



# **SNS COLLEGE OF TECHNOLOGY**

**Coimbatore-35**  
**An Autonomous Institution**



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade(Cycle III)  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## **DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

### **SMART IOT APPLICATIONS**

III YEAR/ V SEMESTER

1

### **UNIT 1 -BASIC APPLICATIONS**

### **TOPIC-3 STRUCTURAL HEALTH, NOISE URBAN MAPS**



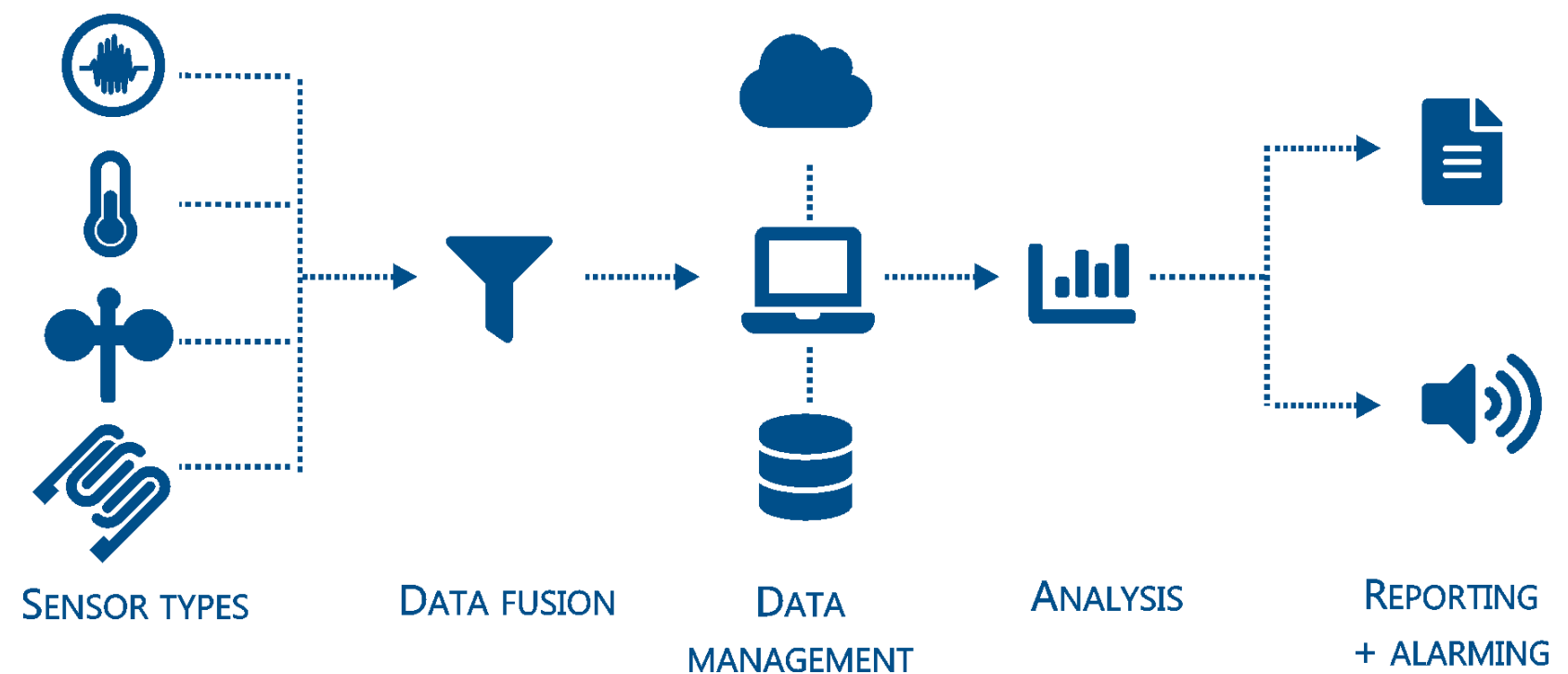
# STRUCTURAL HEALTH MONITORING (SHM)



## □ Definition:

Structural health monitoring (SHM) is a process that involves using sensors, data acquisition systems, and analysis tools to monitor the performance and condition of structures over time.

