Autonomous Vehicles-
Are We There Yet?

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The Changing World

Tesla “Not a Dream”

https://vimeo.com/152927644
Could we say the same about AV?
- Civilisation is not yet sufficiently advanced to handle it
- It can change the world in so many ways
- “Perhaps it is better for revolutionary ideas to be hampered in its adolescence”
  - “All that was great was combated and suppressed, just to emerge stronger and better”
- Our duty is to put the way for those coming after us
AVs – What do they bring?

- Fewer accidents
- Reduced pollution
- Energy savings
- Traffic efficiency
- Time utilisation
How autonomous are AVs?

- Fully autonomous (e.g., Google cars)
  - Fully autonomous in all areas
  - Eliminating the driver from the control loop

- Semi autonomous (e.g., Tesla cars)
  - Full autonomy in certain areas (e.g., highway)
  - The driver should always be on alert, since fail safe is fall back to manual controls

- Assisted driving (traditional manufacturers – Mercedes, BMW, Volvo...)
  - Smart functions (e.g., adaptive cruise control)
  - Still requires high involvement of the driver

More detailed automation classification by SAE [1]
Tesla autopilot problems

“Tesla autopilot tried to kill me”
https://www.youtube.com/watch?v=MrwxEX8qOxA
Semi-autonomy issues

- Distracted driving is one of the major causes of accidents
- The biggest issue of semi-autonomous vehicles
  - How to keep the driver alert?
- Technology makes us more distracted
- Misuse of the “auto” prefix
  - E.g., Tesla advertises “autopilot” functionality misleading the customers to believe the vehicle is more autonomous than it actually is
Full-autonomy isn’t without problems either

- Google car
  - “It just wants to protect soft, perishable humans”

- Troubles with a balancing cyclist on a red light

- Sensitivity vs usability
  - Too sensitive, gets bullied by human participants
  - Not sensitive enough, injure distracted humans

- Where is the limit?
The Trolley Problem

What to choose?

Harm:  

a) the pedestrian,  
b, c) the driver

An innocent passer by  

A deadly wall  

Taken from [2]
Utilitarian AV?

- The big question:
  *Should the AV be in service of the society as whole, or the owner comes first?*

  - Utilitarian approach: minimize the death toll even if it means to sacrifice the passenger of the car

  - Who would buy such a car? Would you?

  - Who gets to decide this question? Society, car owner, company?
What do you think?

Q1: Do you look forward to the future with fully autonomous vehicles?

Q2: Are you in favour of utilitarian vehicles, that will put “the greater good” as its first priority?

Q3: Would you consider buying such utilitarian vehicle yourself?
A public survey results

![Survey Results Chart](chart.png)

Taken from [2]
AVs - Ethical Pandora’s Box

- How to go from non-autonomous to fully autonomous?
  - Is the potential increase in casualties acceptable for the benefit of the final result?

- How sensitive fully autonomous vehicles should be?
  - Should they be programmed not to cause any harm to living beings at all costs?

- In case of unavoidable accidents, should the greater good be more important than the wellbeing of the passengers?
  - Who decides on this?
Open issues

- Should we loosen up the rules for the semi-autonomous vehicles and accept the initial increase in casualties?

- Should the levels of the sensitivity be determined by the government/majority or by the owner?

- Should the vehicle’s protection level of the wellbeing of its passengers be determined by the government/majority or by the driver/owner?
AVs law troubles

- Latest news: “U.S. vehicle safety regulators have said the artificial intelligence system piloting a self-driving Google car could be considered the driver under federal law”
  - If all Google cars share the same AI, does it mean that if one is being prosecuted that the whole fleet is prosecuted?
  - What are the implications if the AI driver is guilty?
    - We usually blame humans in the loop, blaming the machines/software is an uncharted area.

