



Remote Vehicular Collision Detection on Bridges

with Resensys Wireless Monitoring System

Key Monitoring Capabilities

- Detecting vehicular impacts using wireless vibration/acceleration SenSpot™ sensors.
- Visual confirmation of collisions and impact severity with solar-powered cameras.
- Automated notifications and detailed impact reports for timely response.
- Long-term monitoring of structural health to identify potential damages.

Vehicular Collision is not Infrequent

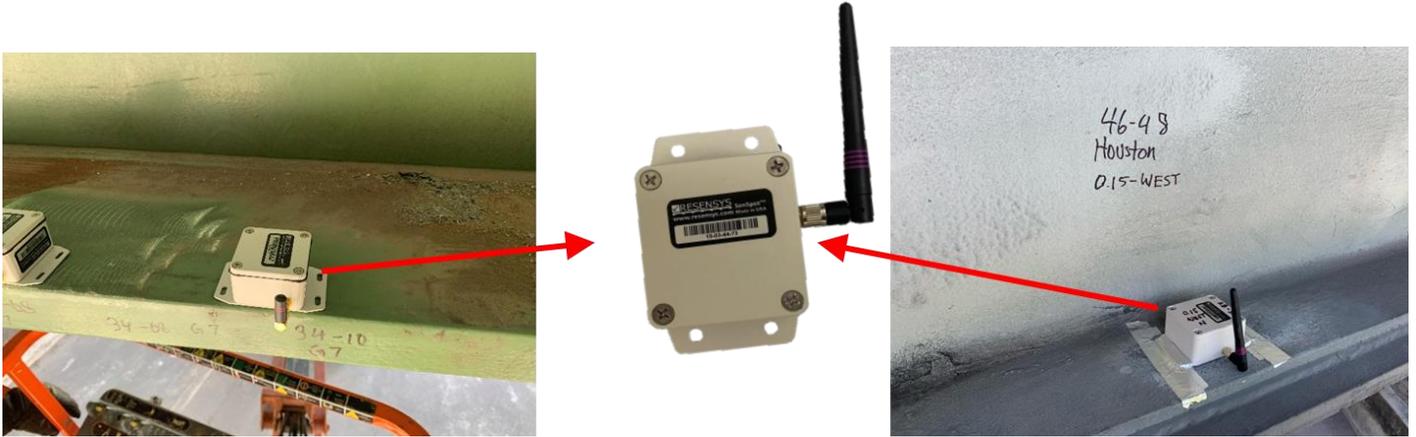
Data shows that bridge impacts from over-height vehicles are not infrequent. According to the Federal Highway Administration, there have been between 13,000 and 18,000 over-height vehicular collisions with bridges in the between 2013 and 2018 (FHWA-HIF-20-087). Each of these incidents requires that nearby roads be closed, inspections of the damage be evaluated, and the public be updated about changing road conditions. Response plans vary across jurisdictions, but the need to employ a timely and effective response is universal to ensure the safety of commuters. Until recently, instrumentation for impact detection has been either too expensive or impractical for widespread use.

Resensys has the Solution!

The Resensys proposes reliable and robust wireless system for vehicular or vessel collision/impact detection:



[Wireless Solar Powered Camera](#) on bridges for vehicular/vessel collision detection and monitoring

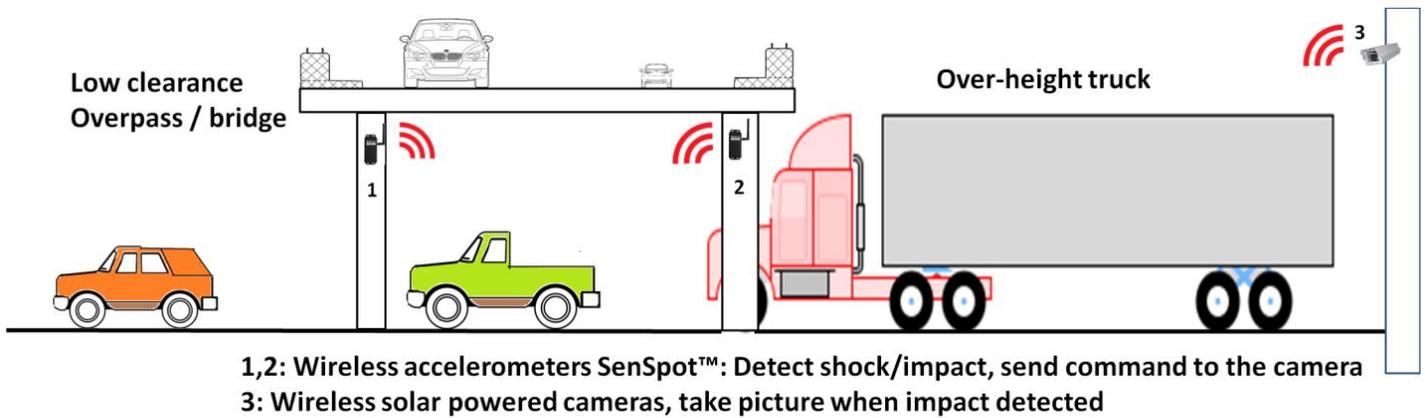


Resensys [Wireless Vibration/Acceleration SenSpot™ sensors](#) on girders of bridges for measuring acceleration and vehicular collision detection and monitoring



Installed wireless accelerometer (3D vibration) SenSpot™s at bottom flange of a girder of a bridge to detect vehicular impacts (over-height vehicles).

