PROJECT

E-VECTOORC

Electric-VEhicle Control of individual wheel Torque for On- and Off-Road Conditions (E-VECTOORC)

Funding: European (7th RTD Framework Programme)

Duration: Sep 2011 - Aug 2014

Status: Complete

Total project cost: €4,773,586

EU contribution: €3,094,997

Call for proposal: FP7-2011-ICT-GC

CORDIS RCN : 99412

Background & policy context:

The E-VECTOORC project brings together 11 complementary partners from industrial and research backgrounds to address the individual control of the electric motor torques of fully electric vehicles to enhance safety, comfort and fun-to-drive in both on- and off-road driving conditions.

Objectives:

The key objectives of the proposal are:
- Development and demonstration of yaw rate and sideslip angle control algorithms based on the combination of front/rear and left/right torque vectoring to improve overall vehicle dynamic performance.
- Development and demonstration of novel strategies for the modulation of the torque output of the individual electric motors to enhance brake energy recuperation, Anti lock Brake function and Traction Control function. The benefits of these strategies include reductions in: i) vehicle energy consumption, ii) stopping distance, and iii) acceleration times.
All developed algorithms will include failsafe strategies and controlled shutdown procedures. The overall control strategy will employ a modular control architecture to allow an easy implementation for different vehicle layouts (e.g., the number of individually controlled motors), vehicle sizes and vehicle applications (from small city cars to sports cars and SUVs).

The activity will be carried out using vehicle dynamics simulations and Hardware-In-the-Loop testing of vehicle components and subsystems, which will be complemented by full scale experimental testing of the entire system using a highly versatile vehicle demonstrator that can represent drive-train architectures with 2, 3 or 4 electric motors.

Experimental testing will provide comprehensive information for quantifying the benefits of the proposed control system in both on-road and off-road driving conditions.
Hence, in line with the ICT Work Programme for FEVs, the potential of electric drive architectures for improving vehicle stability control will be more fully exploited and measured through the E-VECTOORC control approach.

Methodology:

Work Packages
WP 1 - Management

- Scientific, technical, administrative and financial maintenance and coordination of the project.
- Timely completion of all work packages and tasks and successful conclusion of the activity.

WP2 - Powertrain Configuration and Control Architecture Specifications

- Multi-disciplinary investigation and definition of the specifications related to the powertrain in the context of on-road and off-road mobility.
- Specification of the global architecture of the Vehicle Dynamics Control (VDC) system and its

interaction with the Energy Management System (EMS).

WP3 - Advanced Simulation Studies of FEV Dynamics

- Development of advanced vehicle simulators for the optimisation of FEV dynamics in on- and off-road conditions, and for the optimisation of the overall vehicle energy efficiency.
- Evaluation of the potential of the novel control system.

WP4 - Electric and Friction Braking Control

- Verification and optimisation of the braking system components.
- Development of the electric and friction brake system control.

WP5 - Torque Vectoring Control and VDC

- Development and testing of algorithms for yaw moment control.

WP6 - Failsafe and Shutdown Procedures

- Development and testing of algorithms for fault detection, failure management and emergency management (reaction to a major hardware failure or controlled shutdown in case of accident).

WP7 - System Integration, Vehicle Build, Verification and Validation

- Activities for the intermediate and final testing of the developed system and its elements.
- Verification of all technical specifications.

WP8 - Dissemination and Exploitation

- Dissemination of the project results to the general public, academia and industry.
- Exploitation of the project results at the related supplier level.

Parent Programmes:

FP7-ICT - Information and Communication Technologies

Institute type: Public institution

Institute name: European Commission

Funding type: Public (EU)

Lead Organisation:

University Of Surrey

Address:
Stag Hill
Guildford
GU2 7XH
United Kingdom

EU Contribution: €591,372

Partner Organisations:

Fundacion Cidaut

Address:
PLAZA VICENTE ALEIXANDRE CAMPOS 2 PQ TECNOLOGICO DE BOECILLO 209
47151 VALLADOLID
Spain

Organisation Website:
http://www.cidaut.es

EU Contribution: €236,272

Lucas Varity Gmbh

Address:
Carl Spater Strasse
56070 Koblenz
Germany

EU Contribution: €222,999

Skoda Auto A.s.

Address:
Tr Vaclava Klementa
29360 Mlada Boleslav
Czech Republic

EU Contribution: €137,560

Kompetenzzentrum - Das Virtuelle Fahrzeug Forschungsgesellschaft M.b.h.

Address:
Inffeldgasse 21a / 1. Stock
8010 GRAZ
Austria

Organisation Website:
http://www.v2c2.at

EU Contribution: €235,008

Jaguar Land Rover Limited

Address:
Abbey Road
Coventry
CV3 4LF
United Kingdom

Organisation Website:
http://www.jaguar.com

EU Contribution: €97,046

Instituto Tecnologico De Aragon

Address:
Maria De Luna
50018 Zaragoza
Spain

Organisation Website:
http://www.ita.es

EU Contribution: €261,892

Flanders Make Vzw

Address:
August Reyerslaan
1030 Brussels
Belgium

EU Contribution: €596,790

Land Rover

Address:
Banbury Road Gaydon
Warwick
CV35 0RR
United Kingdom

EU Contribution: €194,982

Technische Universitaet Ilmenau

Address:
Ehrenbergstrasse
98693 Ilmenau
Germany

Organisation Website:
http://www.tu-ilmenau.de

EU Contribution: €269,016

Inverto Nv

Address:
Van Parijslaan
9940 Evergem
Belgium

EU Contribution: €252,060

Technologies:

Electric road vehicles
Electric in-wheel motor with torque vectoring

Development phase: Research/Invention

STRIA Roadmaps: Transport electrification, Vehicle design and manufacturing

Transport mode: Road transport

Transport sectors: Passenger transport

Transport policies: Digitalisation

Geo-spatial type: Other