### Monitoring Process Flow



Reference: [https://www.vallen.de/wp-content/uploads/2019/06/Process\\_Flow\\_6.png](https://www.vallen.de/wp-content/uploads/2019/06/Process_Flow_6.png)

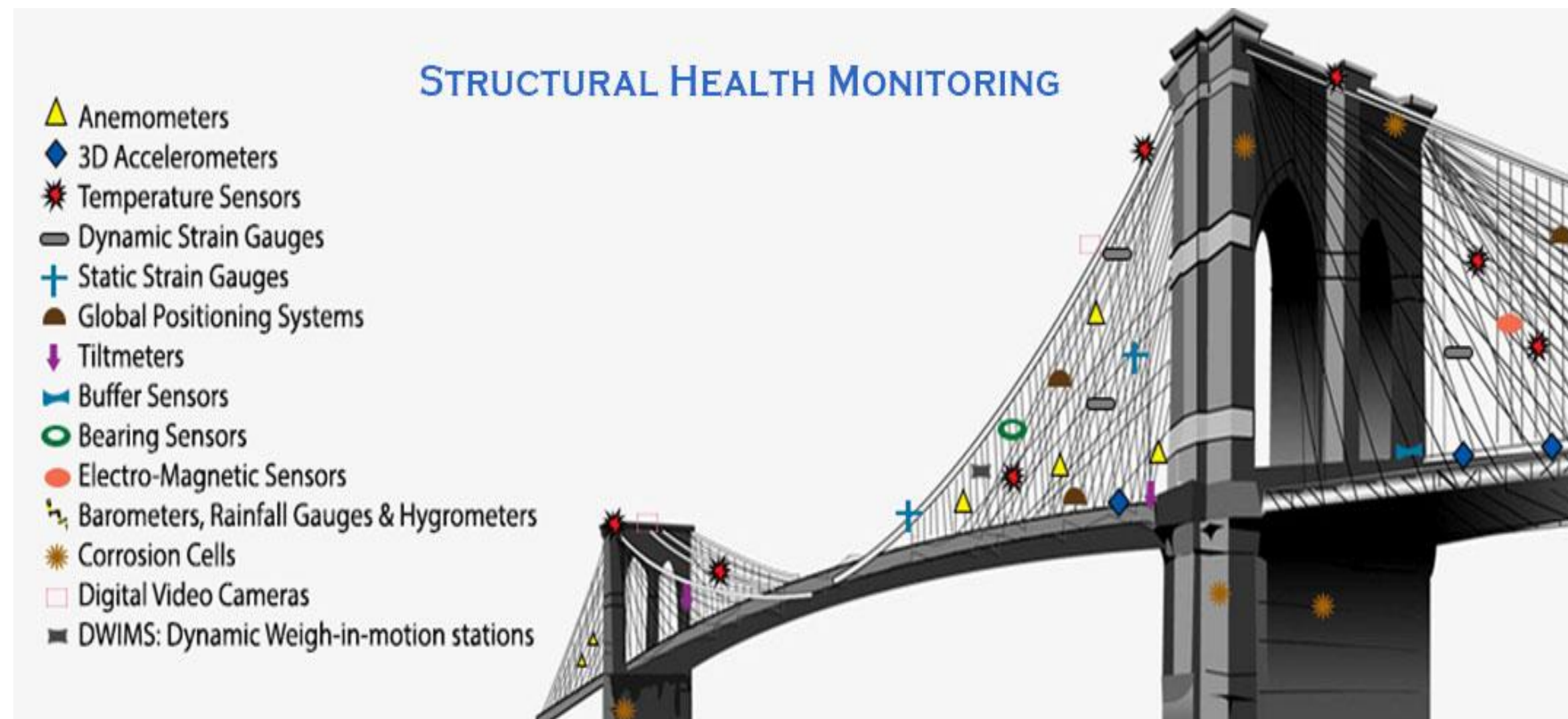


# STRUCTURAL HEALTH MONITORING (SHM)



## □ Objective:

To ensure the safety and integrity of structures through real-time monitoring.



