Self-Driving Cars and the Future(s) of Urban Transportation

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Adapt or Die: The Future of Transportation in a Rapidly Changing World

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2004: No teams’ autonomous vehicles completed DARPA’s 150-mile challenge

2005: Six teams completed the challenge (including teams from Stanford, CMU, UPenn, and MIT)
Existing Prototypes
market-ready in Five Years?
Rapid Increase in Research over the Past Few Years
Primary Impacts: Road Capacity
Secondary Impacts: Enhanced Personal Mobility

Nationally 9% of households don’t own cars.
And 33% of people do not have licenses.
### Secondary Impacts: Economic Restructuring

Americans employed as drivers in 2014

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number</th>
<th>Median pay</th>
<th>Entry level education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus drivers</td>
<td>654,300</td>
<td>29,550</td>
<td>High school</td>
</tr>
<tr>
<td>Delivery truck drivers</td>
<td>1,273,600</td>
<td>27,530</td>
<td>High school</td>
</tr>
<tr>
<td>Tractor trailer drivers</td>
<td>1,701,500</td>
<td>38,200</td>
<td>Postsecondary non-degree</td>
</tr>
<tr>
<td>Material moving machine operators</td>
<td>650,600</td>
<td>31,530</td>
<td>High school</td>
</tr>
<tr>
<td>Taxi drivers</td>
<td>233,000</td>
<td>22,820</td>
<td>Less than high school</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,513,000</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Bureau of Labor Statistics
Secondary Impacts: Public Transit

Line 14 in Paris
Secondary Impacts: Public Transit

Bridj is your everyday transportation system that adapts in real time to where you live, work, and play.

On Bridj you can travel between the connected zones, inbound in the morning and outbound in the evening. When requesting a trip you’ll receive instructions to your pick-up and drop-off spots.
How Will Driverless Cars Change Cities?

Two scenarios frequently mentioned

1. Shared urban mobility
2. Increased personal mobility
Scenario 1: Shared Urban Mobility

- Shared point-to-point mobility,
- limited car ownership,
- reduced on-street and off-street parking,
- increased density and urbanity.
Scenario 2: Increased Personal Mobility

- Increased car ownership and VMT,
- Mostly privately owned,
- Zero-occupancy vehicles (picking up, dropping off, parking, etc.),
- Continued trend of increased long-duration commutes.
Which Scenario is More Likely?

Almost certainly, we’ll see a bit of both with variation across states, cities, and neighborhoods

<table>
<thead>
<tr>
<th>Features of cities and neighborhoods where each scenario is more likely</th>
<th>Shared Urban Mobility</th>
<th>Increased Personal Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>Medium to high</td>
<td>Low to medium</td>
</tr>
<tr>
<td>Transit service</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Land values</td>
<td>High and centralized</td>
<td>Moderate and dispersed</td>
</tr>
<tr>
<td>Rent gradient</td>
<td>Steep</td>
<td>Flat</td>
</tr>
<tr>
<td>Car ownership</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Parking</td>
<td>Priced or permitted</td>
<td>Free and ubiquitous</td>
</tr>
</tbody>
</table>
Influences on Regional and Local Planning?

- Continued shift from capital investments to operations and maintenance
- Reduction in highway spending
- Smart technology investments
- Reduced parking requirements
- Redevelopment and infill of surface lots
Despite rapid advances, changes will not happen over night (as with smart phones).

- Technological and regulatory hurdles remain
- Vehicle fleet takes years to turn over (average personal vehicle is 11 years old)

Likely first movers:
- Taxi, freight, and transit industries
- The mobile office crowd
- Regions building new highway capacity (like HOV or HOT lanes, but for AVs)
- Closed facilities like retirement communities, tech campuses, and airports