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Safety operators in automated vehicle testing and trialling – Guide

Centre for Connected & Autonomous Vehicles

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Foreword

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PAS 1884 has been developed as part of a wider programme sponsored by CCAV in conjunction with the Department for Transport (DfT), Innovate UK and Zenzic to develop a suite of standardization products to promote the safe testing and deployment of automated vehicles in the UK and inform wider international standardization activity.

PAS 1884 is intended to be read in conjunction with:

- the related BSI PAS Connected and Automated Vehicles (CAV) series (PAS 1880, PAS 1881, PAS 1882, PAS 1883 and BSI Flex 1890) and the UK Government Code of Practice for automated vehicle training [N1];
- existing legislation for UK vehicles and roads.

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It has been assumed in the preparation of this PAS that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The guidance in this PAS is presented in roman (i.e. upright) type. Any recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. "organization" rather than "organisation").

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In particular, attention is drawn to the following non-exhaustive list of specific regulations:

- The Automated and Electric Vehicles Act 2018 [1];
- The Data Protection Act 2018 [2];
- EU Regulation 2019/2144 [3];
- EU Directive 2010/40 [4];
- The Road Traffic Act 1988 [5];
- The Motor Vehicles (Driving Licences) Regulations 1999 [6];
- Rehabilitation of Offenders Act 1974 [7];
- The Public Service Vehicles (Conduct of Drivers, Inspectors, Conductors and Passengers) Regulations 1990 [8];
- Equality Act 2010 [9];
- Health and Safety at Work etc. Act 1974 [10];
- The Management of Health and Safety at Work Regulations 1999 [11].

0 Introduction

The UK Government is committed to investing in automated vehicle technology, research and innovation to explore the potential benefits these technologies could bring to industry and society. Testing and trialling automated vehicle technologies in a scenario or set of scenarios is therefore a crucial step to achieve this objective.

The use of a suitably licenced and trained safety operator is a widely-used means to manage risks within automated vehicle tests or trials on public or private roads or land. The safety operator is responsible for the safe operation of the subject vehicle, either from inside or in visual line of sight, and is required to continuously supervise the subject vehicle during automated vehicle tests or trials. It is therefore critical to have a standardized approach to safety operator selection and training to ensure a consistent level of safety. It is also noteworthy that some elements of safety operator training can be done in-house but it is important to have test or trial-specific training on the subject vehicle and route. Good practice is for trialling organizations to also implement regular refresher training so that the safety operator is always fully aware of the limitations and capabilities of the subject vehicle and automated driving system (ADS).

PAS 1884 has been developed to provide guidance to any trialling organization that trains or utilizes safety operators engaged in automated vehicle tests and trials. It might also be of use to road authorities, local authorities, testbeds, vehicle agencies, insurers and legal organizations.

PAS 1884 provides guidance on the factors to be considered in selecting and training safety operators and recommends the key responsibilities of the trialling organization in ensuring that a safety operator is in possession of appropriate skills and knowledge to enable them to act competently at all times during tests or trials and in the event of an incident or emergency. PAS 1884 also provides guidance on how skills testing and refresher training can be used to maintain the competence of safety operators for the role, but it does not provide guidance on their real-time monitoring or supervision during tests or trials. Additional safety operator controls and training might be required that are specific to a given test or trial, or to a specific subject vehicle, or as technology evolves.

Whilst it is acknowledged that many tests or trials will make use of engineers from the ADS development team to fulfil the safety operator role, it might be necessary to consider increasing the number and range of personnel able and qualified to perform the role. This PAS therefore aims to support selection, training and performance of safety operators either within or outside of the ADS development team.

PAS 1884 does not provide guidance on the responsibilities, selection and training of safety operators that are not in visual line of sight of the subject vehicle (i.e. beyond the visual line of sight where the safety operator is unable to continually maintain direct unaided visual contact with the subject vehicle that is under their control). This is due to the fact that, at the time of writing, the technology to enable safe, reliable remote operation of automated vehicles on public or private roads is in a highly immature state and the requirements placed on remote operators, particularly regarding expected situational awareness, remain ill-defined.

Although it is outside the scope of this PAS, guidance for remote operators who are beyond the visual line of sight of the subject vehicle might be an outcome for future standardization work.

1 Scope

This PAS gives guidance for organizations engaged in automated vehicle trialling and developmental testing that utilize safety operators who are either inside the subject vehicle or are outside of it with the subject vehicle always remaining in visual line of sight.

The PAS covers:

a) responsibilities of the trialling organization and safety operator;
b) safety operator selection, fitness to drive and experience;
c) training of the safety operator on:
    1) general skills and knowledge required to drive the base subject vehicle;
    2) test or trial-specific topics;
    3) visual line of sight remote operation;
    4) expected subject vehicle behaviour and unexpected subject vehicle behaviour;
    5) minimal risk conditions and minimal risk locations;
    6) the subject vehicle's relevant operational design domain (ODD) and its attributes;
    7) the test or trial route;
    8) eligibility criteria and abort criteria;
    9) hazards and mitigations;
    10) safety protocols;
    11) handover points;
    12) safety and welfare of passengers; and
    13) management of freight;
d) safety operator skills testing and refresher training; and
e) training and performance records.

The PAS applies to both trials and developmental testing, including trials of prototype vehicles, passenger and freight carrying services on both public and private roads or land, as bound by and proportionate to the relevant ODD.

This PAS reflects existing good practice, but it is not exhaustive. Some additional guidelines, relevant to specific vehicle types, use cases and trials, are also provided as good practice.

The PAS does not cover:

a) endorsement of specific safety operator training courses;
b) guidelines for automated supervision of the subject vehicle;
c) when the safety operator is not in visual line of sight of the subject vehicle; or
d) the role of the in-vehicle or remote test engineer.

This PAS is not intended to provide an accreditation or certification system.

PAS 1884 is of use to any trialling organization that trains or utilizes safety operators.

The PAS might also be of use to safety operators, road authorities, local authorities, testbeds, vehicle agencies, insurers and legal organizations.