Smart cities on the move
Connected and autonomous vehicles

Robert J. Piechocki

© Communications Systems & Networks, 2015
The plan

- Connected and Autonomous (CAV) – the benefits
- CAV – challenges
- VENTURER project – Bristol based CAV project
- What does it all mean for Smart Cities?
Connected and autonomous vehicles

- Vehicle to Vehicle (V2V), Vehicle to Infrastructure (V2I), V2V + V2I = V2X
- Cooperative ITS: obstacle/accident warning, road conditions, look ahead, sensory data sharing: quicker, safer, more efficient
CAV benefits: the good and the maybes

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road safety</td>
<td>YES</td>
</tr>
<tr>
<td>Journey times reliability</td>
<td>YES</td>
</tr>
<tr>
<td>Reduced congestion</td>
<td>YES</td>
</tr>
<tr>
<td>Freight cost and optimisation</td>
<td>YES</td>
</tr>
<tr>
<td>Social inclusion and equity</td>
<td>YES</td>
</tr>
<tr>
<td>Traffic volume</td>
<td>Maybe</td>
</tr>
<tr>
<td>Pollution</td>
<td>Maybe</td>
</tr>
<tr>
<td>Impact on cycling</td>
<td>Maybe</td>
</tr>
</tbody>
</table>
CAV benefits in numbers

- £51 billion per annum by 2030 – benefit to the UK economy
- 320,000 new jobs will be created in the UK
- 2500 lives saved and 25000 serious accidents prevented

Car autonomy – the timeline

**feet off**

1958

- Cruise control (Chrysler - Imperial),
- 1992: adaptive cruise control (Mitsubishi)

**hands off**

2013

- Lane keeping (Toyota, Ford),
- 2015: Self-parking and accident avoidance. Semi-autonomous traffic assistant for speeds up to 37 mph

**eyes off**

2020

- Department for Transport (DfT) definition: “Fully autonomous vehicle is one in which a driver is not necessary”

**brains off**

- 2030
Don’t we have CAVs already?

Rio Tinto’s Autonomous Haulage System (2008) (developed by Komatsu, Japan)

Platooning – Sartre project Safe Road Trains for the Environment (EU led by Volvo)
Road ahead – the technology challenge

• Sensing technology: velodyne lidar, radar, video, ultrasonic radar

• Decision making

• V2V and V2I connectivity

• Security, Privacy and Trust
Road ahead – legislation & insurance

- Road Traffic Act (1930) – introduction of compulsory car insurance
- RTA update 1988 definitions: “driving”, ”without due care and attention”

The Government will need to review existing legislation and introduce definitions:

”ceding control”  ”intervention”  ”due care and attention”

- Insurance will change in a most profound way:
  - Who’s liable: Car OEM? Software provider? Infrastructure? City Councils?
  - Split lability models?
Road ahead – public acceptance

- Will the promised benefits materialise?
- Are CAVs fundamentally safe for: occupants, other road users and pedestrians

or

The Daily A

Sunday, August 30, 2025

Hacked CAV kills 5 pedestrians

The Daily A

Sunday, August 30, 2025

CAV saves life of a Bristolian

Peter Jones from Bristol suffered a heart attack while driving his vehicle home. The on-board health monitoring system recognised a critical situation, took control of the vehicle and redirected it to a hospital.
The VENTURER project

VENTURER has a budget of £5M and is funded by Innovate UK
The VENTURER project aims & UoB involvement

• We will conduct trials to understand and overcome barriers in the adoption of CAV (legal, insurance, public acceptance issues)
• Inform UK Government on required law changes
• To make Bristol an independent test site for CAV systems
CAV and Smart Cities

- Connectivity Infrastructure V2I (802.11p, DSRC, WAVE, ITS-G5)
- Data analytics – planning, optimisation, intelligent mobility
- Why Bristol?

White paper
“Connected & Autonomous Vehicles”
Atkins Global, October 2015
Thank you!
Please follow us on Twitter

www.bristol.ac.uk/engineering/research/csn

Video: www.youtube.com/c/CommunicationSystemsNetworksGroup