Project: Advanced Infrastructure Systems for the United States Army Corps of Engineers, Pittsburgh, PA; determine appliance-level energy consumption in residential homes, NSF, Washington, DC: Indirect Bridge Structural Health Monitoring using Vehicles, Pittsburgh, PA.

Client: US Army Corps of Engineers, National Science Foundation
Client Contact: Andy Harkness

MSMM Services: Project Management

DESCRIPTION

- **Advanced Infrastructure Systems for the United States Army Corps of Engineers, Pittsburgh, PA.** The objective of this project is to develop an information model for embankment dams that can help the USACE integrate, analyze and visualize different sources of data needed to monitor these structures. This project is directly related to the primary objectives of the Risk Management Center (RMC), and the investigators have been working closely with the members of the RMC.

  Task 1: Instrumentation infrastructure for monitoring the health and behavior of dams and levees. This task investigated the status of in place USACE instrumentation infrastructure, and provided a plan to ensure that future infrastructure can better support the information needs and future monitoring technologies.

  Task 2: Requirements identification for enabling real-time monitoring of critical infrastructure through the use of web-enabled sensors & immersive visualization environments. Critical infrastructure needs to be monitored continuously to identify their structural behavior over time and to obtain early failure warnings, otherwise economic damages and negative environmental impacts may occur. Task 2 addresses (a) the management of data related to infrastructure health monitoring and infrastructure surrounding environment; storage of these data, (b) mining data to get early warnings for possible failures, and (c) visualization of infrastructure and resulting risk modeling consequences within the spatial context. This project was initially funded for 1-year, with a cost of $175,000.

- **Determine appliance-level energy consumption in residential homes.** The team explored state-of-the art sensing technology, and advanced signal processing and machine learning algorithms. This was a $1.5M, 3-year project funded by the National Science Foundation. Dr. Mario Berges is the Principal Investigator (PI) for this project.

- **Indirect Bridge Structural Health Monitoring using Vehicles, Pittsburgh, PA.** This project investigated, both in simulation and experimentally, the hypothesis that an array of sensors, mounted on moving vehicles that travel across the bridge of interest, can be helpful in identifying structural damage and thus serve as an indicator for more detailed analysis. This approach can be referred to as indirect health monitoring, which has the advantage that it can be used in multiple un-instrumented bridges at a low cost and without the need for on-site maintenance. It may be viewed as complementary and, if needed, as a substitute for a direct health monitoring approach. Thus, this strategy, if proved to be effective, might help fulfill the need for a practical and cost-effective solution for broad coverage of the bridge population, and help mitigate the costs associated with existing direct SHM practices. This is a $499k, 3-year project funded by the National Science Foundation.