- Companies try to shift the responsibility to the owner by adding settings and functions controlled by the owner
  - Tesla cars require explicit permission from the driver to undergo overtaking manoeuvre
  - Some car manufacturers plan to let the owner choose the settings for certain ethical issues to avoid taking the blame
## Time utilisation

Summary of responses, by country, to Q11: “If you were to ride in a completely self-driving vehicle (Level 4), what do you think you would use the extra time doing instead of driving?”

<table>
<thead>
<tr>
<th>Response</th>
<th>China</th>
<th>India</th>
<th>Japan</th>
<th>U.S.</th>
<th>U.K.</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watch the road even though I would not be driving</td>
<td>36.1</td>
<td>30.7</td>
<td>33.2</td>
<td>35.5</td>
<td>44.0</td>
<td>43.4</td>
</tr>
<tr>
<td>I would not ride in a self-driving vehicle</td>
<td>3.1</td>
<td>7.8</td>
<td>33.0</td>
<td>23.0</td>
<td>23.0</td>
<td>21.2</td>
</tr>
<tr>
<td>Read</td>
<td>10.5</td>
<td>10.2</td>
<td>5.6</td>
<td>10.8</td>
<td>7.6</td>
<td>6.5</td>
</tr>
<tr>
<td>Text or talk with friends/family</td>
<td>20.8</td>
<td>15.0</td>
<td>7.4</td>
<td>9.8</td>
<td>5.5</td>
<td>7.9</td>
</tr>
<tr>
<td>Sleep</td>
<td>10.8</td>
<td>4.7</td>
<td>12.6</td>
<td>6.8</td>
<td>7.2</td>
<td>7.1</td>
</tr>
<tr>
<td>Watch movies/TV</td>
<td>11.3</td>
<td>12.3</td>
<td>6.2</td>
<td>6.0</td>
<td>4.2</td>
<td>5.7</td>
</tr>
<tr>
<td>Work</td>
<td>5.4</td>
<td>16.3</td>
<td>0.7</td>
<td>4.8</td>
<td>4.9</td>
<td>5.1</td>
</tr>
<tr>
<td>Play games</td>
<td>1.3</td>
<td>2.1</td>
<td>1.2</td>
<td>2.0</td>
<td>1.9</td>
<td>2.0</td>
</tr>
<tr>
<td>Other</td>
<td>0.7</td>
<td>0.8</td>
<td>0.2</td>
<td>1.4</td>
<td>1.7</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Taken from [3]
Percentage of adult passengers in fully self-driving vehicles who would, as a group, experience an increase in the frequency and severity of motion sickness.

<table>
<thead>
<tr>
<th>Alternative activity that increases the frequency and severity of motion sickness</th>
<th>U.S.</th>
<th>China</th>
<th>India</th>
<th>Japan</th>
<th>U.K.</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading</td>
<td>14.0</td>
<td>10.8</td>
<td>11.1</td>
<td>8.4</td>
<td>9.9</td>
<td>8.3</td>
</tr>
<tr>
<td>Texting*</td>
<td>6.4</td>
<td>10.8</td>
<td>8.2</td>
<td>5.5</td>
<td>3.6</td>
<td>5.1</td>
</tr>
<tr>
<td>Watching movies/TV</td>
<td>7.8</td>
<td>11.7</td>
<td>13.4</td>
<td>9.2</td>
<td>5.4</td>
<td>7.3</td>
</tr>
<tr>
<td>Working</td>
<td>6.2</td>
<td>5.6</td>
<td>17.7</td>
<td>1.0</td>
<td>6.4</td>
<td>6.5</td>
</tr>
<tr>
<td>Playing games</td>
<td>2.6</td>
<td>1.4</td>
<td>2.3</td>
<td>1.8</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>37.0</strong></td>
<td><strong>40.3</strong></td>
<td><strong>52.7</strong></td>
<td><strong>25.9</strong></td>
<td><strong>27.8</strong></td>
<td><strong>29.7</strong></td>
</tr>
</tbody>
</table>

Taken from [4]
References


