PROJECT

ISMS

Internet-based Structural Health Monitoring System

Funding: European (7th RTD Framework Programme)
Duration: Sep 2010 - Aug 2014
Status: Complete with results
Total project cost: €484,954
EU contribution: €484,954

Call for proposal: FP7-PEOPLE-2009-IAPP
CORDIS RCN: 95494

Background & policy context:
Structural health monitoring (SHM) and non-intrusive damage detection techniques have become important research topics - motivated by the potential life-safety and very large potential economic impact of the technologies with respect to their earthquake/disaster mitigation potential and their role as key enabling technology of condition-based maintenance practices. The potential to save thousands of civilian lives and billions of Euros currently drives efforts in mainly Asia and North America.

Objectives:
ISMS - a collaborative effort between a Danish SME within vibration technologies in combination with two research organizations, French INRIA and Canadian UBC – aims to build a long-term partnership around the development of web-based damage detection procedures applied to instrumented civil infrastructures, which are robust to environmental changes. The innovation lies in the coupling of identification-based methods on one side, and statistical damage detection techniques on the other side – both elements communicating on a single platform on the structure. Progress within SHM research is currently hampered by the inter-disciplinary and intersectoral barriers posed by scientific fragmentation and a disproportionate emphasis on instrumentation aspects.

Methodology:
The IAPP program is chosen as an ideal vehicle to overcome the barriers to integration: ISMS proposes the secondment of 6 researchers over a total of 28 months; the recruitment of one experienced capacity for 18 months; and accompanying networking activities. The project has the potential to develop an extended European research community of world-leading capability within SHM of civil infrastructures. The impact is foreseen not only due to the achievement of scientific project results – but through the project’s positive impact on individual research capability; the significant commercial impact and incentives; the network integration and transfer of knowledge and results within and beyond the consortium.

Parent Programmes:
FP7-PEOPLE - FP7-PEOPLE - Specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities

Institute type: Public institution
Funding type: Public (EU)
Other programmes: FP7-PEOPLE-2009-IAPP Marie Curie Action: "Industry-Academia Partnerships and Pathways"

Lead Organisation:

Structural Vibrations Solutions A/S
Technologies:

Condition monitoring
Structural health monitoring based on modelling

Development phase: Demonstration/prototyping/Pilot Production

Key Results:

Automated bridge monitoring

An EU project developed tools for automated detection and assessment of damage to bridges and other infrastructure. The resulting commercial software combines new algorithms and data processing methods, permitting remote monitoring of many bridges.

A new generation of instruments and analysis tools helps with monitoring and assessing the structural soundness of large infrastructures. Yet, despite clear commercial potential for damage detection and structural health monitoring (SHM) technologies, significant interdisciplinary and intersectoral barriers affect industrial uptake of the technologies.

The EU-funded ‘Internet-based structural health monitoring system’ (ISMS) project addressed the issues. The three-member consortium planned to develop a procedure for automated, Internet-based detection and analysis of structural damage in large infrastructures, particularly bridges. The project also aimed for a transfer of knowledge between academia and industry and ran over four years to August 2014.

Team members extended the current state of the art in terms of algorithms, data processing and interfaces. Work included creation of a progressive damage monitoring system. This stage allowed subsequent development of an Internet-based SHM system, permitting the autonomous monitoring of hundreds of bridges. The project also developed means of visually displaying large amounts of complex data, such as evacuation routes.

The consortium characterised, modelled and evaluated various technical concepts and algorithms for
application in its SHM system. Testing led to optimisation of data processing.

Partners also combined its two research areas – algorithms and data processing – with regard to the system’s interface.

The ISMS project yielded a commercial software package, Artemis, allowing automated monitoring of the structural condition of numerous bridges. The group also achieved strong interdisciplinary coupling and knowledge exchange.

**STRIA Roadmaps:** Infrastructure  
**Transport mode:** Multimodal transport  
**Transport sectors:** Passenger transport, Freight transport  
**Transport policies:** Safety/Security  
**Geo-spatial type:** Infrastructure Node