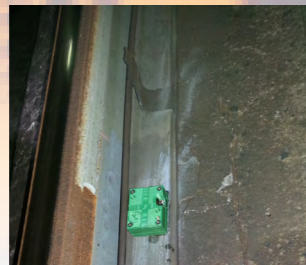


A railway technician performs structural assessment using a miniature vibration sensor (below)

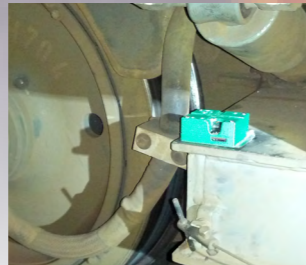
# Hong Kong's Bleeding Edge Vibration Technology

A vibration sensor that can be hidden inside any component and self adjust on the spot ...

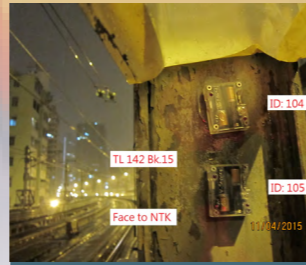
BY RSE



Train Tracks



Bogies



Overhead Lines

“V-Sensor Technology” imagine squeezing 9 sensors and amplifiers into a single palm sized device and compressing a computer into the size of a finger tip; and powering all of that on just AAA batteries ....

“We are at the foot of the robotics age” says John Leung the developer, “we leverage state-of-the-art 100 G-Force Nano-sensors (the world’s smallest) originally developed for airbag systems on Formula 1 cars, now is used for monitoring vibration in the railway industry”.

Being highly compacted, the V-Sensor consists of :-

- **9 sensors in 1 device** providing ultimate integration with high speed ARM CPU & fast SDIO microSD card

- **Performs 6-axis** simultaneous data logging (traditional sensors are 1-axis)
- **Very precise**, it uses a crystal timer, sensors are calibrated against gravity & its software is audited using safety critical tools such as PolySpace
- **High range** up to 100 G-Forces
- **Sensitive** to measure even the slightest touch of footsteps

The applications of the sensor stretches throughout the railway industry; actively engaged in

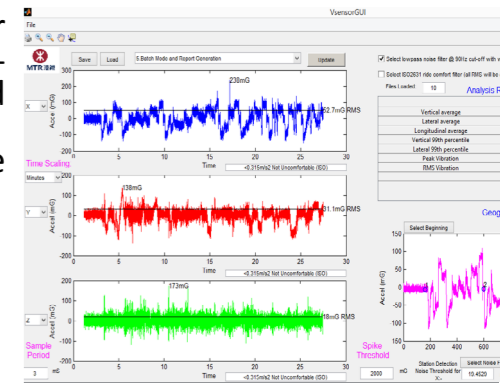
- High voltage overhead line equipment,
- Train tracks,
- Ride comfort measurement (ISO2631),
- Structural assessment, and
- Axle-boxes.

It conserves energy using “micro-sleep”; which enables the battery to last for 27 hours on standard AAA batteries.

Rigorously, it can withstand high temperatures at the hot axle box and can take enormous vibration on train tracks thanks to the hard polycarbonate casing and light weight rigid design.

Plug and go - it is easy to install via epoxy or by using a combination of suitable tape and strap ties as redundant security.

Finally, as we all know re-calibrating sensors every year can turn out to be thousands of dollars of “burden”. In contrast, V-Sensor can be recalibrated on the spot using artificially intelligent software and its rapid sampling of gravity to obtain calibration parameters automatically.



