



Hearing the Music of Structures, Analyzing When the Notes Are Wrong

By Tom Sawyer, Senior Editor, Information Technology



Alan Jeary, CTO, STRAAM

After more than 30 years of research, invention, fieldwork and development, civil engineer Alan P. Jeary finally saw the hardware and software that he developed commercialized in 2010. The dynamic modeling service, which can analyze the vibration dissipation in structures, is now available from

STRAAM LLC, a structural risk assessment and management firm.

Jeary, the New York City-based company's chief technology officer, uses devices with sensitive accelerometers developed for missile guidance systems to collect data on dynamic vibration response in structures. His sensor can be set down on an upper floor for a few hours and collect enough data to profile a building's resonance signature over a range of frequencies.

Sensors often help engineers evaluate structures. Strain gauges watch for distortion when they span areas feared to be in distress. Accelerometers, tilt meters and crack gauges record movement when placed where movement would be of telling significance. Acoustic sensors on bridges can report harmonic changes or the sounds of snapping strands in cables far away. But in those cases, such devices provide clues when change is feared, and they have been correctly placed to detect it. Jeary's work lets physics and mathematics replace the

need for strategic sensor placement. He does it by gathering signals recording vibration decay in buildings, bridges, dams or any structure whose ideal dampening characteristics can be modeled. He then compares the ideal characteristics with the holistic "EKG" of the structure that his sensors acquire. Analysis of that dynamic resonance, compared with what an ideal structural model would predict, then can be used to navigate to locations showing suspicious dynamic response, such as what might be caused by construction defects of fractured elements, for investigation.

STRAAM is being used on many of sensitive projects, from dam and bridge repair to cooling tower modifications. The New York City Metropolitan Transit Authority is using it on its Fulton Street Station renovation, where shallow tunneling beneath old buildings creates a need to establish a baseline of structural health prior to tunneling, and then to monitor for change.

"STRAAM offers a valuable service when we work around existing infrastructure and try to determine what's the risk and how to proceed," says Hsin Wu, the MTA's Project Manager at Fulton Street Station.

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