WIRELESS DATA ACQUISITION SYSTEM IN AUTONOMOUS CRACK MONITORING PROJECTS

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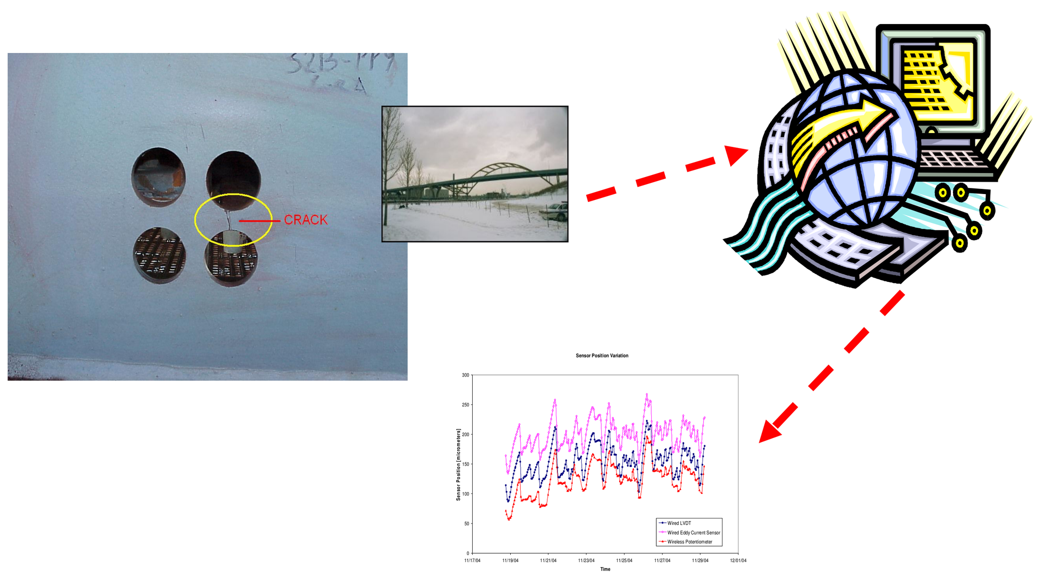
OBJECTIVE

To provide timely information to parties interested in the structural health of critical infrastructure components such as bridges, tunnels, pipelines, and buildings



SYSTEM DESCRIPTION

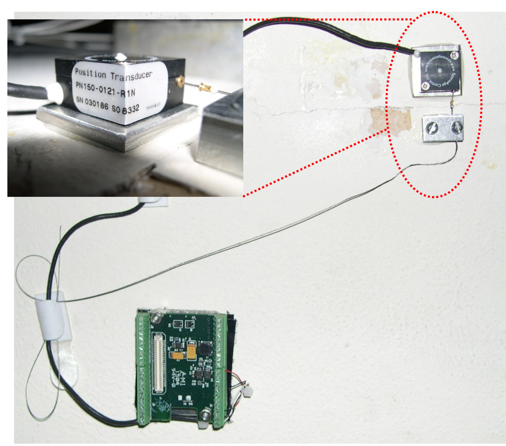


Figure 1:
Crossbow MDA300 and SpaceAge Control Position Transducer

Figure 2: MOXA NPort (left) and Crossbow MIB510 (right)

Components:

- Crossbow MIB510 & mica2 (Base Node)
- MOXA NPort Serial Device Server (Base Node)
- Crossbow MDA300 & Mica2 Mote (Remote Node)
- SpaceAge Control Displacement Transducer

OPERATION OF THE SYSTEM

MDA300 excites the transducer at regular intervals and stores its voltage output along with temperature and humidity battery voltage in local memory

An off-site PC autonomously retrieves the data stored in the onboard memory of the motes via the Internet or phone line

DETAILS OF OPERATION

Daily retrieval of one day's readings of temperature, humidity, transducer position and mote battery voltage

MDA300 12-bit high-precision channels provide 0.1 μm resolution for the position transducer

Interaction between off-site PC and the remote system is provided by an automated java command-line interface.

Remote nodes utilize onboard power management to achieve an expected battery life of about two months.

