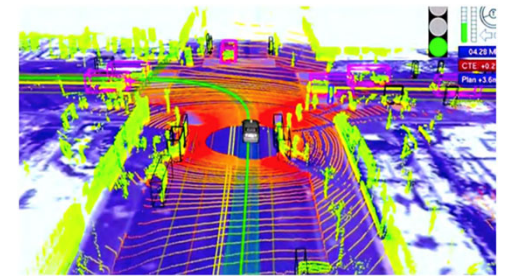
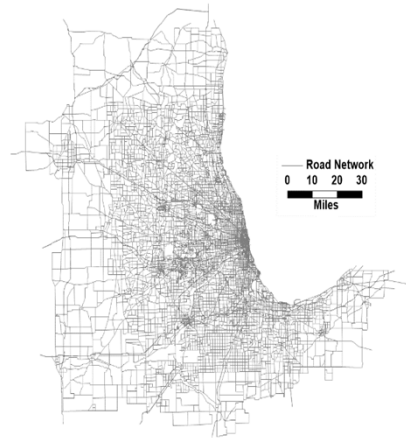




THE UNIVERSITY OF TEXAS AT AUSTIN
CENTER FOR TRANSPORTATION RESEARCH

The Future of US Transport: Shared? Self-Driving? All-Electric? Smart-Charged? Right-Sized? Airborne? Properly Priced?



Kara Kockelman
+ Loads of terrific UT students



COLLABORATE. INNOVATE. EDUCATE.



US Transport Costs *Each American...*

- Over \$9000 per year in travel Time** burden (20% from freight)
- + \$4000/yr for **Car + Truck Ownership** (with insurance – *not use*)
- + **\$3000/yr Roadway Crash** costs (including pain+suffering)
- + \$800 in **Fuel** (for roadway use by conventional vehicles*)
- + **\$700** in Roadway **Carbon Emissions** (assuming \$100/ton**)
- + another \$500 or so in **other emissions** (incl PM2.5 precursors)

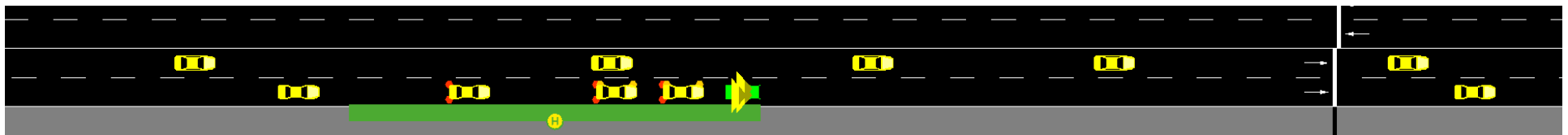
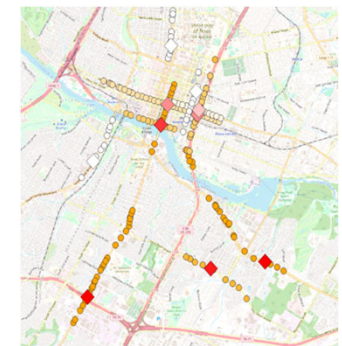
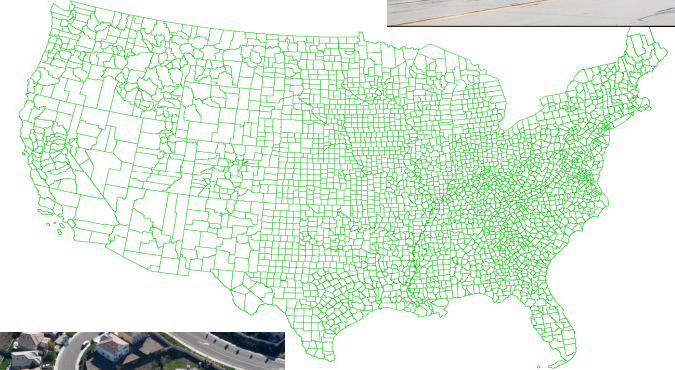
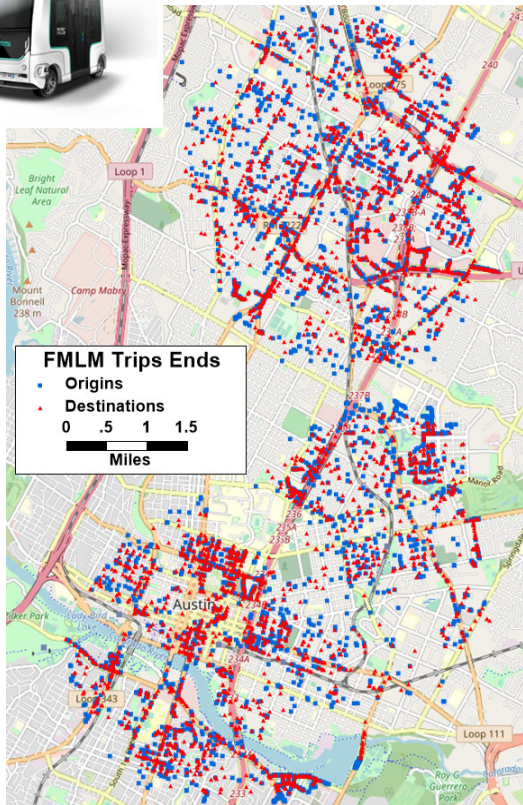
- + Noise, visual blight, habitat & species loss, fear of walking & biking, health care costs from sedentary lifestyles, etc.

* including just \$100/year/capita in **Gas Taxes**

** while **Airline** emissions = \$200 to \$400 per ton CO₂e.



Our UT Austin Research Results





What do **Newer Techs** get us?

BEVs + Smarter grid (e.g., V1G charging + cleaner feedstocks) can **lower roadway emissions damages 90%** (\$1k/capita/year).

Full automation (AVs) can **lower** long-term **Crash costs by 85%** (\$2.5k/capita/year) + **lower perceived Time “costs” 25%** (\$2k/cap/yr)

BUT deliver **gridlock, more sprawl, etc.**

AVs make “driving” much easier. Our results suggest we need distance-based & credit-based congestion tolls, empty-driving limitations, right-sized shared AVs subsidized as **on-demand transit**, & more.



Further Recommendations

- How about **eBike** subsidies (vs. spending \$2/person-mile on poorly used conventional transit systems, which is 10x the cost of filling a private car)?
- Why not require **Upzoning**? (2+ units permitted on single-family lots, as in California + Minneapolis)
- Why not **full-cost Pricing** of roadways (5¢/mile), our own emissions (1 to 10¢/mile), & parking (\$0.10 to \$1/hour)?
- Peer nations already require **auto-Braking** for pedestrians & **speed limiters** + 25¢ **RFID tags** for vehicle registration, automated speed enforcement in dangerous settings, on-board **dongles for GPS-based tolls** (or odometer reads), & vary vehicle reg fees & sales taxes by size & emissions levels, provide mobility wallets, & more. **The US is lagging among its peers.**



Thank you for this honor.

I look forward to your questions & suggestions.



Our 200+ papers are at
[www.caee.utexas.edu](http://www.caee.utexas.edu/prof/kockelman)
prof/kockelman