Future Vehicle Ownership Patterns in an Era of AVs

Katherine Asmussen, Aupal Mondal, and Chandra Bhat
Department of Civil, Architectural and Environmental Engineering
University of Texas At Austin
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Full Citation

TOMNET D-STOP Transformative Technologies in Transportation Survey (T4 Survey)

- Phoenix, Atlanta, Austin, and Tampa metro areas
- Summer and Fall 2019
- Random address-based sample with online instrument
- Comprehensive attitudinal survey on MaaS and AV
- Weighted to better represent Census distributions

<table>
<thead>
<tr>
<th></th>
<th>Phoenix, AZ</th>
<th>Atlanta, GA</th>
<th>Austin, TX</th>
<th>Tampa, FL</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td>1,027</td>
<td>944</td>
<td>1,127</td>
<td>260</td>
<td>3,358</td>
</tr>
<tr>
<td>%</td>
<td>30.6%</td>
<td>28.1%</td>
<td>33.6%</td>
<td>7.8%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Survey Instrument

- Attitudes and Preferences
- Vehicles You Have and Where You Live
- Current Travel Patterns
- Mobility on Demand and Shared Mobility Services
- Autonomous Vehicles
- Background Information
Introduction

Predictions of AV Market Penetration

- Are people buying AVs?
  - When? Now or Later?
- Why are they waiting to buy?
- Will they give up their ability to drive to purchase an AV?
  - What impacts this decision?
    - Travel time? Travel cost? Vehicle cost?
- Will they trust and use AV ridesharing?

Companies plan to produce self-driving vehicles this year or very soon, so what is going to happen?

<table>
<thead>
<tr>
<th>Company</th>
<th>Autonomous Vehicle Majority Market Penetration Prediction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ford</td>
<td>True Self-Driving by 2021</td>
</tr>
<tr>
<td>GM</td>
<td>Self-Driving Beyond 2020</td>
</tr>
<tr>
<td>Honda</td>
<td>Self-Driving on the Highway by 2020</td>
</tr>
<tr>
<td>Toyota</td>
<td>Self-Driving on the Highway by 2020</td>
</tr>
<tr>
<td>Renault-Nissan</td>
<td>2020 for Autonomous Cars in Urban Conditions, 2025 for Truly Driverless Cars</td>
</tr>
<tr>
<td>Volvo</td>
<td>Self-Driving on the Highway by 2021</td>
</tr>
<tr>
<td>Hyundai</td>
<td>Highway 2020, Urban Driving 2030</td>
</tr>
<tr>
<td>Daimler and BMW</td>
<td>Nearly Fully Autonomous by Early 2020's</td>
</tr>
<tr>
<td>Fiat-Chrysler</td>
<td>CEO expects there to be some self driving on the road by 2021</td>
</tr>
<tr>
<td>Tesla</td>
<td>Beginning of 2020</td>
</tr>
</tbody>
</table>

Source: [https://medium.com/@BabakShah/levels-of-automation-for-self-driving-cars-d410d95f796](https://medium.com/@BabakShah/levels-of-automation-for-self-driving-cars-d410d95f796)
**WHAT?**

Type of vehicle?  
Regular Vehicle  Autonomous Vehicle  Rely on AV Ride-hailing Services only

**WHEN?**  
Will you purchase?
**Survey Question:** What will you purchase?

**Stated Preference Question**
Each respondent was presented 2 Scenarios

<table>
<thead>
<tr>
<th>Options</th>
<th>Option A: Buy a regular vehicle</th>
<th>Option B: Buy an AV</th>
<th>Option C: Don’t buy a vehicle and use AV ride-hailing/rental services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs</td>
<td>$\text{XXX}$/month + $\text{YYY}$/mile</td>
<td>$\text{XXX}$/month + $\text{YYY}$/mile</td>
<td>$\text{XXX}$/month + $\text{YYY}$/mile</td>
</tr>
<tr>
<td>Average wait time</td>
<td>0 minutes</td>
<td>0 minutes</td>
<td>$Z$ minutes</td>
</tr>
<tr>
<td>Rank</td>
<td>_____</td>
<td>_____</td>
<td>_____</td>
</tr>
</tbody>
</table>

*Values highlighted vary for each respondent based on random block design*

What would you do when faced with your next car purchase decision in each of the following scenarios?

Respondents ranked 1 as most preferred, 3 as least preferred
What will you purchase?