PRESENTATION OF DATA

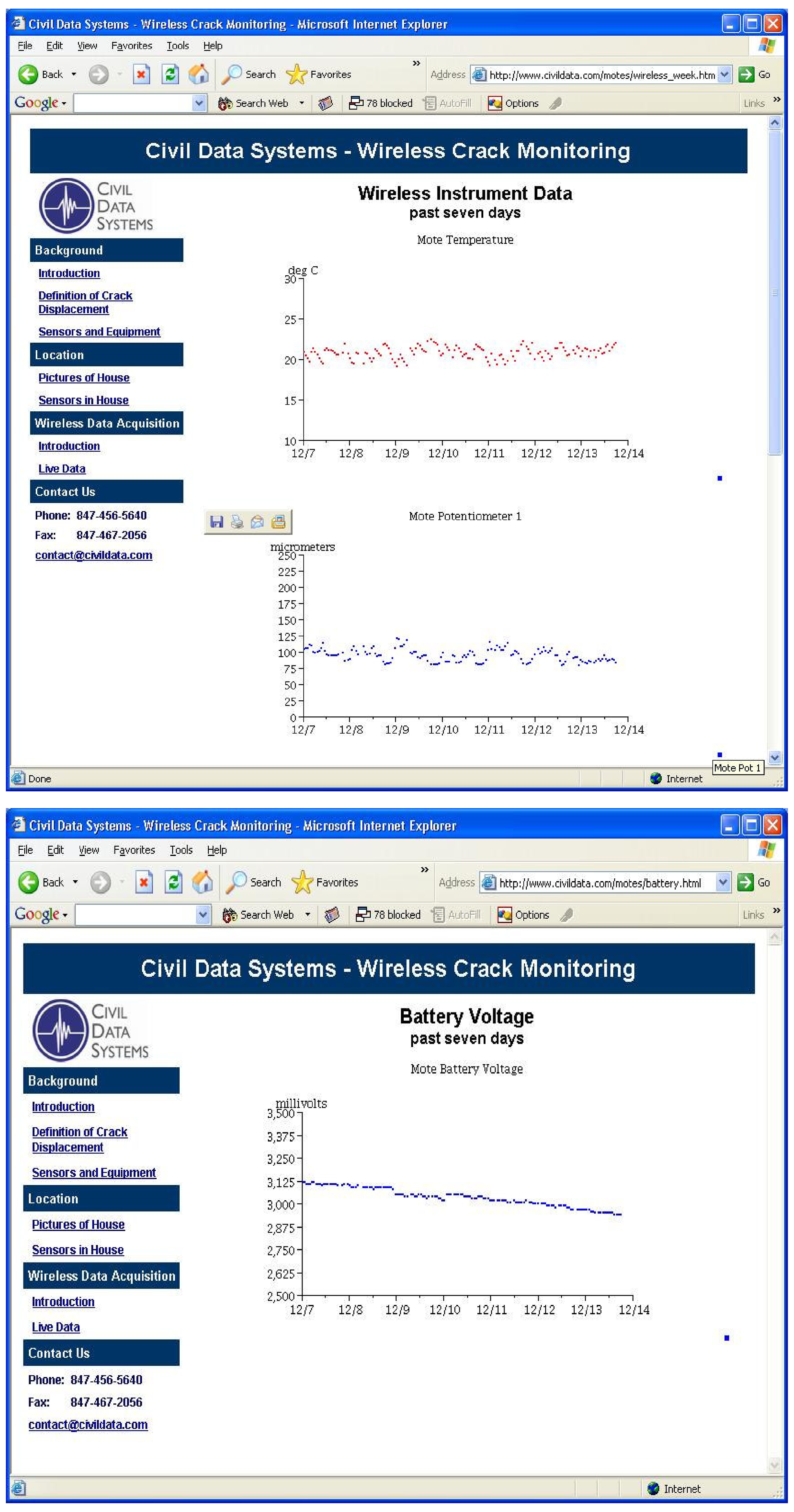


Figure 3: Screen shots from the website

Each time data is retrieved from the motes, website is updated in near real time.

http://www.civildata.com/motes

CASE STUDY: RESPONSE OF COSMETIC CRACKS IN A HOUSE TO ENVIROMENTAL AND BLASTING EVENTS

Case Study supplied by
Professor Charles Dowding
Autonomous Crack Monitoring
Civil and Environmental Engineering
Northwestern University

