RESEARCH CENTER OF VEHICLE INDUSTRY
About the research center

The Research Center of Vehicle Industry (RCVI) was established in 2011 as independent department of Széchenyi István University. RCVI carries out automotive R&D projects in which various university departments and students are involved also among the staff of RCVI.

Mission of RCVI is to strengthen ties between academic and industrial participants of automotive R&D sector, provide new technical solutions and scientific findings by managing

- fundamental and applied research projects
- R&D services
- R&D cooperation.

Core activities are research and development of electrical and hybrid drivelines and related applications, improvement of related mechanical, electrical and control system know-how.
Core activities of RCVI

Following activities are necessary for successful R&D projects:

- Development of electrical drives and power electronics
- Vehicle modeling and simulation, development of control systems
- Electronic design
- Automotive design
- Measurement and functional validation
Core activities of RCVI

Development of electrical drives and power electronics

According to the mission of RCVI, development of electrical drives holds significant importance especially in case of permanent magnet synchronous motors (PMSM). Aim of motor development is to provide tailored motor solutions for certain applications and acquire experience in special motor design (e.g. external rotor). Industry standard tools are available also for motor development.

Development of power electronics (motor drivers, battery packages, ultracapacitors) is performed together with activities mentioned above.
Core activities of RCVI

Vehicle modeling and simulation, development of control systems

Our development activities are based on simulation of vehicles and vehicle drivelines. Simulation results support vehicle integration and parameter optimization (e.g. to find optimal gear ratios, etc.).

We utilize model based development methods and industry-standard tools (MATLAB/Simulink-based toolchain) to create various control algorithms. Typical algorithms are:

- driveline control algorithm
- vehicle state-machine
- real-time health monitoring and self-diagnostics
Core activities of RCVI

Electronic design

Various electronic equipment is necessary to implementation of measurement and control systems. This equipment is developed mainly by electronic design group of RCVI.

Electronic design activities include PCB design, circuit simulation, development of low-level software components and measurement of circuits.

Typical tasks are:
- Development of custom control unit prototypes
- Design and manufacturing of custom gateway circuits for sensors
- Integration of communication systems (e.g. CAN, GPS)
Core activities of RCVI

Automotive design

It is necessary to apply prototype vehicles in order to validate R&D results. These vehicles are customized on basis of series-production vehicles or built as custom prototypes.

Related developments are performed by automotive design group of RCVI with utilization of:

- CAD/CAE technology
- Advanced measurement instrumentation (3D-scanner)
- Manufacturing technology
Core activities of RCVI

Measurement and functional validation

Various measurements and functional tests are parts of the development process. In case of electric motors we utilize our custom-built motor test bench in order to investigate the motor performance characteristics.

Development results are investigated by vehicle measurements even with monitoring of vehicle communication networks and with custom instrumentation too.

We also develop measurement and test methods based on flexible toolchain (NI LabVIEW environment).
Contacts

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June 2013