

Enhancing vehicle perception using V2X technology



The Autonomous Vehicle

Connected and Automated Vehicles (CAVs) are equipped with a range of technologies and devices to help support their journey.

Radar, Lidar, cameras, etc. all provide the vehicle with a representation of the surrounding environment.

There are limitations...

Blindspots, corners, hills, dense traffic... the vehicle cannot see everything.

Supporting visibility is required!



The Highway Merge

Merging onto the highway is a great example of where additional visibility is required.

To safely manage its speed and correct merging position, the vehicle needs to understand ahead of time the positions, speeds and intentions of other vehicles.





Autonomous Cars
Negotiating **Complex**
Environments Using V2X

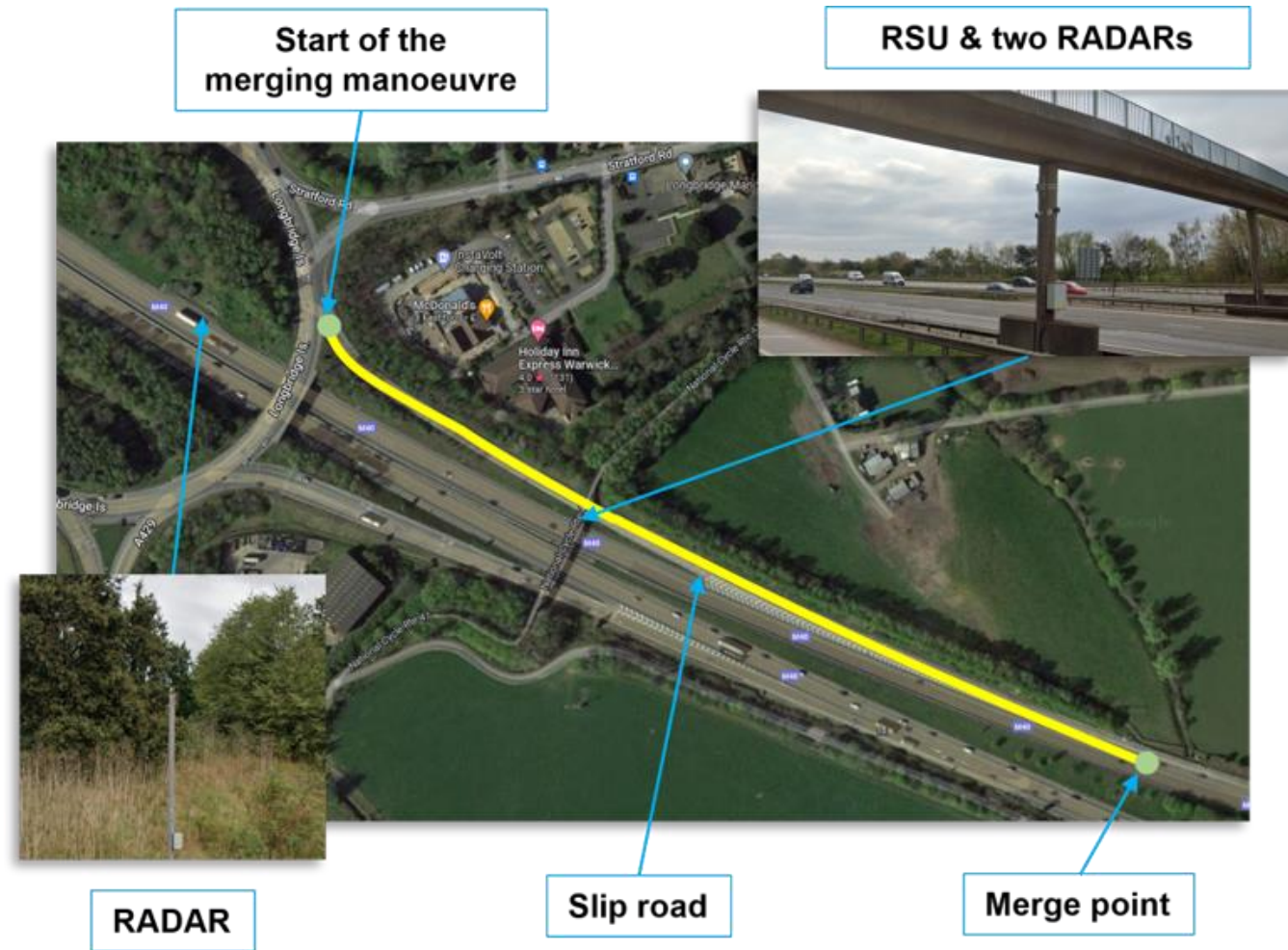
March 2019 – September 2022

2 trial locations: M40 J15 and Coventry Ring Road

£4.7m collaborative R&D project part-funded by CCAV and Innovate UK

Consortium members included:

- Jaguar Land Rover
- Warwick Manufacturing Group – The University of Warwick
- Transport for West Midlands
- National Highways



Technology Deployment

Variety of equipment installed to extend the “vision” of the connected vehicle along the slip road.

