incomplete set of basic metrics, such as throughput. The goal of this participatory session is to propose, expand, and refine a set of suitable metrics for quantifying and addressing AV externalities. We focus on a list of proxy metrics (e.g., average commute time, local environmental effects) from adjacent disciplines such as developmental economics and environmental engineering, and we propose ways to implement them in simulation. These measures could then inform AV regulations and business models, which account for considerations of social equity and mobility justice, as well as the development of better proxy metrics to quantify them.

Goals/Objectives/Outputs: The session will help communities, their residents, and governmental agencies learn about and shape possible social equity metrics that are ready to be used by industry simulators, as well as further refined and advocated by academic researchers.

Participants will:

- Discuss the latest metrics and parameters for citywide AV testing;
- Explore how to simultaneously optimize environmental, economic, and safety features;
- Evaluate the above features in the context of socially equitable mobility concerns;
- Advance state of the art AV traffic simulation;
- Propose new metrics for human factors, community routing needs, and other domains; and
- Shape a new subfield combining AV designers, transportation engineers, and policymakers.

Agenda: Crafting AV Metrics for Equity and Environmental Sustainability (60 min)

This set of presentations and moderated discussion will compile insights and perspectives from multidisciplinary experts in civil engineering, traffic engineering, and behavioral economics.

Taking questions from the audience, panelists will discuss relevant metrics to add to AV simulations to advance multi-modal considerations, evaluate their shortcomings, and reflect on possible adjustments to refine them for modeling purposes.

Presentations (30 min total, ~10 min each)

Simulations for Efficiency and Traffic Management (Cathy Wu)

Modeling for Accessibility and Fair Pricing (Jooyong Lee & Kara Kockelman)

Considerations for Equitable Mobility (Susan Shaheen)

Break (5 min)

Panel Session & Discussion (25 min)

Moderator:

Thomas Krendl Gilbert, Ph.D. candidate, UC Berkeley

Panelists:

Kara Kockelman, Professor, UT Austin

Adam Cohen, Senior Manager, Transportation Sustainability Research Center

Cathy Wu, Assistant Professor, MIT

An Open Discussion of Metrics for Broader Impacts of AVs (60 min)

Description: Via Zoom Breakout Rooms, participants will be placed into smaller groups to discuss new or refined metrics to address domain-relevant concerns of the panelists, incorporating the themes of the panel discussion. This would include the following:

1. What is the problem? Why is it important? Be as specific as possible.
2. What is a suitable proxy metric for this problem?
3. How can this proxy metric be measured? Is the data already available? Is the data accessible? What is the cost of obtaining and utilizing the data?
4. Does this metric have synergies with other metrics? Does it conflict with other metrics? What are ways to alleviate the conflicts?

One possible structure to be refined later: Breakout groups (~4-6 people each) brainstorm a specific feature of concern, corresponding stakeholder group, and a new (or alternative/improved) metric to deal with it (15 min); groups come back together and briefly present their metrics to all participants (5-10 min); second breakouts identify a major roadblock/challenge for that metric and strategy to deal with this (15 min); groups come together again and present their plan with Q&A from panelists and other participants (20 min total)

Group participants can sign up for a working group to sustain ideas and findings after the breakout session.

Zoom Group Facilitators:

Thomas Krendl Gilbert, PhD candidate, UC Berkeley

Michael Dennis, PhD candidate, UC Berkeley

Confirmed/invited speaker names and affiliations: Kara Kockelman (UT Austin), Adam Cohen (TSRC, UC Berkeley)