The Pathway to Driverless Cars

Future Networked Car
5th March 2015
Duncan Kay
February 2013: **Oxford Mobile Robotics Group** unveiled a highly automated Nissan Leaf vehicle, ready for testing on UK roads

December 2013: **Review of regulations** for driverless cars announced in Autumn Statement as part of the National Infrastructure Plan

July 2014: The **government launched a competition** to host a driverless cars trial, with towns and cities invited to apply for a share of the £10m prize fund

August 2014: **DfT launched consultation** on regulatory framework for the safe testing of self-driving cars on UK roads

December 2014: **Bristol, Coventry, Milton Keynes and Greenwich** announced as prize fund locations for testing of automated vehicle technologies starting in 2015

February 2015: Publication of *The Pathway to Driverless Cars* review and official launch of the driverless cars trials.
Benefits of driverless vehicles

**Fewer deaths and injuries**

<table>
<thead>
<tr>
<th>Cause</th>
<th>Percent of Incidents</th>
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</thead>
<tbody>
<tr>
<td>Impaired by alcohol/drugs</td>
<td>14%</td>
</tr>
<tr>
<td>Inappropriate speed</td>
<td>17%</td>
</tr>
<tr>
<td>Disobeyed signals/markings</td>
<td>15%</td>
</tr>
<tr>
<td>Driver distraction including mobile/texting</td>
<td>9%</td>
</tr>
<tr>
<td>Following too close</td>
<td>8%</td>
</tr>
<tr>
<td>Failed to look properly</td>
<td>7%</td>
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</tbody>
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94% of road deaths and injuries involve human error.

**Money saving through reduced insurance costs**

- Opens up access to cars for **everyone** increasing social inclusion.
  - **31%** women do not hold a full driving licence.
  - **14%** men do not hold a full driving licence.
  - **46%** 17-30 year olds do not hold a full driving licence.
Benefits of driverless vehicles

Improving the **efficiency** with which we use our **road network**

The average driver in England can save up to **6 working weeks** a year driving time

Reduce pollution
What do we mean by “driverless”? 

- Existing levels of automation are all essentially ‘advanced driver assistance systems’ (ADAS):
  - Adaptive cruise control / lane keeping assist
  - Traffic jam assist
  - Park assist
  - Highway assistance e.g. GM’s Super cruise - “to increase the comfort of an attentive driver”
- All require the driver remains “in the loop” (which is becoming increasingly challenging).

- The **defining difference** for “driverless” technologies is the driver can be “out of the loop”.
- The driver can then undertake other activities while the vehicle is operating autonomously.

Credit: General Motors

Credit: Volvo Cars
Definitions

• **Highly automated:**
  – a vehicle in which a driver is required to be present and may need to take manual control for some parts of the journey. Under certain traffic, road or weather conditions, the vehicle's automation systems may request the driver to take control.

• **Fully automated:**
  – a vehicle in which a driver is not necessary. The vehicle is designed to be capable of safely completing journeys without the need for a driver in all normally encountered traffic, road and weather conditions. This can be seen as the most advanced form of such technology.

“We won’t be building robot cars” Thomas Müller, Audi

“Google wants to develop a fully automated car”

Main conclusions:

• “Driverless vehicles can legally be tested on public roads in the UK today .. providing a test driver is present and takes responsibility for the safe operation of the vehicle; and that the vehicle can be used compatibly with road traffic law.”

• A Code of Practice will be published in spring 2015 for those wishing to test driverless vehicles on UK roads.

• Review and amend domestic regulations by summer 2017 to accommodate driverless vehicle technology.

• Liaise at an international level with an aim to amend international regulations by the end of 2018.
The Code of Practice

- A ‘Code of Practice’ for safe testing is currently being drafted in consultation with key stakeholders.
- Recommendations are likely to include:
  - Test driver, or operator, able to take control and holds appropriate licence.
  - Test driver or operator has received appropriate training.
  - Vehicle should be fitted with ‘event data recorder’.
  - Vehicle should be protected from unauthorised access (‘hacking’)
  - Vehicle technology should have been proven on closed roads or test tracks.
- Failure to follow the guidance in a Code of Practice would be considered a clear indicator of negligence.
Government backed trials

The GATEway project in Greenwich, London

- Driverless passenger shuttle transport
- Autonomous valet parking of electric cars
- Road going self-driving car
Government backed trials

UK Autodrive – Milton Keynes and Coventry

- Lightweight self-driving ‘pods’
- Road-going self-driving cars
Government backed trials

The Venturer project in Bristol

- BAE Wildcat autonomous vehicle
- Lightweight self-driving ‘pods’
- Road-going self-driving cars
A study is being commissioned examining driver and road user behaviour

Expected to study the impact of driverless vehicles on other road users including:
- Cyclists
- Horse riders
- Disabled road users

In addition the government backed trials are also monitoring public reaction to driverless vehicles
**Timeline for driverless vehicles**

**UK Government**
- February 2015: Review UK regulations
- DfT research and expertise
- Stakeholder call for evidence
- Publication of The Pathway to Driverless Cars
- Develop a Code of Practice in collaboration with key stakeholders
- Publication of the Code of Practice for public road testing
- Review and revise UK domestic regulations

**UK Government and international partners**
- Engage with international partners regarding automated vehicles
- Negotiate and agree changes to vehicle standards:
  - European Whole Vehicle Type Approval
  - ISO standards (for symbols and driver warnings)
  - Other legal and regulatory framework aspects

**Industry**
- Research and development of highly and fully automated vehicle technologies
- Production and testing of automated vehicle prototypes on closed roads/test-tracks
- Testing of automated vehicle technologies on UK public roads
- Production of highly and fully automated road vehicles

**Target for updating UK regulations**

**End 2018**
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