

## SMART WIRELESS SENSOR NODE

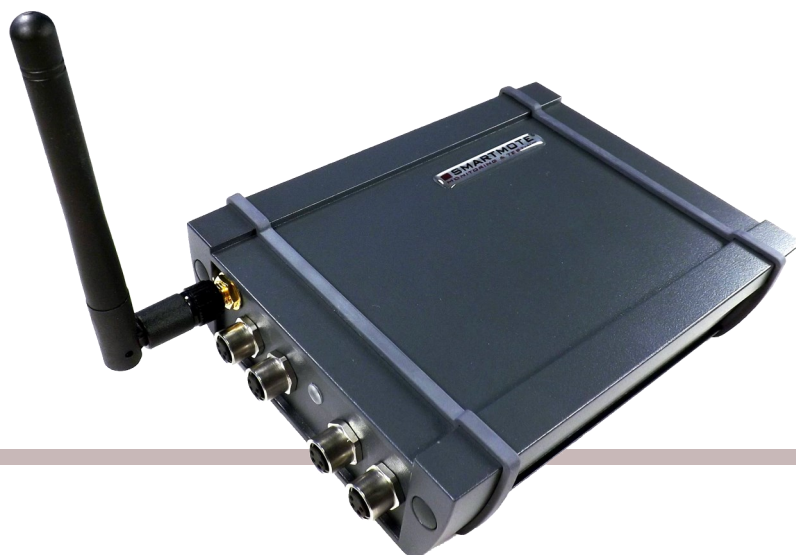
» SMART MONITORING & TESTING SOLUTIONS



### SMARTMOTE<sup>WS</sup>

WIRELESS SENSORS FOR  
STRUCTURAL HEALTH MONITORING

- » MULTIPLE SENSOR PLATFORM
- » LONG-TERM OPERATION
- » EXCELLENT ROBUSTNESS
- » HIGH RELIABILITY



## WIRELESS MONITORING

### ENVIRONMENTAL INFLUENCES AND DAMAGE PROCESSES

Modern civil engineering structures as well as historical structures have been under environmental influence for centuries or even millenniums. These influences induce damage processes in the building materials that lead to a degraded state of the structures eventually. The degradation effects can sum up and destroy the valuable object that structure and monuments authorities try to preserve for the coming generations.

Environmental influences are manifold and have their origin in physical and chemical effects. This comprises decomposition by light, rain, salts, gases and others. To prevent the degradation or the destruction of structures and historic objects, engineers, restorers and conservators try to chemically and physically conserve and protect the object. For them it is of great importance to know and understand the main factors responsible for the damage effects.

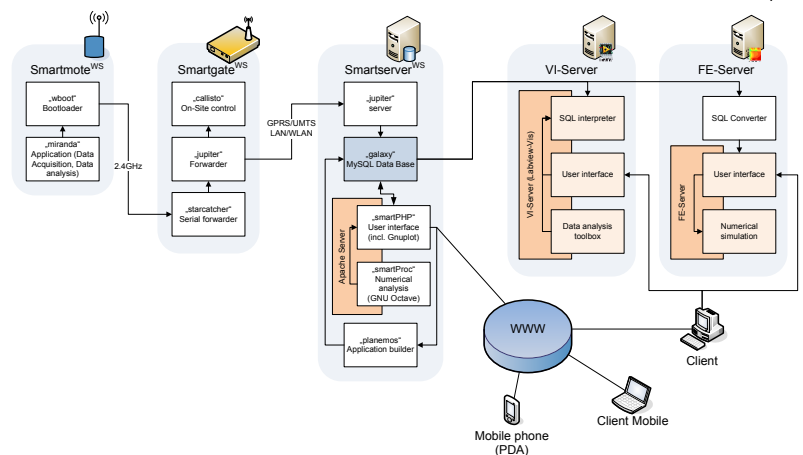
### BENEFITS OF STRUCTURAL HEALTH MONITORING

By knowing the main causes for damaging effects, best countermeasures for preservation and conservation can be taken and the remedies are adapted to the specific structure. To this end, understanding of environmental effects is necessary. To this effect, all relevant environmental quantities have to be recorded and analyzed by relating the resulting effects to the physical and chemical values. Damage processes are usually slow and medium to long-term measurements are necessary.

The knowledge resulting from the SHM measurements can be used for the discovery and confirmation of general correlations but it can also be used to erect an object specific treatment plan, if correlations are already known but influencing factors for the specific object are unknown. Wireless monitoring systems can help to clarify real influences on objects.

### THE MAIN ADVANTAGES

- » Easy and fast installation
- » Low system costs
- » Low interference with normal utilisation of the object
- » Remote control and alarm functionality



## KEY FEATURES

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- » Hybrid star network for minimization of data loss and power consumption
- » Battery operation up to several years (depends on data rates)
- » Robust casing to withstand harsh environments
- » 2.4 GHz transceiver to allow for worldwide operation
- » Flexible data buffering to obtain reliable data transfer success rates
- » Event or time based measurements
- » Remote control and reprogramming

### MULTIPLE SENSOR PLATFORM

- » Up to 4 digital inputs/outputs (I<sup>2</sup>C, One-wire) for interfacing digital sensors
- » Up to 2 analog inputs for interfacing external analog sensors (e.g. strain gauges, displacement sensors, air velocity sensors, rain sensors etc.)
- » Integrated vibration sensor
- » 2 internal sensor board connectors for optionally interfacing:
  - high sensitivity inclination sensors
  - material moisture and salt sensors (Impedance and/or potential measurements)
  - RS 485 or SPI devices



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MONITORING & TESTING