

CIHT Dubai Online Seminar – Bulletin

Jochen Lohmiller (PTV), Khalid Al Awadhi (Roads and Transport Authority), Peter Sukennik (PTV), Andrew Pearce (Atkins)

Connected and Autonomous Vehicles – Planning the Future of Road Transportation

About the Event

Road applications linked to Connected and Autonomous Vehicles (CAVs) are developing rapidly in many parts of the World. Conditional Automation, with examples such as assisted parking & expressway autopilot, could become available shortly, whilst fully driverless road vehicle operation may be feasible and proven from a safety perspective from the end of this decade. Some countries have defined roadmaps for driverless trip-making and the next few years are expected to see rapid advances not only in technology, but also the enabling environment in terms of policy, regulation, ethics and sustainable business models.



Whilst cities are likely to pursue different scenarios, CAV technology may combine with electric powertrains, Intelligent Transport Systems and on-demand service models to transform the road user proposition and experience. In Dubai, the Roads and Transport Authority has a target that 25% of all trips in the Emirate will be driverless by 2030 and is looking at definitive use cases and what changes to physical and digital infrastructure may be required. This will challenge and evolve existing conventions around road planning, design and engineering.

This Online Seminar from the CIHT Dubai Group considered the timelines, impacts, early applications and future prospects for CAVs through four contrasting presentations by professionals working in the field.

Presentations



Autonomous Vehicles – The Future of Mobility? – Jochen Lohmiller (PTV)

To replace human drivers with a system is an underestimated challenge with which even global players struggle. But the achievements are visible, autonomous vehicles are no longer a futuristic vision and there are now many trials around the world.

Jochen began his presentation with a striking video clip showing the optimisation of road space with CAVs and pedestrians in a street environment walking and driving around, missing each other by a whisker with the aid of CAV optimisation technology! This is an exciting vision of the future for some, a somewhat scary vision for others.

This emphasised that there are clear optimisation benefits through automation of transport, but that safety and risk management are fundamental to effective operations and acceptance by the general public.

Jochen stated that CAVs have the potential to reduce accidents, reduce parking requirements (they can drive themselves to parking lots at the end of a journey), improve congestion and journey times. CAVs can enhance mobility for all (you don't need a driving licence to ride in one) and adoption of CAVs means that road space can be re-allocated to other users through enhanced public realm.

There are some key questions which do need to be considered. Among these are the potential for a rise in vehicle kilometres, the impact of varying rates of CAV penetration within user groups, what levels of infrastructure investment and alterations will be required and who will provide the regulation and to what level, for example with regards to the prospect of ride-share schemes.

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Jochen cited a study in Lisbon, Portugal, where the future could be 100% shared CAVs with no private car ownership. This would require a vehicle fleet only 17% of the current size to service all trips with vehicles being used throughout the day rather than for very limited periods of time (current privately owned vehicles operate typically for only 15-30 minutes a day). CAVS would be parked off street, but there could be an increase in overall traffic with vehicle km rising potentially +44%, for example as a result of movements between the end of one journey and the start of another. The transition to automation is unclear.



Overview of the Dubai Self-Driving Transport Strategy and Challenge – Khaled Al Awadhi (Dubai Roads and Transport Authority)

Khaled is currently overseeing the implementation of the Dubai Self-Driving Strategy which aims to have 25% of trips in the Emirate driverless by 2030. He began by stating that the Dubai 2040 Urban Master Plan aspires that Dubai will be the best city for living in the world, that it will be a world leader in seamless and sustainable transport and integrated mobility.

Dubai Self-Driving Transport – Expected Benefits

The successful roll-out of the strategy is expected to bring many direct and indirect benefits to the city of Dubai



The RTA’s strategy focuses on a multi-modal transport system where driverless vehicles play an important role. Khaled outlined the enablers for this to happen including legislation, driver behaviour and acceptance, driver and vehicle registration, insurance and liability, infrastructure requirements, cyber security, data privacy and HD mapping. He described the Dubai World SDT Challenge which is encouraging technology leaders to come to the Emirate to test, demonstrate & showcase their products. The first round of the Challenge focused on first-last-mile connections, the second, under way now, focuses on autonomous goods deliveries.

Driverless technology is focused on passenger and freight traffic and the benefits described by Khaled include improved safety, productivity, happiness, reduced pollution, reduced mobility costs, increased efficiency of public transport and reduced on street parking. The RTA estimates that the benefits will amount to 22 billion AED a year.