Across the 2 sites;

- 4x smartmicro MLR detectors
- 2x Yunex Traffic Roadside Units

- 13x infrastructure cameras

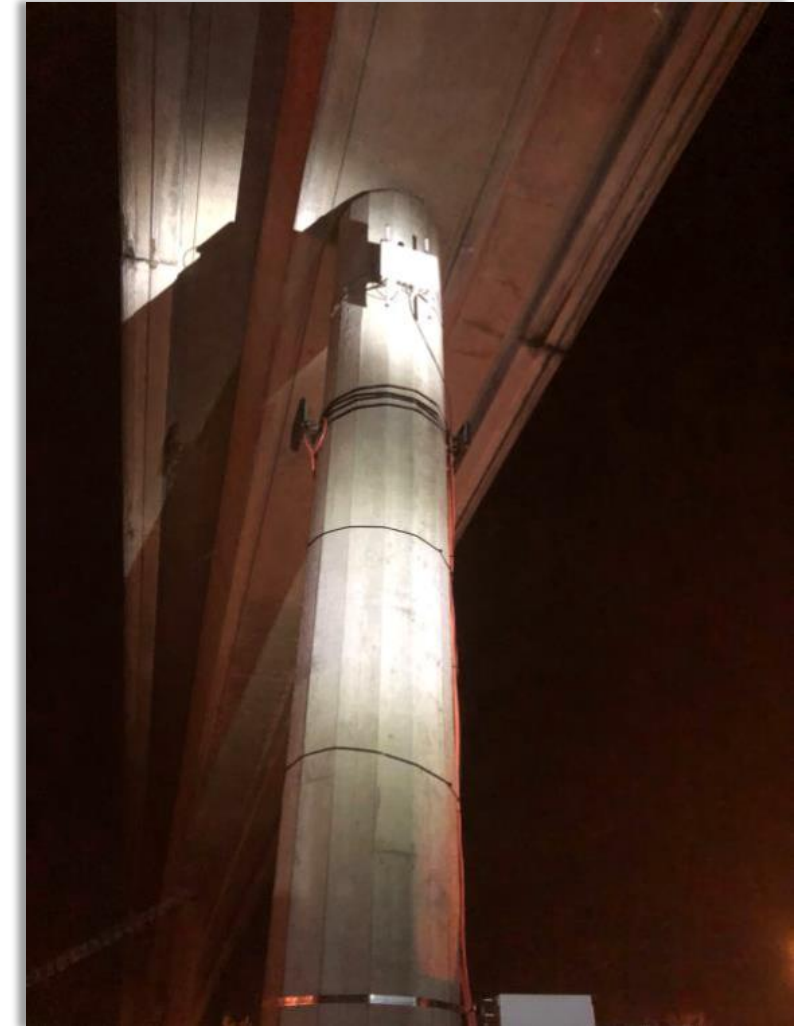
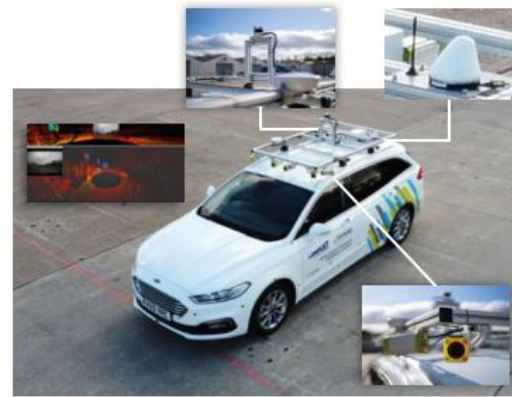


Tracking vehicles and broadcasting Collective Perception Messages (CPM)



8+ months of road traffic data

Connected ego test vehicle equipped with a variety of sensors and communications equipment



Real-time Object Data *Transmission & Storage*

Combined the data of the 3 radar devices (M40 J15 site) into a single CPM which was then sent to the CAV at the rate of 10 messages per second via ITS-G5 (802.11p).

Object positional resolution typically accurate to 0.1m - 0.3m.

CPM messages were stored in an Amazon Web Services data lake for system evaluation and vehicle movement analysis.

MATLAB data access API (Application Programming Interface) provided to the consortium partners.



