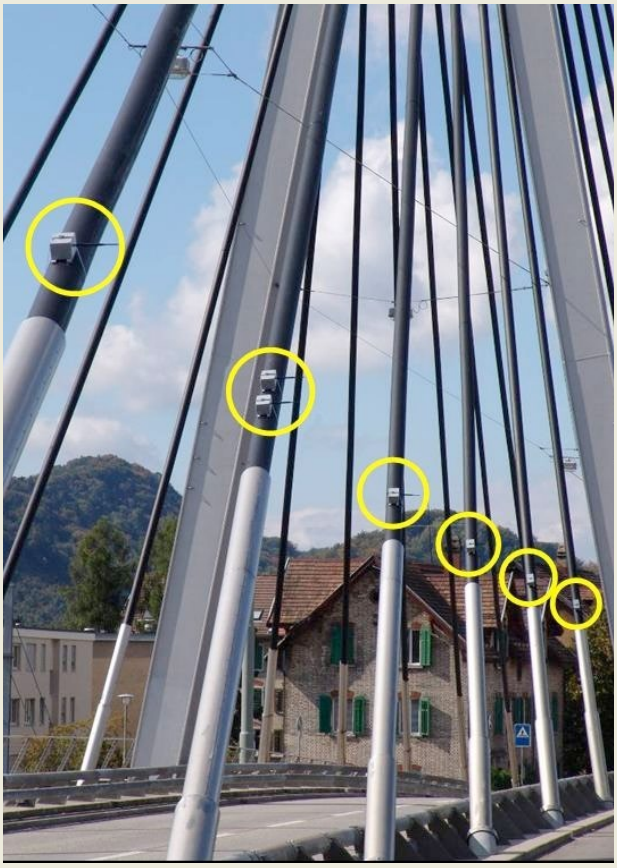
MONITORING OF CIVIL STRUCTURES WITH WIRELESS SENSOR NETWORKS

EMPA
Materials Science & Technology



Structural monitoring is increasingly applied on civil structures to provide reliable and quantitative data about their actual performance. This data is used in the assessment, maintenance and rehabilitation efforts of bridges that are approaching the end of their design lifespan. Conventional wired monitoring systems turned out to be inflexible, labor-intensive and expensive.

Monitoring with wireless sensor networks, networks of tiny computers equipped with sensors and a wireless communication interface, has the potential to overcome these drawbacks. The advantages of wireless sen-sor networks over conventional wired monitoring technology are fast deployment, great flexibility, easy scalability and self-organisation. These advantages, however, are achieved by introducing a major handicap concerning power management, because wireless sensor networks have to operate from batteries. Minimi-zation of power consumption is therefore a key issue for achieving competitive lifetimes. This innovative concept, which was implemented within the EU-project "Sustainable Bridges", was demonstrated with a long term test on the Storchen Bridge in Winterthur where the tensile forces of stay cables are monitored by com-puting the natural frequencies from ambient vibration measurements. For the commercialization of this innovative technology the Empa spin-off company Decentlab GmbH has been founded by two Empa employees and commercialization has started in spring 2009.