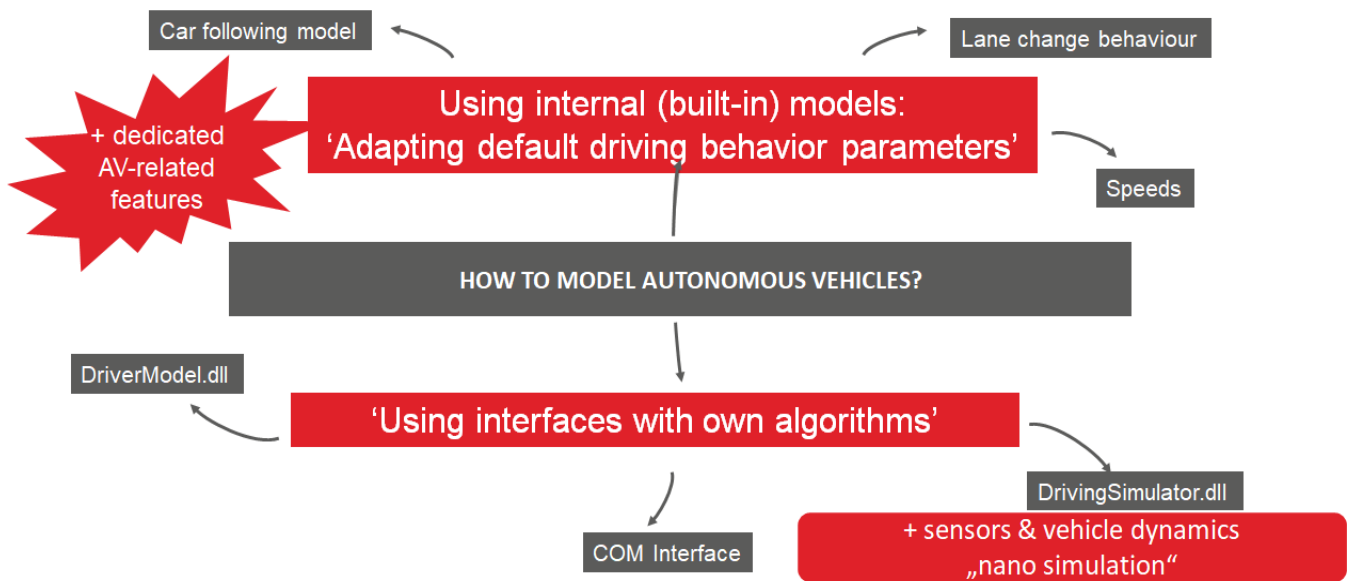
Modelling Approaches for Autonomous Vehicles – Peter Sukennik (PTV)

Peter’s presentation showed us that a range of macro, meso and micro models for conventional vehicles have been developed for decades and rely on proven algorithms and empirical data. The rise of advanced driver assistance systems and development of automated vehicles requires the adaptation of the simulation software and depending on the question to be answered, different approaches are possible. This presentation showed the latest updates and current possibilities in the simulation of automated vehicles.

Peter started off with a quote by Niels Bohr that all demand forecasters and planners should remember: “Prediction is very difficult, especially if it’s about the future.” Forecasting is about utilising the right tool for each case and for each stage. New features are being introduced into models to replicate CAVs where vehicles can see each other, react to others and negotiate pedestrians and other road users.

The transition where CAVs become more common needs to be considered and PTV split these into Introductory, Established and Prevalent stages. Driving logics will change in each period. This is reflected in the models.

However, there is still a reliance on the modeller’s inputs, judgement and assumptions. This requires us all to be familiar with CAV operations, the behaviour of people and the pattern of use of CAVs in the future.



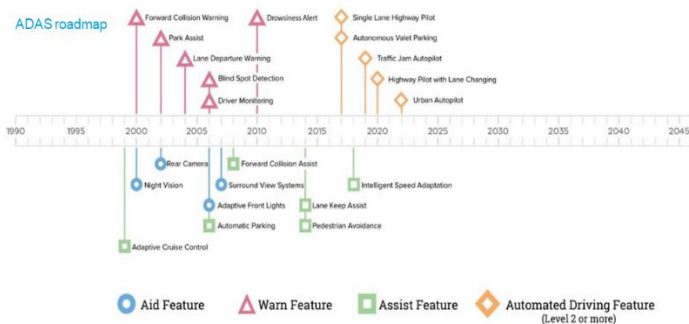
Connected Vehicles – Near Term Benefits If We Act Now – Andrew Pearce (Atkins)

Andrew considered that whilst highly automated driving still has big hurdles to overcome, many benefits can be realised through Connected Vehicle and Advanced Driver Assistance System (ADAS) technology which is already available and just needs to be rolled out. This presentation outlined the steps towards the driverless car, focusing on near horizon applications and actions needed to deploy them in the next few years. Real world examples demonstrate how road safety, road asset management and traffic management can benefit.

Andrew described the SAE International levels of driving automation: Levels 0-2 Driver Support Facilities and Levels 3-5 Autonomous Vehicles. In terms of the road to full autonomy, the US is planning 80% of intersections to be Level 2 capable by 2040.

However safety is key, and we must get to a point where CAVs are at least as safe as, if not safer than, humans. The barriers to Levels 3, 4 and 5 are technology, institutional and governance, and consumer acceptance and will take considerable time to overcome.

