

Self-Driving Vehicles as Transit in US Settings: Complementing Buses and Trains with Demand-responsive SAVs

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Abstract: Shared autonomous vehicles (SAVs) can deliver door-to-door (D2D), first-mile last-mile (FMLM) and dynamic ride-sharing (DRS or pooled-ride) services in many cities today. This 3-part presentation explores potential improvements in US travel and transit systems by simulating interactions between fixed-route and on-demand SAV services across the Chicago and Austin regions. The first study microsimulates SAVs providing fixed-route, fixed-stop service alongside private automobiles. System costs for each traveler type are computed across different demand profiles, SAV sizes (seat counts), and other dimensions; and smaller SAVs reduce corridor costs across most scenarios. The second uses POLARIS to mesoscopically simulate D2D plus FMLM and autonomous-bus services across the 20-county Chicago region's hundreds of train stations, thousands of bus stops, and millions of travelers. Assuming fares of \$0.50 per passenger-mile and 1 SAV for every 40 residents, this mode is predicted to attract 15% of person-trips and lower household vehicle ownership by 40%. Adding FMLM service raises the region's traditional transit (bus + train) split from 5.4% to 6.3%, with each SAV serving 12% more trip requests per day. Automating the bus system (and halving headways, with half the seats per bus) does little to mode splits. The third study simulates a full replacement of buses with autonomous services across the 6-county Austin region. Using the region's bus stops as pickup and drop-off points, the transit fleet size falls by 10% or more, thanks to coordination in trip services. Subsidizing SAV fleet managers to serve current bus demand emerges as the region's most cost-effective and welfare-improving transit option.

Bio: Kara Kockelman is a registered professional engineer and holds a PhD, MS, and BS in civil engineering, a master's in city planning, and a minor in economics from the University of California at Berkeley. Dr. Kockelman has been a professor of transportation engineering at the University of Texas at Austin for 27 years, and is Associate Site Director of the NSF Industry-University Cooperative Research Center for Efficient Vehicles and Sustainable Transportation Systems and an MIT Mobility Fellow. She has authored over 240 journal articles (and two books), and her primary research interests include planning for shared and autonomous vehicle systems, the statistical modeling of urban systems, energy and climate issues, the economic impacts of transport policy, and crash occurrence and consequences. Her and her students' work can be found at www.cae.utexas.edu/prof/kockelman. They hope you will join them each year in the carbon-free, cost-free Bridging Transportation Researchers they help offer our world: <https://bridgingtransport.org/>.

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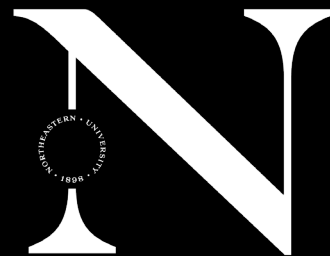


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