UDOT’s Autonomous Vehicle Demonstration Project – Public Acceptance Perspectives

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National Conference of State Legislatures
Autonomous Vehicles Pre-Conference
December 10, 2019
EasyMile Gen2 - Level 4 Autonomous Vehicle
Levels of Autonomy – Society of Automotive Engineers

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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<tbody>
<tr>
<td>0</td>
<td>No Automation&lt;br&gt;Zero autonomy; the driver performs all driving tasks.</td>
</tr>
<tr>
<td>1</td>
<td>Driver Assistance&lt;br&gt;Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.</td>
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<td>2</td>
<td>Partial Automation&lt;br&gt;Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.</td>
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<td>3</td>
<td>Conditional Automation&lt;br&gt;Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.</td>
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<td>4</td>
<td>High Automation&lt;br&gt;The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.</td>
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<tr>
<td>5</td>
<td>Full Automation&lt;br&gt;The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.</td>
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-Shopping District – Station Park, Farmington – June 2019

-Business Park Office Complex and visually impaired – July 2019  
1950 W North Temple, SLC State Office Complex

-College Campus – University of Utah – August-September 2019

-Convention Center – Mountain America Expo Center – October-January 2020

-State Capitol Legislative engagement – October 16, 2019 & March 3, 2020

-Transportation Expo - St. George

-Medical Center – Still searching

-Entertainment District – Thanksgiving Point – Tulip Festival April 2019
1950 W Salt Lake City – State Office/business park complex
Research Efforts

1) Public Focus Group on CAV
2) U of U Department of Psychology – Applied Cognition Lab
3) UTA Rider Surveys
Areas of impact to move to CAV’s

- Economic
- Environmental
- Safety
- Social
Project Goal

Human Factors/Psychology relationship with Automated Driving Systems (ADS)
Pedestrians and other drivers clearly understand whether the shuttle is going to stop, turn, yield, etc…

I trust this shuttle to obey traffic laws, stop for pedestrians, and get me to my destination in a safe and timely manner.
“Fascinating. I mean like technically the technology is not that complicated, but I am still just amazed by it.”
I have complete confidence that this autonomous shuttle would get me to my destination in a timely manner.
[Rider] “I don’t think people are ever going to fully trust fully automated machines so that host thing is going to stay a job for a while.”

[Operator] “Yeah, It’ll take some time.”

[Rider] “It’s pretty cool.”
If there was no host aboard the shuttle I would feel insecure being alone with other passengers.
“This is crazy, like I honestly can’t believe it. It’s not hitting anyone, it waited to turn, and all that stuff. It’s pretty cool.”
My experience riding the autonomous shuttle was extremely positive
The shuttle operated in a manner that was consistent with my expectations.
“I just don’t want to get off this it just too entertaining. I’ll be back on.”
Ridership
Station Park – 2613 (653/week)
1950 W Office Complex – 677 (225/week)
U of U – 739 (246/week)

Incident rate of obstructions

<table>
<thead>
<tr>
<th>Per Hour of Service</th>
<th>Station Park</th>
<th>1950 West</th>
<th>U of U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual switches</td>
<td>1.91</td>
<td>2.40</td>
<td>1.97</td>
</tr>
<tr>
<td>Soft stops</td>
<td>2.55</td>
<td>0.88</td>
<td>3.20</td>
</tr>
<tr>
<td>Emergency stops</td>
<td>0.44</td>
<td>0.26</td>
<td>0.73</td>
</tr>
<tr>
<td>Manual button e-stop</td>
<td>0.00</td>
<td>0.00</td>
<td>0.08</td>
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Feedback

The autonomous shuttle pilot is the technology testing period. During this period different types of data will be collected, including feedback from the public. We want to know what you think of autonomous vehicles, how it could be applied in Utah, and what your experience was like riding the shuttle.

Take the survey
Submit a comment

If you would like to be entered into a drawing for providing your feedback, please include your email address. You could win gifts cards to Starbucks™, IHOP™, McDonalds™, or a FAREPAY™ card. Drawings will be held once a month. Thank you for sharing your feedback!

Tell us what you think!
Scan the QR code to take the survey or visit www.avshuttleutah.com.

#avshuttleutah

AUTONOMOUS SHUTTLE PILOT PROJECT

www.AVShuttleUtah.com
Take a free ride on Utah’s first autonomous shuttle!

On site now through January 2020

#avshuttleutah  avshuttleutah.com
Lighthouse Research & Development, Inc.

- Two Focus Groups
  • Male (14) & Female (13)
  • 2 x 90 minute session
  • Moderator
  • Educational material and video
    • Advised on ‘Connected’ and ‘Automated’
When identifying the potential benefits of CAV technology, participants most frequently cited safety as the greatest benefit. Participants also cited convenience, efficiency, environmental benefits, and economic benefits of CAV technology.
When discussing the potential drawbacks of CAV technology, participants most frequently commented on:

1) the potential for technology to be “hacked,”
2) the concern for too much dependence on technology,
3) the concern that such technology could be distracting, and
4) the concern that such technology may not necessarily be safer.
Participants also expressed concerns with new technology that has potential glitches and don’t perceive that their mechanics can repair such vehicles.
Figure 2
Participant Perceptions of CAV Technology
Based on a one-to-seven rating scale

What is your perception of CAV technology?

- All Participants: 5.52
- Males: 5.71
- Females: 5.31

How likely would you be to purchase your next vehicle with CAV technology?

- All Participants: 4.89
- Males: 4.71
- Females: 5.08

*Comparisons, though interesting to note, are not statistically significant, due to the small population included in the focus group research.*
Utah Transit Authority (UTA) Rider surveys.

- Canyons Village – 151 Riders/76 Surveys
  - 99% felt safe
  - 4.6 out of 5 Stars

- Station Park – 2,613 Riders/343 Surveys
  - 99% Felt Safe
  - 4.7 out of 5 Stars

- 1950 West Office Park – 677 Riders/64 Surveys
  - 94% felt safe
  - 4.5 out of 5 Stars

- University of Utah – 1,073 Riders/55 Surveys
  - 96% Felt Safe
  - 4.8 out of 5 Stars
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