Presentation Deployment Scenario: Pont de la Poya, Fribourg, Switzerland

Solexperts, Switzerland

Green sEnsor NEtworks for Structural monitoring

GENESI develops structural health monitoring systems for critical infrastructures such as tunnels, bridges, dams, private and public buildings, providing cutting edge green wireless sensor networks technology

KEYWORDS: structural health monitoring, energy harvesting, wireless sensor networks

First Workshop

11th March, 9.30-17.00
Hilton – Amsterdam Airport Schiphol

Introduction

Structural health monitoring (SHM) in civil engineering is defined as the instrumentation of structures, including buildings, bridges, dams, tunnels and many others; with sensors and accompanying equipment to assess structural integrity. Monitoring certain features of a structure over time, and evaluating these features to determine the health of a structure is the main task of such structural health monitoring applications. The target is reducing risks and increasing safety of buildings and structures. The risk can be defined as the amount of damage multiplied by the probability of occurrence.

A systematic approach for planning and execution of structural health monitoring includes risk management procedure and based on these results technical details, operation mode of a SHM-system and data handling is to be established.

Risk management includes three steps, risk evaluation, risk classification (probability of occurrence combined with expected damage/benefit) and risk handling using a SHM-system. The goal of SHM is to reduce relevant risks and eliminate high threats so to ensure, that remaining risks are accepted. The main objectives of a SHM-system are:

- Physical quantities to be monitored and measuring principal / instrument selection
- Location of points, installation details
- Frequency of readings and data transmission
- Data processing, transform readings to information, alert
- System operation and organization of SHM

Project Poya Bridge

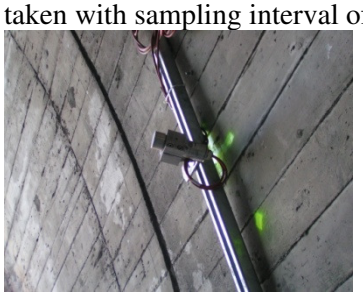
The Poya-Bridge, with a total length of 853m in Fribourg, Switzerland, will be constructed in 2012. The span width of the bridge is 196 m. The foundation of the 2 main pillars will be on piles and on concreted shafts.

Figure 1 Poya Bridge

This project is co-financed by the EC 7th Framework Programme on Research & Development, and part of the portfolio of the Embedded Systems Unit – G3 Directorate General Information Society
For more information please check:
http://cordis.europa.eu/ist/embedded

Within the GENESI project, it is planned to equip the bridge with different types of instruments.

Tiltsensors will be installed on the main pylons to measure structural displacements. Readings are to be taken with sampling interval of up to 30Hz.



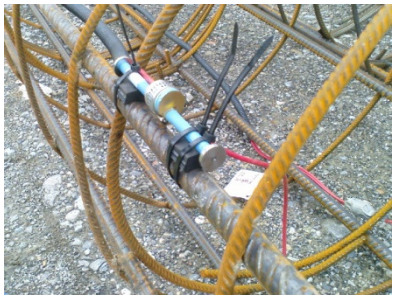
Displacement sensors are to be installed to measure bearing deformations mainly caused by temperature effects.

Temperature sensors both for air and structural temperature measurements are important to compensate and identify temperature effects

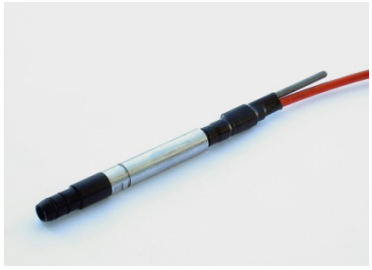
Accelerometers measure dynamic effects of the bridge main structure due to traffic and wind exposure.

Wind direction and wind velocity measurement

Strain measurement in the foundation is to detect load and resistance of the foundation



Water pressure, groundwater level is to be measured to verify/control stability of retaining walls



Force measurement in e.g. ground anchors is to be measured to verify/control stability of retaining walls

Workshop Demo

The aim of the demo and the presentation is to show different sensors, their installation in the field and on the Poya bridge structure subjected to SHM. Important is to also focus on general problems related to installation and maintenance of SHM equipment. An overview over different type structures subjected to SHM and over the SHM operation phases related to the structure lifetime is presented.

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