



# cRIO goes mobil...

The SEA cRIO Gxxx MOBILE Module in R&D  
Evaluation of the Acceptance of Safety Belts in Coaches



## Task

The human-machine interaction plays an important role in the field of automotive and traffic engineering with an increasing significance of traffic safety. One example for this is a regulation of the fastening of safety belts in coaches prescribed by the European Union. The Forschungsverbund Verkehrstechnik und Verkehrssicherheit (FVV) – Research Network for Traffic Safety - currently performs a study – an interdisciplinary cooperation between the FH-Trier and the University of Trier – to evaluate the acceptance of safety belts.

For this purpose all seats and belts of a coach were equipped with digital sensors. A data logging system is supposed to collect data of the occupancy of the seat and the use of the safety belt. The collecting of the data is performed fully automated and without being recognized by the passenger. Besides the digital data – e.g. actual GPS position of the bus - has to be acquired. Furthermore the area of operation of the bus is all over Europe and the collected information is supposed to be monitored at any time, which requires the ability of a remote request.

The hardware should match the following requirements:

- self-sustaining and reliable,
- robust and insusceptible to faults,
- small and compact.

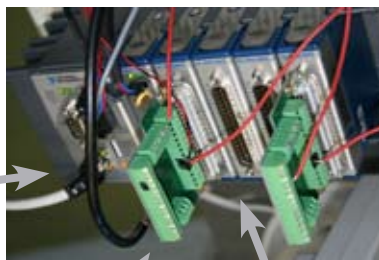
Furthermore data access should be:

- fast and permanent
- – in any country,
- immediately and
- independent of operation.

## Solution

CompactRIO Chassis;  
size: 179,6x88,1 mm

CompactRIO  
Controller



modules for  
digital IOs

cRIO Gxxx  
Mobile  
Module

The vehicle characteristic requirements precludes a PC based measurement system. The task was solved by the use of a mobile system based on the CompactRIO platform by National Instruments. CompactRIO systems are robust, compact and furthermore very powerful due to the FPGA technology.

Central components of the system are the CompactRIO Chassis 9104 providing eight slots and the CompactRIO Controller 9004 with a real time operating system.

Four digital modules (cRIO 9425) each measuring 32 channels are used to collect the signals of the seats. The system controls the data logging as well as it acquires the actual GPS position of the vehicle.

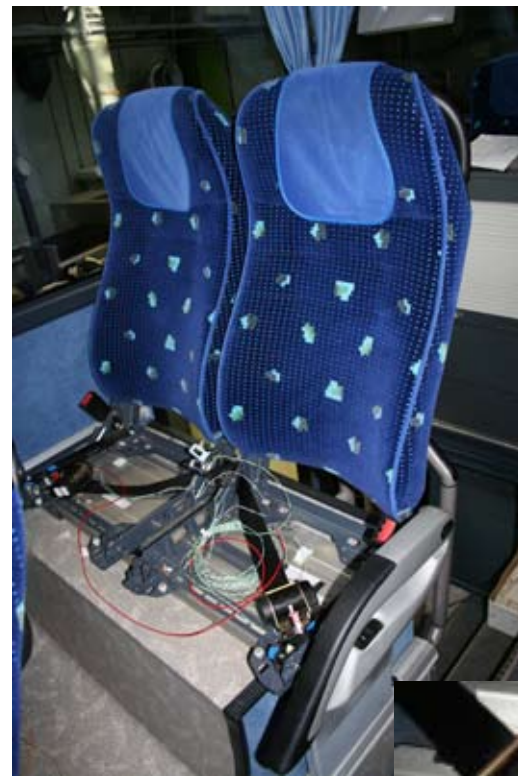


**SEA** Science & Engineering  
Applications Datentechnik  
GmbH

Linder Höhe  
51147 Köln

Phone: +49 - 22 03 - 9 80 07 - 0  
Fax: +49 - 22 03 - 9 80 07 - 14

www.sea-gmbh.com  
info@sea-gmbh.com



Left and below:  
Sensors applied to  
seat and belt

overleaf:  
CompactRIO  
system with Gxxx  
Mobile module  
and digital  
modules

Pictures and  
technical  
information of  
the setup are  
provided by the  
Forschungsverbund  
Verkehrstechnik und  
Verkehrssicherheit.

Forschungsverbund  
Verkehrstechnik und Verkehrssicherheit



The required mobility is achieved by the use of the cRIO Gxxx Mobile module from S.E.A. Datentechnik GmbH. This module is simultaneously responsible for the position determination and the data transfer via mobile radio telephone service. It conjoins an accurate and fast GPS receiver with a GSM modem for the connection to the Internet (via public mobile radio telephone service).

In this presented application the cRIO Gxxx Mobile module transmits collected data via GSM/GPRS all over Europe using different mobile radio telephone services and Internet to a central server. Data transfer is initialized by SMS likewise status information (e.g. the position of the vehicle) can be queried by SMS, too.

The software was created based on LabVIEW™ by National Instruments with LabVIEW RealTime and LabVIEW FPGA. For the visualization of the position data (position tracking) a common navigation software is used.

