Second edition
2023-05

Road vehicles — Data communication between sensors and data fusion unit for automated driving functions — Logical interface

Véhicules routiers — Communication de données entre capteurs et unité de fusion de données pour les fonctions de conduite automatisée — Interface logique

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*.

This second edition cancels and replaces the first edition (ISO 23150:2021), which has been technically revised.

The main changes are as follows:

- extension of the potentially moving object interface at object level (extension of the logical signal group person);
- update of the road object interface at object level (extension of the road marking sign);
- extension of the static object interface at object level (extension of the entity type traffic sign; addition of new entity type traffic sign board);
- addition of new free space area interface at object level;
- extension of the camera detection interface at detection level (addition of new entity type point; update of existing entity type shape);
- addition of new interfaces group/layer – sensor input interface (addition of new generic sensor input interface; addition of new common sensor input interface);

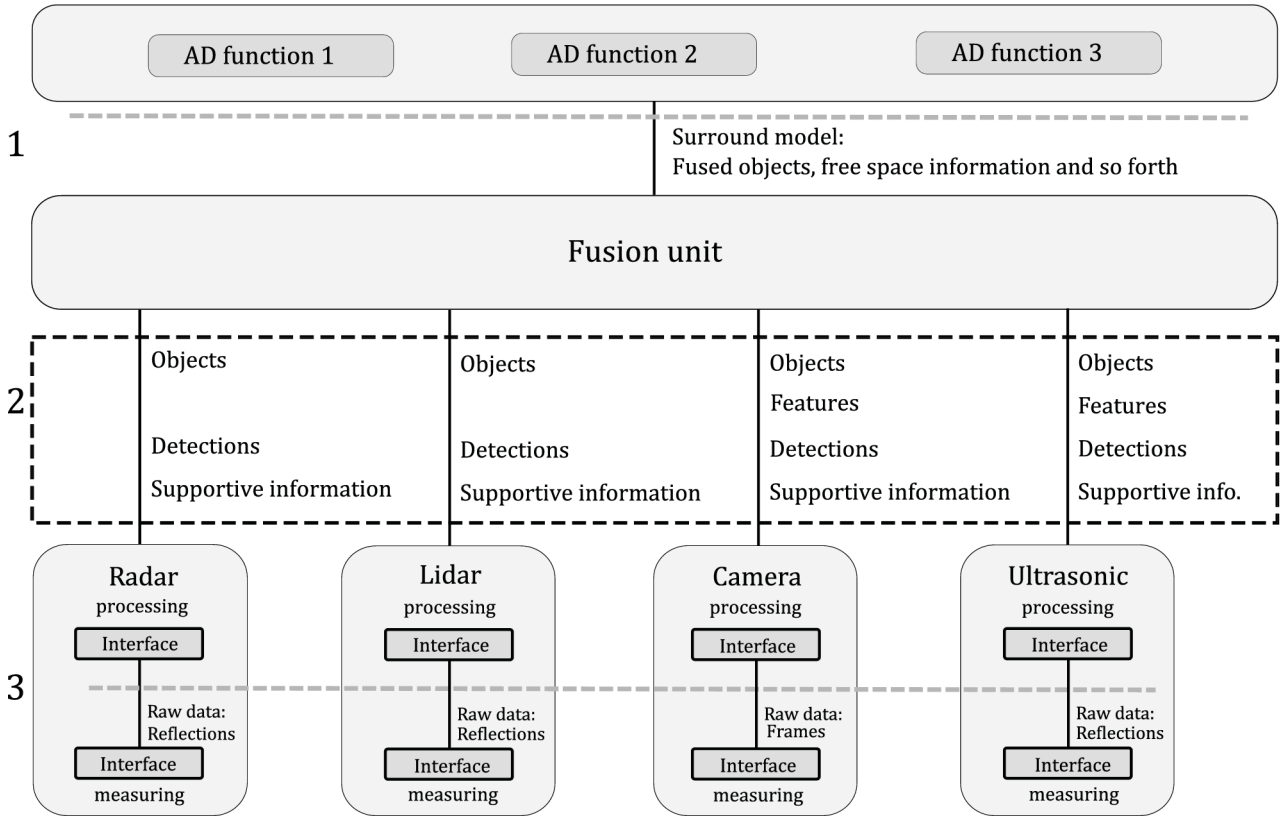
- extension of the error model (addition of covariances, cross-covariances and time series as error model implementation);
- refinement of the terms, for example, value as measured-, tracked- and predicted quantity value;
- new measures to link signals with their origin, that means linking signals at object level with, for example, detection entities;
- harmonisation of the document, for example, to achieve a better readability;
- update and add figures for clarification.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

(Highly-)automated driving (AD) functions for road vehicles require a situation awareness of the surroundings of the vehicle and, preferably, a comprehensive scene understanding. For the fast and reliable recognition of real-world objects, a sensor suite is necessary to provide information for the fusion unit. Utilisation of different sensor technologies like radar, lidar, camera and ultrasonic with different detection capabilities is indispensable to ensure both complementary and redundant information. The fusion unit analyses and evaluates the different sensor signals and finally generates a dynamic surround model with sufficient scene understanding.

