

Groundbreaking driverless car project showcases vision for a connected transport future

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'Fog technology', designed by researchers in the University's Faculty of Engineering, is an innovative computing infrastructure that could be fundamental in allowing CAVs to be safer and more efficient. Credit: University of Bristol

The multi-organisational team behind the £5.5 million FLOURISH connected and autonomous vehicle (CAV) project is today [Monday 13 May] celebrating the completion of three years of collaborative research and development with the launch of its latest findings.

These findings focus on data and connectivity and consider how data can be leveraged to optimise the functionality of the road network and provide an enhanced [user experience](#).

Tracey Poole, FLOURISH Project Manager and Transport Planning specialist at Atkins, a member of the SNC-Lavalin group, said: "Throughout the last three years, the FLOURISH team has been committed to exploring how innovative new technologies can be used to keep our cities moving and people connected.

"With the user of the future in mind, we have explored the technology required to realise this vision. This thinking has informed our investigations into the safe operation of a network of [driverless vehicles](#) in a connected smart city environment—which is crucial if we are to achieve the full benefits of this technology, for all.

"It has also been a key driver of our engagement with older adults and those with mobility-related conditions.

"The benefits of CAVs include enhanced, inclusive and personalised mobility, increased capacity on our road network and improved air quality."

Data and connectivity

The FLOURISH car trials have investigated the requirements for the effective, secure and resilient transfer of data between vehicles and with the cyber-physical infrastructure around them.

FLOURISH partner, the award-winning Communications Systems and Networks (CSN) Research Group at the University of Bristol's Smart Internet Lab, has pioneered the application of Fog-Based Computing to CAVs, providing a mechanism for the real-time transfer of data between vehicles and the network. More immediate than cloud-based solutions, this ground-breaking new technology enables vehicles – and fleets of vehicles – to respond to changing road and [traffic conditions](#) and assures the provenance of the data source.

Robert Piechocki, Professor of Wireless Systems at the University of Bristol, explained: "Fog-Based Computing is a state-of-the-art new technology which has the potential to deliver huge benefits to those who plan the provision of transport in our cities and for those who rely on our road network. It

gives a clear road map for how driverless cars can be operated, with agility and safety built into the DNA of a network."

FLOURISH has also used simulated environments to examine how Artificial Intelligence can be exploited in traffic management systems to create a responsive network of CAVs. This would enable the network to respond to changes in conditions – weather, an accident, volume of traffic – immediately and reroute journeys using real-time [vehicle](#) and traffic information to safely navigate the best route.

Furthermore, the project has explored the potential for connected and autonomous vehicles to communicate with each other and the surrounding infrastructure using frequencies typically associated with Wi-Fi. Usually seen as an enabler of indoor connectivity, its low frequencies can enable data to be effectively transmitted for longer distances.



Vehicle-to-Everything communications in a smart city environment. Credit: University of Bristol

Secure and cyber-resilient communications

The FLOURISH team has pioneered an Incident Response Framework, to maintain the integrity and service availability of wireless communications between digital and physical assets. The framework allows incidents which could undermine the integrity or impact the performance of both the

vehicle and [network](#), to be identified and assessed for the level of threat they pose. It provides a set of principles, based on the development of scenarios, for the management of a response to a range of safety incidents. These scenarios can range from deliberate interference with vehicle-to-vehicle and vehicle-to-infrastructure communications, to signal jamming and accidental failures.

Christian Compton, cyber-security expert at Atkins, a member of the SNC-Lavalin group, added: "If we are to deliver the transformative benefits of CAVs, it is absolutely essential that the public is confident in the ability of the technology to respond to a range of potential scenarios and select the appropriate response to keep users safe."

The user experience

An inclusive approach to the design of the Human Machine Interface (HMI), the technology with which users will interact with the CAV, has been central to FLOURISH. Throughout the duration of the project, a series of increasingly complex real-world and simulated trial scenarios have assessed what older adults will require to be able to confidently engage with driverless cars. This has culminated in the creation of a Standardised Assessment Framework (SAF), which establishes best practice for assessing the needs of users and linking specific user needs to design preferences.

Chris Alford, Associate Professor in Applied Psychology at the University of the West of England, said: "If we are to successfully introduce CAVs onto the UK's roads, then it is essential that we listen to what people want from this technology. The creation of the Standardised Assessment Framework shows that we are doing just that."

For users of the future to have confidence in driverless cars, it is also essential that the regulatory environment facilitates the smooth introduction of CAVs, while protecting the privacy of individuals. The [latest research](#) from the FLOURISH legal and insurance partners has focused on the General Data Protection Regulation and what it means for individuals in a data-connected transport system.

More information: Final report from the FLOURISH project:
flourishmobility.com/publications

Provided by University of Bristol

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