

E – DRIVETOUR

Beyond the Border of Electric Vehicles: an Advanced Interactive Course

Erasmus+ Programme: Knowledge Alliances

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D1.3 Demonstrator Specifications

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VERSION	DATE	EDITORS	COMMENT
V 0.1	30/04/2020	IHU	First draft version
V 0.2	12/05/2020	IHU	1 st version with courses prepared
V 0.3	04/06/2020	IHU	Review and upload on Google Drive
V 1.0	30/04/2020	IHU	Final Version
V1.1	31/12/2022	IHU	Revised Final Version

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Table of content

1	Executive summary	3
2	Objectives of the report	4
2.1	Purpose of the document.....	4
2.2	Scope of the document and reference to other project activities.....	4
2.3	Structure of the Document	4
3	Conclusions.....	6
	Annex I – Selected course syllabus	7





1 Executive summary

The main objective of this document is to define the EDRIVETOUR project demonstrator specifications that set the foundations which will further enable the implementation of the large, problem based learning activities of the project.

The demonstrator projects that were initially stated in the proposal will have their specifications defined in order to be further elaborated in WP3 and WP4. This will allow the educators to also identify the tools (software/hardware) that will be used and provide a comprehensive list necessary for the procurement process.

The projects defined will constitute the content of the two large laboratory courses, i.e. TS1.12 and TS2.12.

The current version of the document is established as the deliverable about the E-DRIVETOUR demonstrator specifications and will be considered as the reference point for other project activities (Development of Reconfigurable Laboratory Apparatus – WP3 and Integration, Deployment & Benchmarking – WP4).

A general description of all demonstrator projects is given in Chapter 4 of this deliverable. Each description is the necessary information for the thorough set up of the project including hardware and software involved.





2 Objectives of the report

2.1 Purpose of the document

The main objective of this document is to define the specifications for the Demonstrator projects of the E-DRIVETOUR project. The Demonstrator projects are large scale projects to be performed in the frame of the course TS1.12 and TS2.12 by student groups. Through these practical projects the understanding of the courses by the students will be made clear. The title, the general project description, main equipment needed, the student requirements and deliverables for each project will be defined in order to give exact guidelines to be followed in the forthcoming Tasks of the E-DRIVETOUR project and mainly in Task 4.2 (Demonstrator Setup). Thus, this document will help the rational, specific and educationally correct definition of all Demonstrator projects for the students to work on and avoid misunderstandings and misguidance. Each project definition is enriched with the required equipment, hardware and software, pointing out its origin (existing or purchase location).

2.2 Scope of the document and reference to other project activities

This document is aimed to define the foundations for the Demonstrator projects, to set the guidelines for the correct and rational description of all projects which will be elaborated in WP4 Demonstrator setup and worked during courses TS1.12 and TS2.12 in WP4. The document together with all its attachments are the basis for task 4.2 to be taken place in the forthcoming work package WP4 which requires the development of the actual demonstrator configurations (hardware and software) whereas demonstrator deployment will take place. Also, it is connected to WP3 and the specifications for e-learning platform as all measurements performed during these projects will be uploaded to the e-learning platform. Figure 1 is indicative.

2.3 Structure of the Document

The document includes the following contents:

- In *chapter 2*, the introductory section is provided, highlighting the scope and objective of the deliverable
- Following, *chapter 3*, presents the scope, the content and the way of implementation of the Demonstrator projects
- *Chapter 4* summarizes all Demonstrator projects, focusing on the title, the general project description, main equipment needed, the student requirements and deliverables for each project





- In *chapter 5*, a summary and the main conclusions of the work are reported in the last chapter of the deliverable
- *Chapter 6* contains the bibliographical references of the present document

Finally, Annex I contains the course syllabus of courses TS1.12, TS2.12 and TS2.4 as was defined in the E-DRIVETOUR proposal.

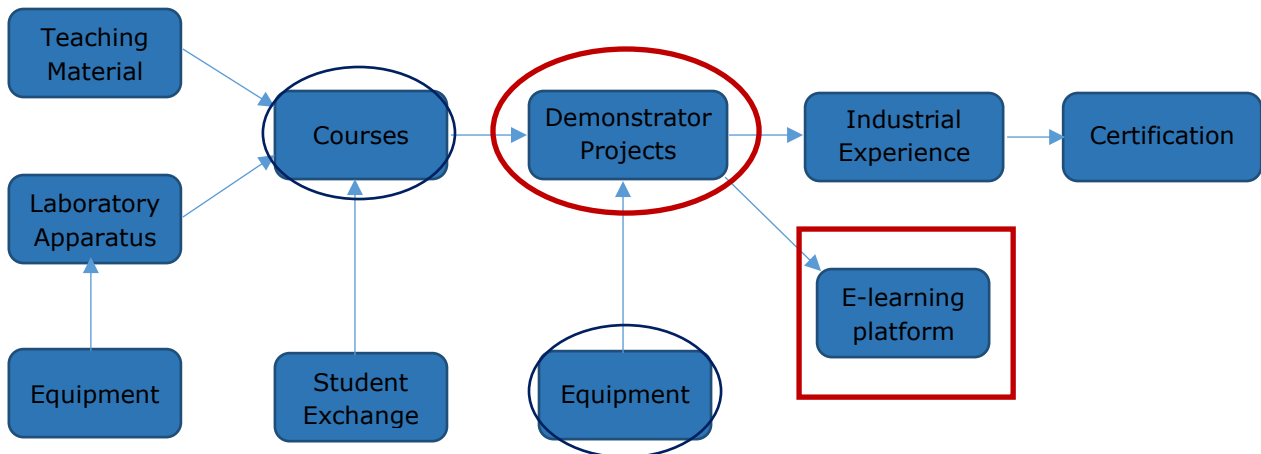


Figure 1: Connection of Task 1.3 to forthcoming WPs.