While current partly-automated functions utilise only particular objects (for example, vehicles, pedestrians, road markings) to generate a simple surround model, it is necessary for future highly-automated driving functions to merge not only the recognised objects but also to include other sensor-specific properties and characteristics of these objects for the generation of a coherent surround model of the surroundings. To minimise the development efforts for the sensors and the fusion unit and to maximise the reusability of development and validation efforts for the different functions on the sensor and fusion unit side, a standardised logical interface layer between the sensor suite and the fusion unit and a standardised logical interface layer to the sensor suite are worthwhile and beneficial for both the sensor supplier and the system supplier.



Key

1 logical interface layer between the fusion unit and AD functions

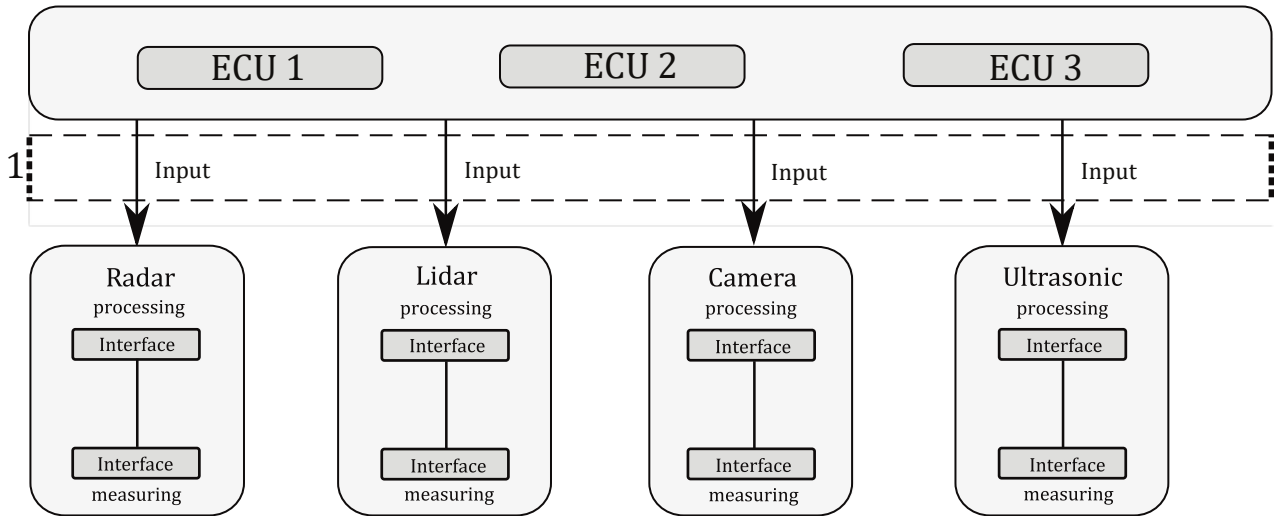
2 logical interface layer between a single sensor as well as a single sensor cluster and the fusion unit

3 interface layer on raw data level of a sensor's sensing element(s) and its processing

Figure 1 — Architecture: sensors/sensor clusters – fusion unit – AD functions

The logical interface layer between a single sensor as well as a single sensor cluster and the fusion unit (see Figure 1, key 2) addresses the encapsulation of technical complexity as well as objects including

free space areas, features and detections to enable object-level, feature-level and detection-level fusion. Additional supportive information of the sensor as well as the sensor cluster will supplement the data for the fusion unit.



Key

1 logical interface layer between other in-vehicle electronic control units (ECUs) (for example, odometry) and a single sensor or a single sensor cluster

Figure 2 — Architecture: ECUs' sensor input – sensors/sensor clusters

The logical interface layer between an electronic control unit and a single sensor as well as a single sensor cluster (see Figure 2, key 1) addresses the input of a single sensor as well as a single sensor cluster.