**Easy to use software guides you through the analysis process and generates reports automatically (Above)**

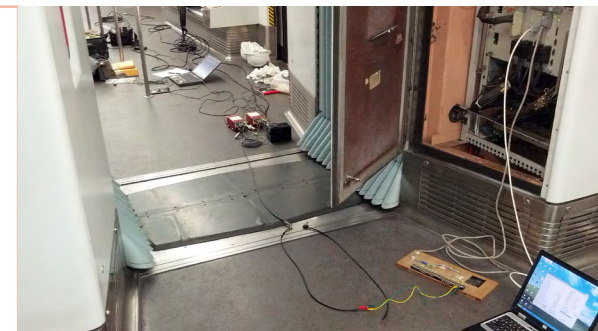
**The V-SENSOR Device (Below)**



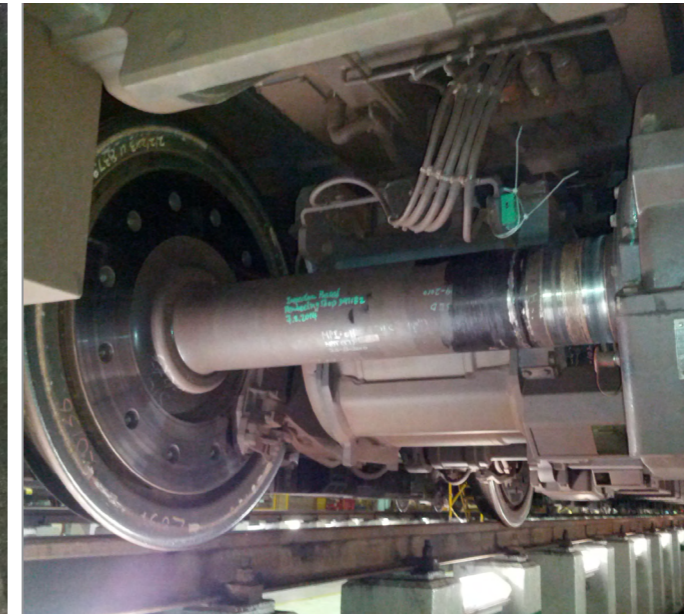
## Why Vibration Monitoring is So Tough?

In the past, train vibration measurement requires 4 engineers locked up inside the train for 5 hours:  
 Book an entire train empty during busy hours  
 1 hour for installing analog sensors  
 5 hours for testing  
 1 hour for data analysis  
 2 hours report writing

In contrast, V-Sensor requires no train booking as the miniture sensor can be hidden under a seat. Analysis is automated and within seconds a 3D graph and technical report is generated.



# Myriad of Applications from high impact to tiny vibrations (right)



(Above) 1000m long track installed with a green and white V-Sensor monitors the most roughest of vibrations when metallic wheels roll everyday

Furthermore, V-Sensor comes with software that guides you through the entire analysis process step by step, with fast import of data (2 gigabytes in a minute), fully automatic report generation and powerful 3D graphics engine; it can do:-

- o 3D plots
- o Frequency spectrum analysis
- o Average vibration calculation (root mean squared)
- o Peak or shock detection
- o ISO2631 ride comfort analysis
- o Comparison with international standard limits
- o Train station to station detection

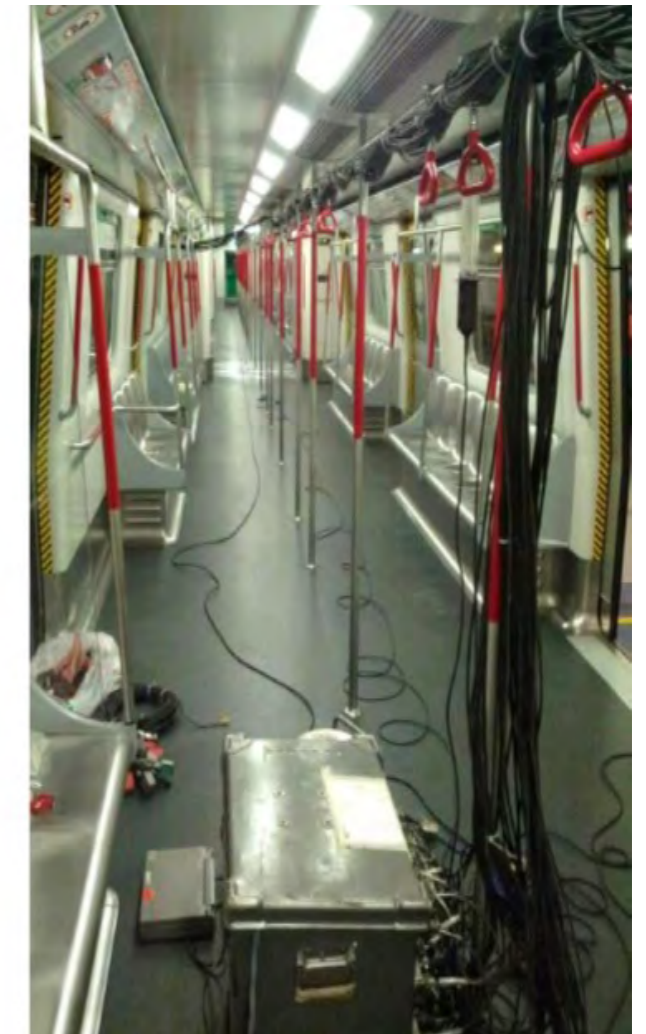


### Hard Polycarbonate

Molded with stone hard fire proof polycarbonate is the secret to V-Sensor's ability to withstand high temperatures and high G Forces

### Unique Characteristics

- No wires required for multiple sensors! Can synchronize with other sensors without the need to connect them together no matter how far apart.
- Suitable for structural analysis 1kHz or higher sampling rate
- Easy report generator Generates 4 different reports based on the selected application
- Inertial sensing for railway applications Automatically detects train stations just from the acceleration data.
- Guaranteed availability and longevity All electronic components have 10 year "availability" certification. The manufacturing uses in-house NC coding, precision fixtures, and quality control procedures. The just-in-time manufacturing concept is employed in the supply chain.



"Wired installation is a thing of the past"