Andrew described the benefits of ADAS technology, with better asset management, smarter parking, in vehicle information and messaging, smarter signal timing and phasing, and better provision for vulnerable road users.

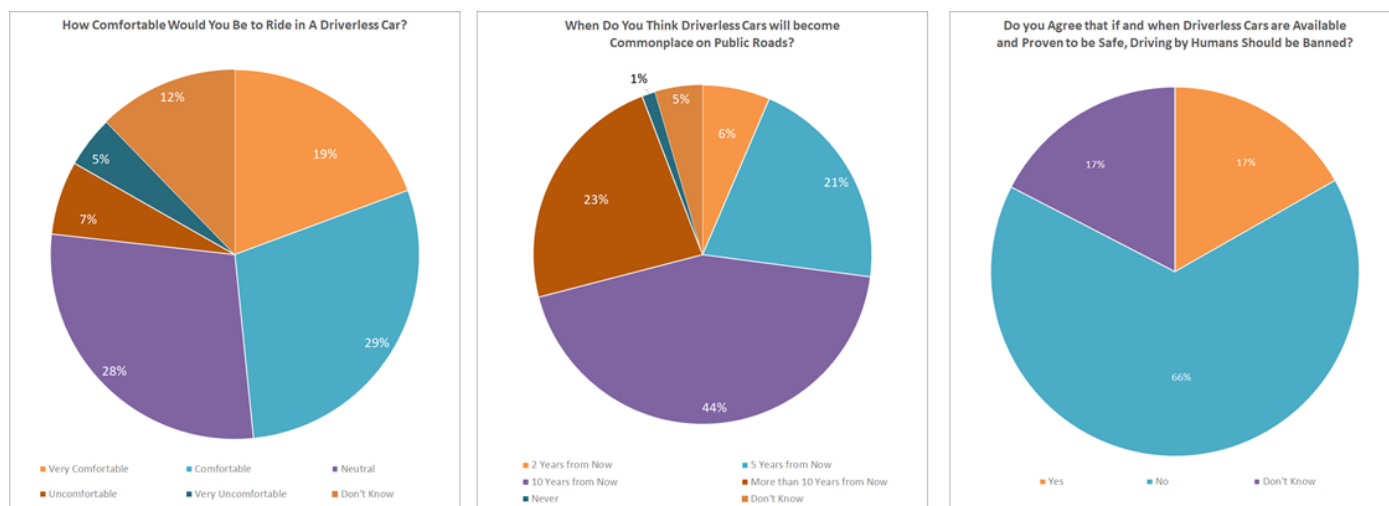


The example of asset management was expanded on where the road network is an extremely valuable asset and an economic and social enabler. It needs to be maintained well and asset management in the past has relied on expensive surveys with little ability to identify damage between surveys. With better in vehicle technology, CVs can undertake constant information collection on the condition of road assets which can be fed through to better maintenance planning and works.

Andrew presented monetary quantification of benefits from ADAS + Connectivity applications which are significant and represent a clear additions over and above the well discussed benefits of safety, capacity and optimisation. Applied to the UK, these were estimated as GBP 1.5 billion or AED 8 billion, split between direct financial savings for transport agencies and wider economic benefits to society.

Survey

Registrants to the Seminar were asked three simple questions about their attitudes to driverless cars. The results are shown below and indicate (i) registrants are reasonably comfortable about riding in a driverless car (ii) believe commonality of CAV technology is 10 years away or more and (iii) even when CAVs are proven, generally believe the right to drive manually should be maintained.



N = 155, CIHT Seminar Eventbrite Registrations as of 23rd March 2021

Questions

How will AVs be checked and maintained in the future, particularly privately owned AVs?

This is the responsibility of the vehicle owner in the same way that condition of existing vehicles generally is the responsibility of the owner. However, ownership may shift from individual motorists to greater focus on corporate entities operating CAV fleets in the future.

Where roads are busy and CAVs are operating, how will emergency vehicles be accommodated and how will AVs make way for emergency vehicles?

These protocols need to be considered in planning for AVs in terms of infrastructure and vehicles. Vehicles will need to be able to adapt their behaviour for emergencies, but regulation may be required. It is possible already to fit emergency vehicles with technology to influence traffic signals at the moment.

Is there a future for public transport if CAVs are so flexible and have so many benefits?

There will always be a need for high capacity public transport systems in urban areas. Car sharing may become attractive, but this is effectively public transport on a smaller scale. Current taxis are expensive because they need a driver but in future shared vehicles will be driverless and therefore cheaper to operate and use.

How will the use of robotics in vehicle driving help with public assurance?

This is a consideration for vehicle providers, the public and the insurance industry.

What is the mode share that can be considered as the basis for CAV operation to begin with?

Modal share will develop with increasing prevalence and acceptance. The situation is changing fast!

This Bulletin is issued by the CIHT Dubai Group. For further information, contact ciht.dubaigroup@gmail.com.