



Development Platform for Safe and Efficient Drive

Application Database

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TABLE OF CONTENTS

TABLE OF CONTENTS	2
LIST OF FIGURES	3
LIST OF TABLES	3
LIST OF ABBREVIATIONS	3
REVISION CHART AND HISTORY LOG.....	4
EXECUTIVE SUMMARY.....	5
INTRODUCTION.....	6
METHODOLOGY	7
DATABASE STRUCTURE	8
DATABASE FUNCTIONS	10
CONCLUSIONS	14

LIST OF FIGURES

None

LIST OF TABLES

None

LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AUTOSAR	AUTomotive Open System ARchitecture
DAS	Driver Assistant Systems
HMI	Human Machine Interface
OEM	Original Equipment Manufacturer
SP	Sub Project
WP	Work Package

REVISION CHART AND HISTORY LOG

REV	DATE	AUTHOR	REASON
0.1	24.01.2013	W. Ritter	Initial Version of Deliverable D11.1.
0.2	25.01.2013	M. Kunert	Revision and further edits, inputs
0.3	17.02.2013	J. Scholliers (VTT)	Peer review
0.4	21.02.2013	M. Kunert	Inclusion of peer review comments
1.0	22.02.2013	W. Ritter	Final version for submission
1.1	06.03.2013	M. Kutila	Layout formating

EXECUTIVE SUMMARY

The Deliverable D11.1 itself is an application database in the form of a Microsoft Excel-sheet that contains the 33 Basic Driver Assistant Applications of the current and the near future car market. These 33 Basic Driver Assistant Applications represent the generic building blocks of more complex future Driver Assistant Applications. All the future Driver Assistance Function platforms should at least support these basic functions. In a second step, from this application database the overall platform needs will be derived. This work will be subject of Deliverable D11.2 and documented therein.

In this report we describe

- Which sources we have used to build up the data base
- The history and working effort of its development and
- The structure of the application database.

The application database is accessible by all project partners on the DESERVE project server.

Note:

The scope of Driver Assistant Applications that is addressed by the DESERVE project and within this deliverable is focused on functions that make a larger use of embedded systems components, like they are used for radar, video or other environmental perception systems. Applications like for instance eCall, traffic information or green driving support are out of scope and already worked on by other public projects or initiatives, like TeleFOT, PReVENT, eImpact and TRACE.

INTRODUCTION

The objective of task T1.1.1 – Application database and task T1.1.2 - Application Needs identifications of Work Package WP11 - Application Needs is to get an overview of Driver-Assistant-System-functions (DAS-functions) which are or will be in near future offered in the automotive market. This set of DAS-functions represents the basic scope of DAS-functions to be covered by a future DAS-function development toolkit, such as the DESERVE platform. The advantages of an universal development platform for the development of the next DAS-functions is manifold. Besides the advantage to rely and reuse many of the modules already developed for earlier product generations the development time for new and often more complex DAS applications can be even shortened or kept constant with much higher added value and performance. This principle of reuse of already tested and validated submodules is well known in general, but only in the early beginnings for embedded systems.

The database generated in this deliverable is the starting point towards a holistic DESERVE development platform that is capable to meet the demanding requirements of future DAS systems.

Being the first document in the DESERVE deliverable list, no reference can be made to other deliverables or further readings. On the other hand, this report will be the headstone for all further work and documents and already provides indications and coarse headings on how the project central theme will evolve. Open questions and possible shortcomings or limitations of the DESERVE approach are shortly mentioned where possible.

METHODOLOGY

With Deliverable 11.1 an application database was build that contains a collection of DAS applications, relevant for the current and near future automotive vehicle market. While the application database itself is implemented in a Microsoft Excel-sheet, from which a short overview is available in the annex of this report, this deliverable report describes

- What sources we have used to build it up
- The history and working effort of its development and
- The structure of the application database

Used Sources to generate the Application Database

To build up this database the following sources were used:

1. The extensive expertise of project participants involved in the project consisting of OEM, Tier1, Tier2 and universities,
2. Public overviews and literature review for DAS such as Wikipedia and the links provided therein [WIKI 2012]
3. The very comprehensive and current overview of the DAS by Hermann Winner [Winner 2012],
4. Proceedings from conferences with focus on DAS in 2012 [IV 2012, ITS 2012]
5. Further sources, recommendations, standards or guidelines from other relevant organizations or institutional bodies

Activities to generate the Application Database

The following activities were performed to generate the application database:

a) In the kick-off meeting in Otaniemi (Helsinki, Finland) from 20. to 21. 11. 2012 the structure of the database was defined, first entries generated and agreed to proceed to the further creation of the database. For cost and time reasons, the use of more complex

tools (such as the DOORS application management tool for building the application database access) was renounced and it was decided to build the database using simple tools such as a Microsoft Excel spreadsheet for it. This offers the advantage that all project members could directly participate in the construction without any additional cost and teaching effort. The transfer to a more complex tool using the EXCEL data sheets will be discussed later on as needed.

b) The database elaborated during the kick-off meeting in Otaniemi, Finland was stored at the project data server (of VTT) with the task for all project participants to fill in missing applications and to correct existing entries during the following 15 days until the Application Needs Workshop in Orbassano, Italy at CRF premises.

c) The final completion and consolidation of the database was conducted on the Application Needs workshop in Orbassano (Turin, Italy) on 7. 12. 2012. For further fine adjustments an access to the application database via the project server was possible for all participants of work package 1 until 14.12. 2012. After that date the application database was frozen for evaluation in the next task1.1.3, the definition of the general platform needs.

The final application database is accessible by all project partners on the DESERVE project server.

