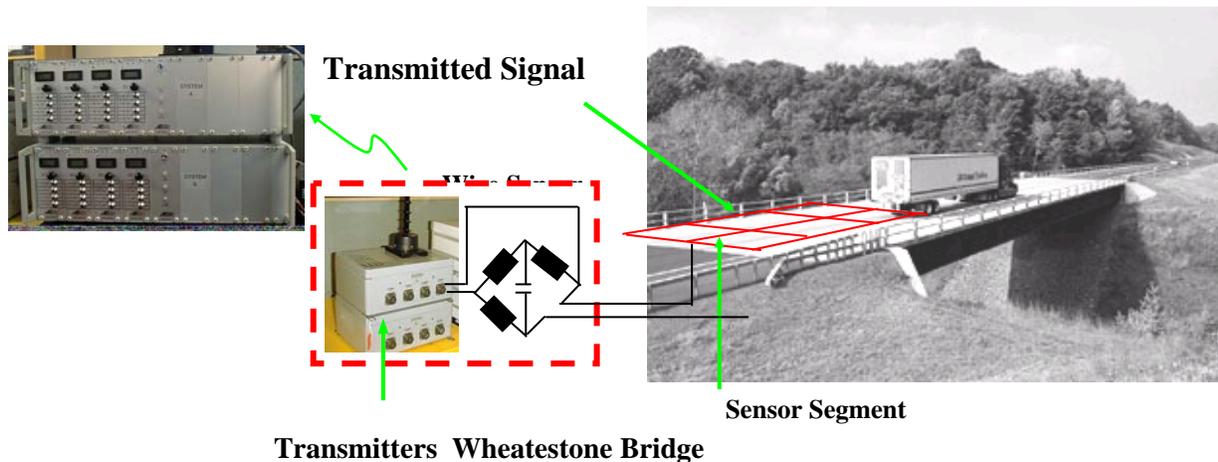


Survey and Investigation of The State-of-the-Art Remote Wireless Bridge Monitoring System

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Receivers



Objectives

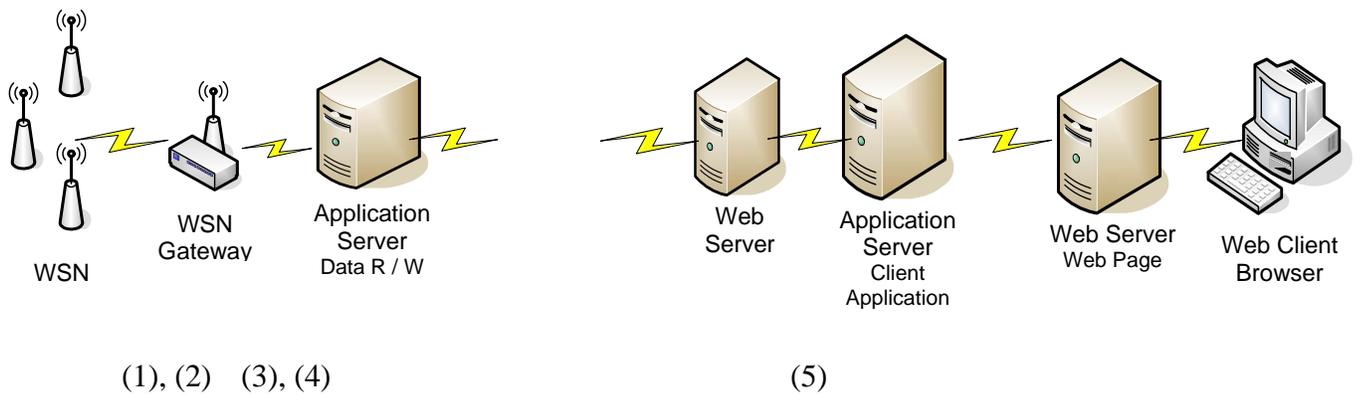
In order to study bridges' long-term performance, it is in the bridge owners' interests to find the state-of-the-art technology developed by the industry and research institutes which use an intelligent wireless monitoring system, instead of the conventional on-site bridge testing. The system could include (1) a practical plug-and-play battery-operated "wireless" data acquisition unit and (2) state-of-the-art "wireless" data transmission and communication technologies. The objective of this project is to further investigate and integrate the "off-the-shelf" wireless remote monitoring system with the latest technology.

Technologies and Applications of "Wireless" Structural Health Monitoring Systems

In recent years, wireless technology has revolutionized digital communications. The wireless communications systems may reduce problems of installation and maintenance of the wire system. It is suitable for certain applications, like long span bridges. However, a wireless system is not totally problem free. Noise and interference are two examples of problems. But with the development of new technologies, especially in the telecommunication field, these problems can be resolved in the near future.

As stated in the beginning, the purpose of this study is to find state-of-the-art technology developed by industry and research institutes which use intelligent wireless monitoring systems instead of conventional on-site bridge testing. The second objective of this project is to investigate further and integrate “off-the-shelf” wireless remote monitoring systems with the latest technology for future use in the State of Maryland.

Based on the survey documented in this report, it is found that wireless communication, together with its applications and underlying technologies, is among today's most active areas of technology development. Figure below shows the requirements of hardware and supplies in (1) sensors, (2) data acquisition system (DAQ), (3) power supply, (4) data transmission, and (5) data processing and data storage.



A survey of various wireless data acquisition systems has been conducted at an early stage of this project and the report lists the capabilities of the surveyed system in a summarized form. Research has also been conducted by attending conferences, searching for references and discussion with peers. It is found that in recent years researchers from diverse backgrounds have achieved a lot by developing smart material or structures to monitor conditions, detect failure, control damage and adapt to changing environments. The report also lists the known systems and their capabilities and provides the summary of those researches. It is foreseen that once these technologies have matured, new tools that provide feedback on the state of the health of the civil infrastructure system will be available in the near future.

For a copy of the report, contact the MD SHA Research Division at badkins@sha.state.md.us or 410-545-2921. For information about the project, contact Dr. Fu at ccfu@umd.edu or 301-405-2011.