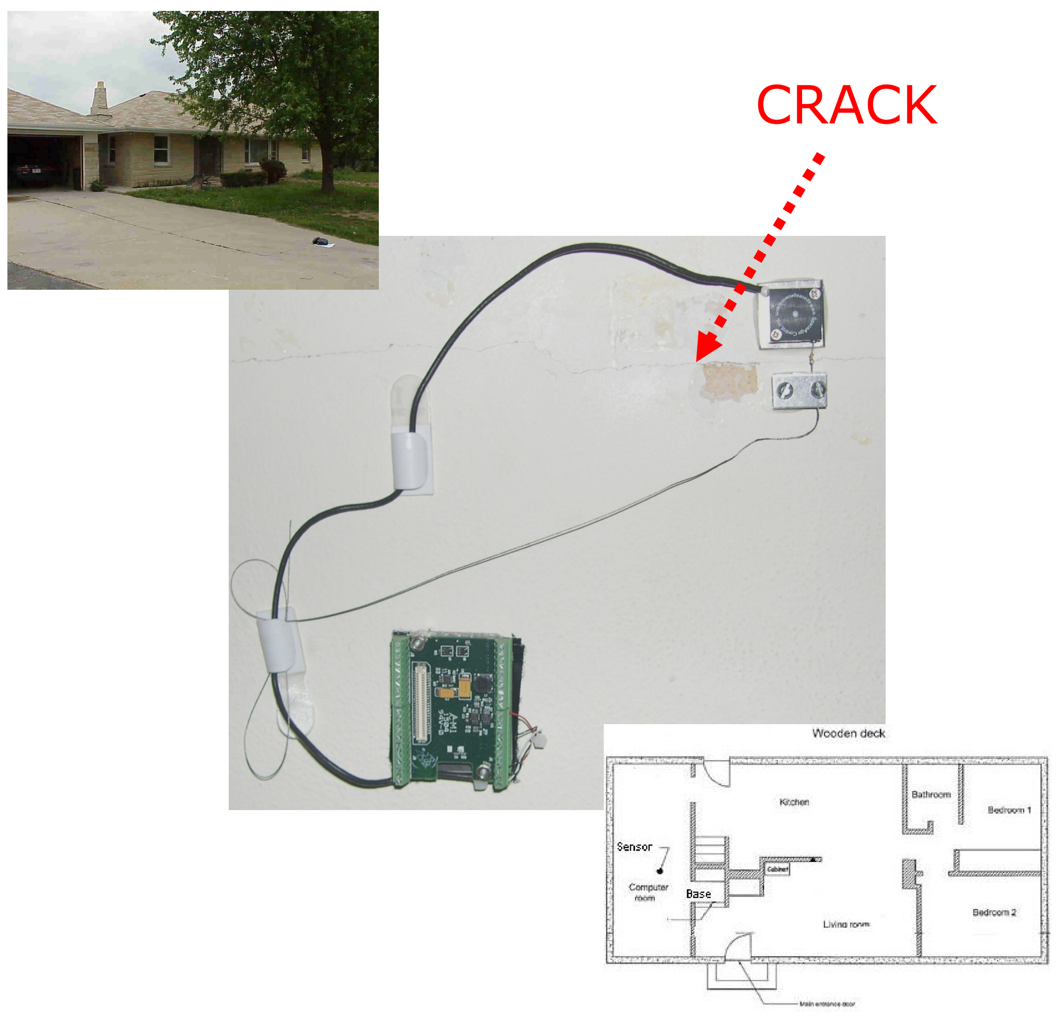


Figure 4:
Crossbow MDA300 and SpaceAge Control Position Transducer installed over crack

- There exists a limestone quarry 1500 ft away from the structure.
- Crack displacements due to blasting events and environmental effects (temperature, humidity, and wind) are in the scope of this case study.
- Established wired benchmark system used in the same house to validate results.

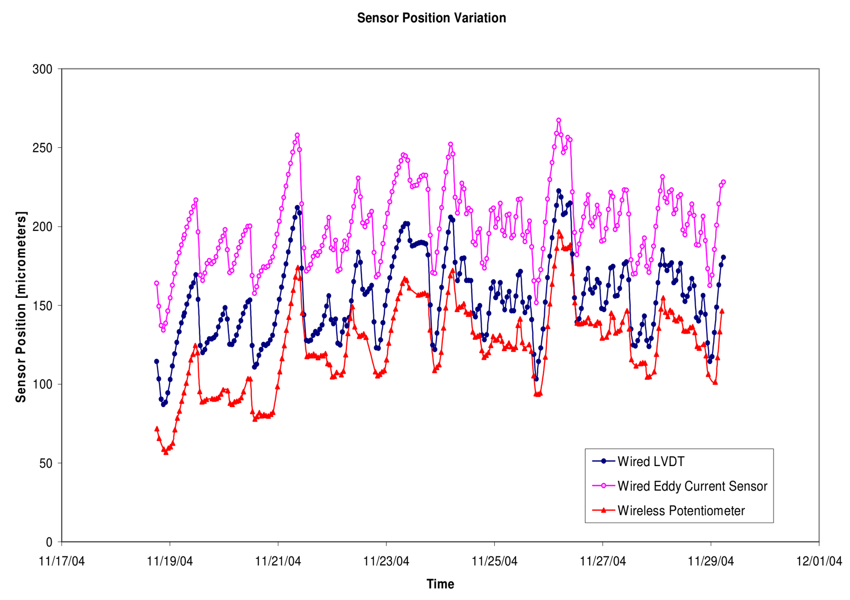


Figure 5:
Comparison of wireless and wired sensor data