3 Conclusions

Deliverable D1.3 provides a description of the requirements for the Demonstrator projects. This document is the outcome of the work performed in Task 1.3. Demonstrator (hardware/software) Specifications.

The description and functionality of the Demonstrator projects' full details is portrayed in this task. Eight kinds of demonstrator projects, all around vehicle electrification and augmented reality technology, will be specially worked on. All projects are connected to real electric vehicle situations in order to present several educational opportunities for the students to investigate the overall functionality at the product level and participate actively in a range of real life instrumentation and control needs.

The document will set the foundations for the forthcoming WPs and especially WP4 which requires the setup and development of the actual projects. Between Months 22 to 25 the partners will prepare the demonstrator components set for use in the course considering this document. This will require student teams to receive the respective sensing/measuring equipment and begin the installation of sensors and instrumentation for data acquisition. For all projects, connection to the internet and live data streaming will be possible through the e-Learning platform. Out of the eight (8) Demonstrator projects, five (5) will be located in IHU's laboratory and three (3) at the UTHR facilities, where the students will work on during the overall educational period.

Finally, the overall hardware and software equipment required for the development of all eight (8) are included in the .xls file attached to this document.



**Annex I – Selected course syllabus****COURSE SYLLABUS****Course Title****Intermediate Project 1****Teaching Period****Course Code**

First Term

TS1.12

**Lectures
In-class****Lectures
Web****Lab
Exercises****Practice****Home Work**

40

Exams**ECTS
Credits**

1.44

Language

English

Lecturer

International Hellenic University (IHU)

Prerequisites

All other courses of TS1

Content (Syllabus Outline)

Intermediate Project 1 is mentioned in time slot 1 of the overall educational procedure; however it will concern the participating students right after the end of the courses of time slot 1. Particularly, the students will be divided in international groups and will have the obligation to deal with a subject related to the courses of time slot 1, appropriately selected by all teachers. A tutor will be assigned to each group of students in order to assist them complete their project. The project will require the utilization of the NI products in order to produce a scaled automotive control system based on the NI LabVIEW software, for example, a replica autonomous EV, transferring goods from one place to another through a specific pathway. A descriptive manuscript, a possible experimental structure and a small presentation will be the deliverables of each project group. Each intermediate project will have to be delivered by the beginning of the courses of time slot 2.

Objectives and Competences



The objective of the specific course, which is basically laboratorial, is to enhance the gained knowledge of the students on the subjects taught in time slot 1 and integrate knowledge acquired during the overall educational program, through the utilization of the NI products in order to produce a scaled automotive control system based on the NI LabVIEW software.

Intended Learning Outcomes

Students that will perform the specific project, will be able

- to recognize the essential requirements for the solution of an automotive engineering problem
- to calculate the parameters required to produce a problem solution
- to satisfactorily present a simple LabVIEW program
- to design and develop an automotive control system for a scaled vehicle
- to cooperate with distant teams and share knowledge

Learning and Teaching Methods

The working hours of the students will be devoted to laboratory occupation for the preparation of their deliverables. Student tutors will play a supervisory role.

Assessment

The students will be assessed in groups according to the quality of their deliverables.

Basic Literature

All educational material provided in the frame of the other TS1 courses.





COURSE SYLLABUS

Course Title

Intermediate Project 2

Teaching Period

Second Term

Course Code

TS2.12

Lectures In-class

Lectures Web

Lab Exercises

Practice

Home Work

40

Exams

ECTS Credits

1.44

Language

English

Lecturer

International Hellenic University (IHU)

Prerequisites

All other courses of TS1 and TS2.

Content (Syllabus Outline)

Intermediate Project 2 will play a similar role in the educational procedure as Intermediate Project 1, link Time Slot 1 courses with Time Slot 2 ones. The students will have to develop simple Augmented Reality (AR) code based on the NI products provided by the partner institutions. The AR code will be used by the *Developing Tool Demonstration* course. The code will be simple enough as developing blank geometrical drawings in the AR space. Similarly with Intermediate Project 1, a tutor will be assigned to each group of students in order to assist them complete their project. A descriptive manuscript, the AR code and a small presentation will be the deliverables of each project group. Each intermediate project will have to be delivered by the beginning of the practical experience period.

Objectives and Competences

The objective of the specific course, which is basically laboratorial, is to enhance the gained knowledge of the students on the subjects taught in time slot 2 and integrate knowledge acquired during the overall educational program, through the development of Augmented Reality and Hololens technology code.





Intended Learning Outcomes

Students that will perform the specific project, will be able

- to recognize and describe the basic instructions of the AR programming language
- to recognize and describe the elementary structure of an AR code
- to satisfactorily present a simple AR code
- to analyze, design and develop an AR code creating simple geometrical drawings
- to analyze, design and develop a simple marker-based AR application
- to analyse, design and develop a sensor system based on LabVIEW®
- to cooperate with distant teams and share knowledge

Learning and Teaching Methods

The working hours of the students will be devoted to laboratory occupation for the preparation of their deliverables. Student tutors will play a supervisory role.

Assessment

The students will be assessed in groups according to the quality of their deliverables.

Basic Literature

All educational material provided in the frame of the other TS1 and TS2 courses.

