UNECE panel discussion on remote driving StreetDrone

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STREETDRONE
DELIVERING AUTONOMY

Introduction

At **StreetDrone** , our mission is to create the world's most sustainable, efficient and safest logistics solution. We are a leading developer of **autonomous vehicle technologies** designed to progressively automate **ports and yard logistics** , with zero emissions, zero delays, and zero incidents. As a leading technology developer, our strengths lie across the **full stack** , from low-level embedded **control systems** and **hardware design** to **autonomous software** and **teleoperation systems** .

Ross James

Programme Manager and Lead Safety Engineer

Has over 10 years of experience in leading vehicle safety engineering, working for industry leaders such as Jaguar Land Rover. He holds a BsC in Design Engineering and is an IPMA Certified Project Management Associate.

Fionán O'Sullivan

Head of Connected Vehicle Systems

Has extensive knowledge of software and systems design and development and worked as an Electrified Powertrain Controls Engineer and Lead Software Engineer for 9 years, working alongside leaders in the industry such as Jaguar Land Rover. He holds a Bachelors in Electronic Engineering and is working towards a MsC in Software Engineering.

AUTONOMY

We are at the forefront of autonomous technology developments, working with customers to understand how future technologies will influence the supply chain.

TELEOPERATION

Our teleoperation function means that vehicles can be driven safely by remote operators, taking people out of operational environments and making entire vehicle fleets more efficient.

VEHICLES

SD Advanced Engineering, enables the retrofit of vehicle with all of our drive-by-wire technology, to ensure that operators have access to the latest in safe autonomous and teleoperated technology.

Case Study: 5G CAL

5G Connected Automotive Logistics demonstrated the key features for successful CAL deployment – the safe and secure operation and handover of the CAV from autonomous mode to remote manual operation (teleoperation) and vice versa, when a situation outside of the autonomous logic of the vehicle arises.

This is considered a crucial demonstration of the capabilities of 5G and CAL, and critical for their operation in potential emergency situations, and, it is believed, will represent a world-first innovation.

As part of a consortium led by the **North East Automotive Alliance, StreetDrone** partnered with **Sunderland City Council**, **Newcastle University**, **Vantec**, **Nissan**, **Coventry University**, **Connected Places Catapult**, and **Perform Green** to deliver a 5G-connected, autonomous 40-tonne truck to distribute parts and assemblies across the Nissan plant, linking to many local SMEs in their supply chain.

Case Study: ENCODE

ENCODE aimed to investigate the cybersecurity risks associated with multi-driver systems, and implement measures, including secure connectivity, to facilitate safe deployment of such systems.

Project work involved engagement with key stakeholders such as DfT and CCAV, to validate and further best practices, and culminated in a live trial of multi-driver vehicles in London and Oxford to showcase project outcomes.

ENCODE was delivered by:

- **StreetDrone**, leading autonomous technology developer
- **TRL**, safety specialists / SMLL testbed
- **Coventry University**, cybersecurity experts
- **Angoka Ltd**, start-up providing protected communications
- **Oxfordshire County Council**, a leading innovator among local authorities in the adoption of CAV technology.

Deployment Scenarios

Full remote driving : Exercising full, direct control of the lateral and longitudinal motion of the vehicle through steering wheel and pedals on a remote workstation.

Advantages

+ Does not necessarily rely on an automated vehicle software
+ Can fulfill driving tasks outside of the ODD of the vehicle (an additional ODD must exist for remote operation but can be wider)
+ Flexible in a wide range of scenarios, both pre planned and remote resolution of unplanned issues

Disadvantages

- Requires a reliable high bandwidth low latency network to ensure safe operation
- Likely to still require sensor suite for object detection

Discrete remote commands : Remotely providing authorisations and high-level instructions to support an automated driving system.

Advantages

+ Can support limitations in the decision making capability of automated driving systems
+ Possible to still provide useful functionality over much weaker networks

Disadvantages

- Only useful in conjunction with automated driving system
- Does not allow for remote recovery of vehicle

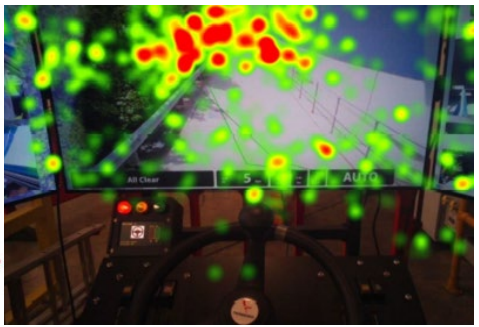
Opportunities and challenges

Functional Safety

It is imperative the remote workstation must be engineered to appropriate functional safety standards ie equivalent to ISO26262 to ensure safe and secure operation of the vehicle(s) at all times. StreetDrone's remote workstation mirrors the same control system architecture as on the vehicle(s)

Cognitive workload

Current StreetDrone deployments have operated to a 1:1 or 1:2 ratio of remote operators to vehicles however in order to scale, this technology is likely to be used at a much higher ratio of vehicles to remote operators, it will therefore be important to understand the cognitive workload of the tasks that the remote operator is being asked to perform and ensure they an appropriate ratio is used. StreetDrone has been conducting research in conjunction with Newcastle University in this area.



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