

# 基於智能無線傳感器網絡的 實用建築物健康監測系統

## A Practical Wireless Structural Health Monitoring System using Intelligent Sensor Network

### 建築物及橋樑結構健康監測

A structural health monitoring system to provide healthy conditions of a structure in real-time

香港老舊樓宇、大跨度橋樑和摩天大廈眾多，監測這些建築物的結構情況對公眾安全至關重要。我們研發了一個基於智能無線傳感器網絡的建築物健康監測系統，能夠滿足公眾對各類建築物結構安全監測的需求。本系統採用無線喚醒和振動喚醒結合的技術，大幅降低能耗，並採用分布式的方式有效實現結構健康監測算法。本系統曾應用於中國中央電視臺新大樓和廣州鶴洞橋，均取得了良好的效果。



理大李兆基樓實驗  
Deployment in PolyU's Lee Shau Kee Building



北京中央電視臺大樓實驗  
Deployment in the CCTV Building

In Hong Kong, the conditions of a large number of old tenement buildings, long bridges and skyscrapers are critical for public safety. We have designed a practical structural health monitoring system using intelligent sensor networks. The system utilizes radio-triggered and vibration-triggered wakeup units to wake up the node from the sleep mode when necessary, and adopts 'wireless synchronization, on-board storage' to obtain highly synchronized sensing data. In addition, many existing centralized and computationally intensive structural health monitoring algorithms have been tailored and embedded in the system. Our system has been deployed on many real infrastructures such as the CCTV tower in Beijing and Hedong Bridge in Guangzhou.

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### 特色與優點

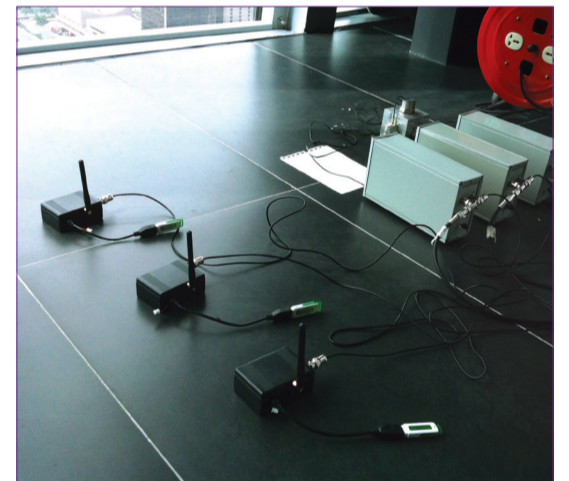
- 運用先進無線傳感器網絡技術，提供一個有效的建築物健康監測系統，以符合各類土木工程項目的實際要求。
- 成本低及易於部署
- 關鍵時刻自動喚醒以收集資料
- 無線同步採樣及本地節點存儲
- 簡單易用的介面

### 應用

- 老舊建築物的狀態監測和即時匯報
- 各種橋樑結構健康的監測
- 建築物的實時資料獲取

### 獎項

2013香港資訊及通訊科技獎 (Hong Kong ICT Awards 2013) 特別貢獻獎 (Special Mention Award) 以及優異獎 (Certificate of Merit)



現場布置  
Experiment setup

### Special Features and Advantages

- Can meet the practical requirements of civil engineering and promises as a practical WSN-based structural health monitoring system
- Low cost, ease of deployment
- Automatic wakeup when critical event occurs
- Wireless synchronization, on-board storage
- User-friendliness

### Applications

- Monitoring old buildings and report the condition when danger occurs
- Monitoring high-buildings and large-span bridges
- Short-term data collection

### Award

Hong Kong ICT Awards 2013 Special Mention Award and the Certificate of Merit

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