**Austin**
- Regular Vehicle: 46%
- Autonomous Vehicle: 41%
- AV Ridehailing Services: 13%

**Phoenix**
- Regular Vehicle: 60%
- Autonomous Vehicle: 28%
- AV Ridehailing Services: 12%

**Tampa**
- Regular Vehicle: 62%
- Autonomous Vehicle: 24%
- AV Ridehailing Services: 14%

**Atlanta**
- Regular Vehicle: 55%
- Autonomous Vehicle: 33%
- AV Ridehailing Services: 12%

**All Cities**
- Regular Vehicle: 54%
- Autonomous Vehicle: 34%
- AV Ridehailing Services: 12%
What will you purchase?

First Choice
- Regular Vehicle
- Autonomous Vehicle
- Autonomous Ride-hailing

Second Choice
- Regular Vehicle
- Autonomous Vehicle

Demographic Data

<table>
<thead>
<tr>
<th>Age</th>
<th>Regular Vehicle</th>
<th>Autonomous Vehicle</th>
<th>AV Ride-hailing Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 and younger</td>
<td>43%</td>
<td>43%</td>
<td>14%</td>
</tr>
<tr>
<td>30 to 64</td>
<td>54%</td>
<td>34%</td>
<td>12%</td>
</tr>
<tr>
<td>65 and older</td>
<td>44%</td>
<td>24%</td>
<td>12%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Educational Background</th>
<th>Regular Vehicle</th>
<th>Autonomous Vehicle</th>
<th>AV Ride-hailing Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completed graduate degree(s)</td>
<td>52%</td>
<td>36%</td>
<td>12%</td>
</tr>
<tr>
<td>Bachelor's degree(s) or some graduate school</td>
<td>54%</td>
<td>34%</td>
<td>12%</td>
</tr>
<tr>
<td>Some college or technical school</td>
<td>57%</td>
<td>30%</td>
<td>13%</td>
</tr>
<tr>
<td>Completed high school or GED</td>
<td>58%</td>
<td>27%</td>
<td>15%</td>
</tr>
<tr>
<td>Some grade/High school</td>
<td>34%</td>
<td>48%</td>
<td>18%</td>
</tr>
</tbody>
</table>
What will you purchase? **Demographic Data**

**Male**
- Regular Vehicle: 51%
- Autonomous Vehicle: 37%
- AV Ridehailing Services: 12%

**Female**
- Regular Vehicle: 57%
- Autonomous Vehicle: 31%
- AV Ridehailing Services: 12%

What will you purchase? **Attitudinal Data**

**Anti-Tech**
- Regular Vehicle: 63%
- Autonomous Vehicle: 25%
- AV Ridehailing Services: 12%

**Happy Commuter**
- Regular Vehicle: 57%
- Autonomous Vehicle: 30%
- AV Ridehailing Services: 13%

**Pro-Environment**
- Regular Vehicle: 49%
- Autonomous Vehicle: 36%
- AV Ridehailing Services: 15%
What will you purchase? Willingness to Pay

Cost per month

Choose Regular Vehicle
Choose Autonomous Vehicle

Anti-Tech

AV costs more: 70% 30%
Same cost: 72% 28%
AV costs more: 76% 24%

Solo Unitasker

AV costs more: 58% 42%
Same cost: 61% 39%
AV costs more: 68% 32%

Contemporary Efficient

AV costs more: 56% 44%
Same cost: 62% 38%
AV costs more: 65% 35%
Survey Question: When will you purchase?

When do you expect to buy an AV?

- I will be one of the first people to buy an AV.
- I will eventually buy an AV, but only after these vehicles are in common use.
- I will never buy an AV.

When will you purchase?

- **Austin**: 5% I will be one of the first people to buy an AV. 27% I will never buy an AV.
- **Phoenix**: 2% I will be one of the first people to buy an AV. 54% I will eventually buy an AV, but only after these vehicles are in common use.
- **Tampa**: 3% I will be one of the first people to buy an AV. 43% I will never buy an AV. 55% I will eventually buy an AV, but only after these vehicles are in common use.
- **Atlanta**: 2% I will be one of the first people to buy an AV. 36% I will never buy an AV. 61% I will eventually buy an AV, but only after these vehicles are in common use.
When will you purchase?

All Cities

- I will be one of the first people to buy an AV: 3%
- I will never buy an AV: 36%
- I will eventually buy an AV, but only after these vehicles are in common use: 61%

Demographic Data

Male

- I will never buy an AV: 31%
- I will eventually buy an AV, but only after these vehicles are in common use: 63%
- I will be one of the first people to buy an AV: 6%

Female

- I will never buy an AV: 39%
- I will eventually buy an AV, but only after these vehicles are in common use: 59%
- I will be one of the first people to buy an AV: 2%
When will you purchase?

**Demographic Data**

**Age**
- 29 and younger: 23%
- 30 to 64: 71%
- 65 and older: 4%

**Educational Background**
- Completed graduate degree(s): 24%
- Bachelor's degree(s) or some graduate school: 62%
- Some college or technical school: 32%
- Completed high school or GED: 41%
- Some grade/ high school: 76%

**Attitudinal Data**
- I will be one of the first people to buy an AV: 6%
- I will eventually buy an AV, but only after these vehicles are in common use: 61%
- I will never buy an AV: 33%

**Happy Commuter**
- I will never buy an AV: 40%
- I will eventually buy an AV, but only after these vehicles are in common use: 57%
- I will be one of the first people to buy an AV: 3%

**Anti-Tech**
- I will never buy an AV: 47%
- I will eventually buy an AV, but only after these vehicles are in common use: 52%
- I will be one of the first people to buy an AV: 1%

**Pro-Environment**
- I will never buy an AV: 33%
- I will eventually buy an AV, but only after these vehicles are in common use: 57%
- I will be one of the first people to buy an AV: 6%
Thank you!
Katherine Asmussen, kasmussen29@utexas.edu
Aupal Mondal, aupal.mondal@utexas.edu
Chandra Bhat, bhat@utexas.edu

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