Approach to Impact Detection



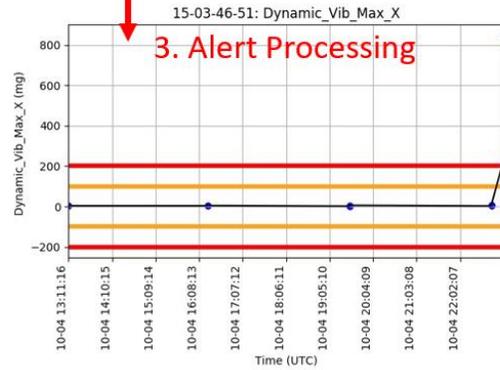
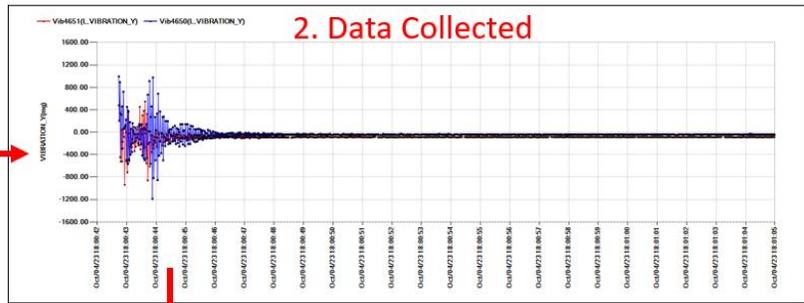
Vehicular Collision Detection approach using [Wireless Accelerometer](#) and [Wireless Solar Powered Camera](#)

- **Sensor group 1, 2:** These are wireless vibration SenSpot™ sensors (accelerometers). These devices constantly monitor acceleration on the pier, taking up to 400 samples of tri-axial acceleration per second. Vehicular collisions are reliably detected using the 3-dimensional acceleration data.
- **Device group 3, 4:** These are wireless solar powered cameras. While vehicular collision and assessment of the damage upon an impact is initially done using accelerometer, a confirming and surrounding visual assessment and identification of the responsible source can be provided using cameras.

Notification Report of Impact Detection



1. Impact Event



4. Fast Notification



Email



SMS

Sample of collision detection notification report with recorded measurement and picture at the time of the impact.



A typical timestamped picture taken by Resensys [Wireless Solar Powered Camera](#) indicating the girder of the bridge was hit by an over-height vehicle.



Capture multiple angles with Resensys [Wireless Solar Powered Camera](#) to capture more details on the severity of impact.



Resensys [Wireless Solar Powered Camera](#) can show the severity of an impact and quickly inform officials unsafe road conditions.

How Resensys System Works?



A typical vehicular/vessel Collision/Impact Monitoring and Detection system includes the following components:

- **[Wireless SenSpot™ Sensors and Devices](#)**: are attached to piers, girders, and other members of a bridge structure. The number of gauges required per structure is usually dependent upon the design, existing issues on members and possibility of vessel/vehicular collision and needs:
 - [Wireless Vibration/Acceleration SenSpot™ sensor](#)
 - [Wireless Solar Powered Camera](#)
- **[SeniMax™](#)**: is a wireless data logger gateway that is connected to the cellular, Ethernet, or satellite networks; it wirelessly collects SenSpot™ data at the site and sends it to a cloud database server (one SeniMax™ can cover as many as 100 SenSpot™ sensors and devices within its wireless communication range).
- **[SenScope™](#)**: software for data analysis and visualization, data export, automated alert management, thermal analysis, and vehicular/vessel collision detection, monitoring and corresponding data analysis. For vehicular/vessel collision, Resensys monitoring software can be set to provide alert notifications with visual feedbacks when pre-established thresholds have been exceeded to allow proactive and timely action to be taken.

Resensys Benefits

- 10+ years Battery Life
- Easy to install & self-adhesive
- Small in size & lightweight
- Usable on different kinds of materials
- For short- and long-term monitoring
- No need for calibration in the field
- Quick Testing
- Rugged, weatherproof, & corrosion resistant
- High precision
- Lightweight design
- Immediate alert services
- Infrastructure less & energy self-sufficient system