Protecting Infrastructure with 21st Century Technology
Resensys offers a cost-effective and scalable solution for real-time monitoring of structures. Some example applications are

- **Structures**: infrastructure (e.g., bridges, wind turbines) monitoring such as loading, vibration, displacement, settlement, and crack activity.

- **Aviation**: monitoring humidity, temperature, strain, vibration, displacement, deformation, acceleration for effective maintenance of aircrafts.

- **Gas/Oil industry**: monitoring pipeline deformation, corrosion, displacement vibration, tilt, inclination, temperature, humidity on pipeline as needed.

- **Green energy**: building and home energy utility such as monitoring temperature, humidity, light intensity, human presence.

### Wireless Solutions For Your SHM Needs

**RESENSYS PROVIDES A TOTAL END TO END SOLUTION**

- **SenSpot™**: attached to structure (as many as needed, average 10-50 per structure)
- **SeniMax™ (USBSink™ for Indoor)**: collects data on site of SenSpot™ and sends to remote server (1 per structure)
- **SenScope™**: software that analyzes data & generates alerts

---

**SenSpot™**

- **Ultra-low-power** (minimum of 10 years without battery replacement)
- **Power source**: replaceable (non-replaceable) lithium-ion battery
- **Wireless communication** (IEEE 802.15.4)
- **Small size and lightweight**, 1.35in × 3.0in × 0.6in and about 90 gr.
- **Easy mounting** and quick installation (self-adhesive or flange mount)
- **Working temperature**: -40 to +150°F (-40 to +65°C)
- **Long communication range**: 0.62mi (1.0Km) free space
- **Ingress Protection**: IP65

**Types of SenSpot™ Sensors**

- **Strain**, resolution: 1 µStrain
- **Vibration (Acceleration)**, resolution: 1mg, adjustable range (±2g, ±4g, ±8g)
- **Tilt and inclination**, resolution: 12.9 arc seconds (0.003 degrees)
- **Precision tilt**, resolution: 0.5 arc seconds (0.00014 degree)
- **Humidity and moisture**, resolution: 1% RH
- **Displacement**, resolution: 0.1mm
- **Peak (Max-Min) displacement detector**, resolution: 0.1mm
- **Human presence**: sensing range 6m (20ft)
- **Temperature**, resolution: 0.5 °F
- **Light intensity**
A complete Resensys SHM system

- **SenSpot sensors**: to be attached to a structure member.
- **SeniMax**: collects SenSpot data at the site and sends it to a remote server (one unit can cover as many as 100 SenSpots).
- **Repeater**: extends the range of the SenSpot sensors when needed (in massive structures).
- **SenScope**: software for data analysis and visualization.
Components of a Complete Resensys SHM System

- **SenSpot sensors**: attached to a bridge (e.g., one per bearing).
- **SeniMax**: collects SenSpot data at the site and sends it to a remote server (one unit can cover as many as 100 SenSpots).
- **Repeater**: extends the range of the SenSpot sensors.
- **SenScope**: software for data analysis and visualization.

**SenScope™**

Resensys SenScope™ is for real-time monitoring and structural diagnosis based on measurements of Resensys SenSpot™ sensors. SenScope™ is capable of reducing large volumes of data from Resensys SenSpot™ sensors into specific structural diagnostics information. The information generated by SenScope™ facilitates decision-making and accelerates the course of action for maintenance/repair. Its features include:

- Real-time communication with Resensys SenSpot™ and SeniMax™
- Real-time data visualization and management
- Real-time comparison and visualization of data of multiple sensors
- Monitoring a large number of sites
- Automated structural diagnostic and alert generation without continuous human intervention or operation.
- Alert generation with customizable alert levels
- Visualization and archiving of historical data of the structure
- Capability of adding user notes per sensor
- Capability of providing e-mail or text message alerts
Monitoring Bridge Piers with Resensys High Precision Wireless Tilt SenSpot Sensors

- Change in tilt can happen as a result of settling, deformation, or permanent change in loading.

- Resensys high precision wireless tilt sensors detect and report any unhealthy change in tilt that may affect overall safety of the structure.

- Precision tilt SenSpots are suitable for monitoring operation of bridge piers by measuring tilt of piers with arc second accuracy. Using this technology; movement, settling, deformation and over-tilting of bridge piers are detected at an early stage, before it becomes a major issue and leads to safety compromise and/or road closure.

Monitoring Displacement with Resensys Wireless Displacement SenSpot Sensors

- Steel girders of old bridges mostly suffer from fatigue cracks primarily due to non-functional bearings.

- Visual inspection is traditionally used for crack monitoring; however, this method is time and capital consuming. It also cannot be done frequently and in many cases the measurements are unreliable and inaccurate.

- Resensys displacement meters can be used to monitor the dynamics of such cracks.
Monitoring Bridge Bearings using Resensys Wireless Tilt SenSpot Sensors

- Bearings are designed to accommodate the expansion and contraction of a bridge deck and superstructure as a result of temperature change.

- Accumulated stress as a result of malfunctioning bearings can damage a structure by forming (fatigue) cracks in steel, piers, and abutments.

- Resensys sensors provide accurate information about tilt, temperature and strain on bridge bearings; the system can detect instances where the bearings are partially or completely frozen.

- As a secondary measurement, in addition to the tilt SenSpots on the bearings, strain SenSpots can be used on the bridge girders to measure any accumulated stress in proximity of the bearings that are being monitored. When bearings become completely or partially frozen, strain is expected to accumulate in girders close to malfunctioning bearings.
Resensys LLC founded in 2008 with the mission of protecting infrastructure systems against aging and structural malfunction. Resensys offers a cost-effective and scalable solution for real-time monitoring of infrastructures. The solution incorporates novel sensing, ultra energy efficient processing, and wireless communication technologies into a small, wireless, easy to attach, and adhesive-mount sensor. Several important quantities such as strain, displacement, vibration, tilt, inclination, moisture, humidity, temperature, light intensity, human presence, etc. can be measured using the Resensys technology.