

Smart Lifeline Systems for Improving Water and Energy Efficiency

This technology has the potential to 1) reduce costs associated with water distribution system leakage inspection and 2) reduce risk of infection due to poor water quality.

Keywords: water distribution systems, infrastructure, public health, public safety

Process Implementation Readiness



Background and Technology Description

U.S. water distribution systems (WDS) are aging with many pipes leaking or failing. This costs the nation \$1-2B annually; this figure grows when adding property damage and replacement costs due to infrastructural failures. Leakage causes inefficient energy distribution through the network and can introduce infection into WDS in low pressure conditions. In Buffalo, NY, over 80% of WDS are over 55 years old, and average 106 breaks per year per 100 miles of pipe.

Work was conducted at the Department of Civil, Structural and Environmental Engineering laboratory at University of Buffalo. An innovative monitoring system was designed using sparse arrays of permanently installed piezoelectric transducers capable of transmitting and receiving guided ultrasonic waves to triangulate and detect leaks in WDS. Uncertainty in leak location was minimized using a novel nonlinear Kalman Filtering Unscented Transformation algorithm.

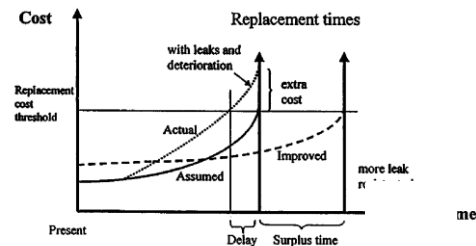
Technology Benefits and Value

- Novel use of transducers permanently attached to WDS to perform real-time structural monitoring/routine inspection
- Detection of active/pre-existing cracks with unique dual modes of passive acoustic emission testing and active ultrasonic testing
- Demonstrated ability to locate cracks with 98.2% accuracy within 0.3 ms of crack occurring at distances up to 2 meters

Target Customers

Water Management: Utilities and Municipalities

The U.S. Environmental Protection Agency states that making water infrastructure last longer is essential to protecting human health and the environment, and maintaining safe drinking water and clean water bodies.



- Implementation of this technology has potential to both increase the replacement cost threshold and eliminate extra cost of un-located leaks
- Real-time monitoring will prevent water contamination, property damage, and adverse environmental impacts from uncontrolled discharge

Intellectual Property

This technology is currently not under patent.

Opportunity

NYSP2I is interested in working with qualified parties for technology and product development of this process.

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