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Road vehicles — Test scenarios for automated driving systems — Scenario categorization

Véhicules routiers — Scénarios d'essai pour les systèmes de conduite automatisée — Catégorisation des scénarios

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Foreword

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Introduction

Test and verification of automated driving systems (ADS) is one of the main challenges for the introduction of ADS into the market. Scenario-based testing is an approach for prospective verification of ADS that is broadly supported in the automotive field. It is expected that many test scenarios will be used to conduct the validation and verification of ADS, e.g. see ISO 34502. It is common practice to use some form of categorization of the scenarios.

The goal of this document is to propose a way to categorize scenarios. Scenario databases, such as the German In-Depth Accident Study (GIDAS)[2], the Community database on Accidents on the Roads in Europe (CARE)[3], the Initiative for the GLobal harmonization of Accident Data (IGLAD)[4], road safety from the government of the United Kingdom[5], and the National Automotive Sampling System (NASS) General Estimates System (GES) from the United States[6], already contain categories, but these categories are generally not shared among different databases. This document provides a method to harmonize the way scenarios are categorized. To enable the scenario categorization, “tags” are defined as meta-attributes that provide an additional source of information for each of the scenarios. A scenario category is defined using tags, such that all scenarios that share the same tags are considered to belong to that scenario category.

NOTE This document does not provide a hierarchical structure for the scenarios. There are many ways to provide a hierarchical structure and there is no best way to do this. For example, scenarios can be structured based on the road layout or based on the driving behaviour of a vehicle. The most suitable way to structure the scenarios depends on the application.

Road vehicles — Test scenarios for automated driving systems — Scenario categorization

1 Scope

This document defines an approach for the categorization of scenarios by providing tags that carry information about the scenarios.

This document is applicable to SAE level 3 to SAE level 5 Automated Driving System (ADS)[19].

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 34501, *Road vehicles — Test scenarios for automated driving systems — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 34501 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Categorization

4.1 Objectives

The objective of this clause is to provide a way to categorize scenarios.

4.2 General

A scenario category refers to a set of scenarios that share one or more characteristics. Tags are attached to a scenario for the purpose of categorizing the scenarios. A given scenario is part of a scenario category if all tags of the scenario category are also part of the tags that are applicable to the given scenario. Scenario categories do not need to be mutually exclusive. A standardized set of tags for defining scenario categories makes sharing and transferring scenario (categories) between different entities easier.

Scenario categorization can be used to structure the test cases for ADS. Another application of scenario categorization is the scenario assignment for the assessment of ADS within a given Operational Design Domain (ODD) because it might be easier to relate an ODD to scenario categories instead of relating an ODD to all possible scenarios. Scenario categorization can also be used to select scenarios from a scenario database or scenario library by using tags or a combination of tags.

In some cases, there is a need of having generic scenario categories – and thus a wide variety among the scenarios belonging to the scenario category – and, in other cases, there is a need of having specific scenario categories without much variety among the scenarios in the scenario category. For some systems, one may be interested in a very specific set of scenarios, while for another system one might be interested in a set