DATABASE STRUCTURE

Structure of the Application Database

In the subproject WP11- Application needs an application database was created, that identified 10 groups of DAS with 33 applications that are currently available or will be

soon introduced in the automotive market. This elaborated DAS database will serve as a basis for the DAS applications addressed, investigated and finally selected for further work within the DESERVE development framework. It should be noted that not all of the DAS applications could be dealt with in the same manner and working depth throughout the project and a selection to a few demo cases, that will be examined and developed in more detail in WP4, is therefore needed. The DESERVE consortium assumes that this is not limiting the general approach and concept of an universal platform approach for DAS function development to any extend.

The database content is divided into 10 main DAS groups:

- Lane change assistance system
- Pedestrian safety systems
- Forward/Rearward looking system (distant range)
- Adaptive light control
- Park assistant
- Night vision system
- Cruise Control System
- Traffic sign and traffic light recognition
- Map supported systems (Note: only DAS scope, no driver information)
- Vehicle interior observation

Within this 10 main groups a subset of 33 DAS applications, like e.g. adaptive high beam assist in the DAS group Adaptive light control, forming the base modules for more complex next generation DAS, are listed and described in more detail w.r.t. sensor requirements, interfaces, actuators, HMI, interfaces and vehicle data. In a special column of the Excel worksheet some links to further literature and information for each of the are provided.

DATABASE FUNCTIONS

Overview of the 10 DAS groups with the 33 DAS functions

Lane Change Assistance System

- Lane Departure Warning System

- Blind Spot Detection

- Lane Change Assistance System

- Overtaking Assistance System

Pedestrian Safety Systems

- Pedestrian Detection System

Forward/Rearward looking system (distant range)

- Collision Warning System

- Low Speed Collision Avoidance System

- Pre Safe System

- Collision Avoidance System

- Emergency Braking ahead

- Electronic Emergency Brake Light

- Intelligent Intersection (Emergency Vehicle Detection)

- Rear Approaching Vehicle

- End-Of-Tail-Congestion Warning

Adaptive Light Control

- Adaptive High Beam Assist

- Partial High Beam Assist

- Inter Urban Light Assist

- Map supported Frontal Lighting

Park Assistant

- Ultrasonic Park Assist System

- Intelligent Park Assist

- Rear View Camera System

- Surround View

Night vision system

- Night Vision System

- Night Vision System with pedestrian detection

Cruise Control System

- Adaptive Cruise Control

- Adaptive Cruise Control -Stop & go

Traffic sign and traffic light recognition

- Traffic Sign Recognition

Traffic Light Recognition System

Navigation Map supported Systems (Note: only DAS scope, no driver information)

Curve Warning System

Fuel Economy System

Vehicle interior observation

Driver impairment warning System (drowsiness, fatigue, ...)

Driver/Rider visual Distraction Warning System (focus on the driving task, eye gaze evaluation)

Occupant Detection and Classification System

DAS-Functions to be demonstrated

Within the DESERVE project the following functions from the application database, as defined in this deliverable, will be demonstrated:

DAS-function	Demonstrator from
Inter Urban Light Assist for passenger car	Daimler
Driver impairment warning System for cars	CRF
End-Of-Tail-Congestion warning for motorcycles	Ramboll
Blind-Spot-Detection for motorcycles	Ramboll

Motorcycle occupant detection and classification Systems Ramboll

Adaptive cruise control for heavy trucks Volvo

The complete application database document is available on the DESERVE web server for registered user of the DESERVE consortium.

References:

- [IV 2012] Proceedings of Intelligent Vehicles, 2012 IEEE INTELLIGENT VEHICLES SYMPOSIUM, June 3-7, 2012, Alcalá de Henares, Spain,
- [ITS 2012] Proceedings of 19th ITS World Congress in Vienna, Austria, 22-26 October 2012.
- [WIKI 2012] Internet link Wikipedia Advanced Driver Assistance Systems,
http://en.wikipedia.org/wiki/Advanced_driver_assistance_systems
- [Winner 2012] Handbuch Fahrerassistenzsysteme: Grundlagen, Komponenten und Systeme für aktive Sicherheit und Komfort (ATZ/MTZ-Fachbuch) von Hermann Winner, Stephan Hakuli und Gabriele Wolf, 686 pages,
Vieweg+Teubner Verlag; Auflage: 2., korr. Aufl. 2012

CONCLUSIONS

The DESERVE platform, as defined, specified and finally developed and tested within the DESERVE project, will be used to develop next generation DAS systems in an efficient and holistic way. Within the scope of the tasks T1.1.1 and T1.1.2. of WP11 – “Application Needs” the currently available DAS applications were analyzed with respect to the most important key performance indicators, like architecture, sensor and actuator parameters, interfaces, HMI and other specifications.

The application needs are described in a neutral, sensor independent way to keep the database as general and universal as possible. This was realized by using the classification terms and description forms for all the DAS needs in the same way.

The selected 33 DAS applications are shaping the research scope to the essential working size and define the starting point for the development of the DESERVE platform.

The selection criteria used to come up with the 33 DAS functions was to take such systems into account that are already in or near to market introduction. The final intention and project goal is to demonstrate the capability of one common DESERVE platform tool to cope with and solve all the different road traffic scenarios with their prevailing DAS function in operation. This will be shown for some of the DAS applications in demo-cars of the participating partners in a later stage.

The main challenges and the possible shortcomings for DESERVE are to find a platform concept not only on the software side (like e.g. AUTOSAR), but also by hardware means.

Essential is to provide a hardware platform where its modules can be used for both the general algorithm development and the real-time in-vehicle tests of newly developed driver assistant functions at the same time. The ultimate target, transferring the algorithms running on the DESERVE platform easily with minimum or no overhead at all, to other hardware target platforms, used in series production, is of very high scientific research character and may become one of the main contributions of the DESERVE project to the embedded system community.