Reference: [https://top-tech.sa/wp-content/uploads/2022/09/healthmonitoring\\_pic.jpg](https://top-tech.sa/wp-content/uploads/2022/09/healthmonitoring_pic.jpg)



## IMPORTANCE OF SHM



- Ensuring safety and reliability of structures
- Extending the lifespan of infrastructure
- Reducing maintenance costs
- Preventing catastrophic failures



## COMPONENTS OF SHM



- Sensors (e.g., strain gauges, accelerometers, temperature sensors)
- Data Acquisition Systems
- Data Transmission Methods (wired and wireless)
- Data Processing and Analysis Tools



## ROLE OF IOT IN SHM



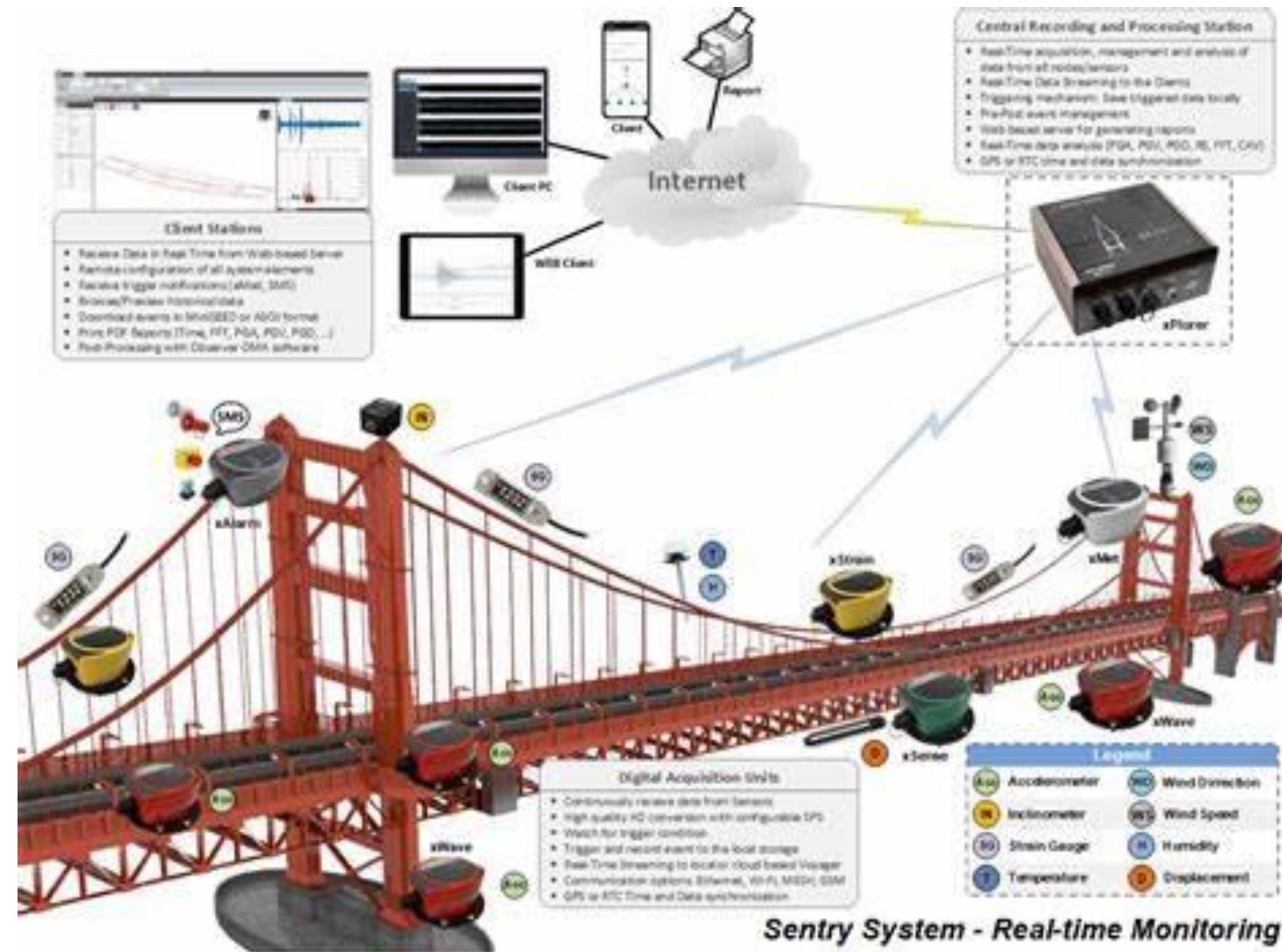
- Wireless Sensor Networks (WSNs)
- Cloud Computing
- Edge Computing
- Artificial Intelligence and Machine Learning



# ACTIVITY



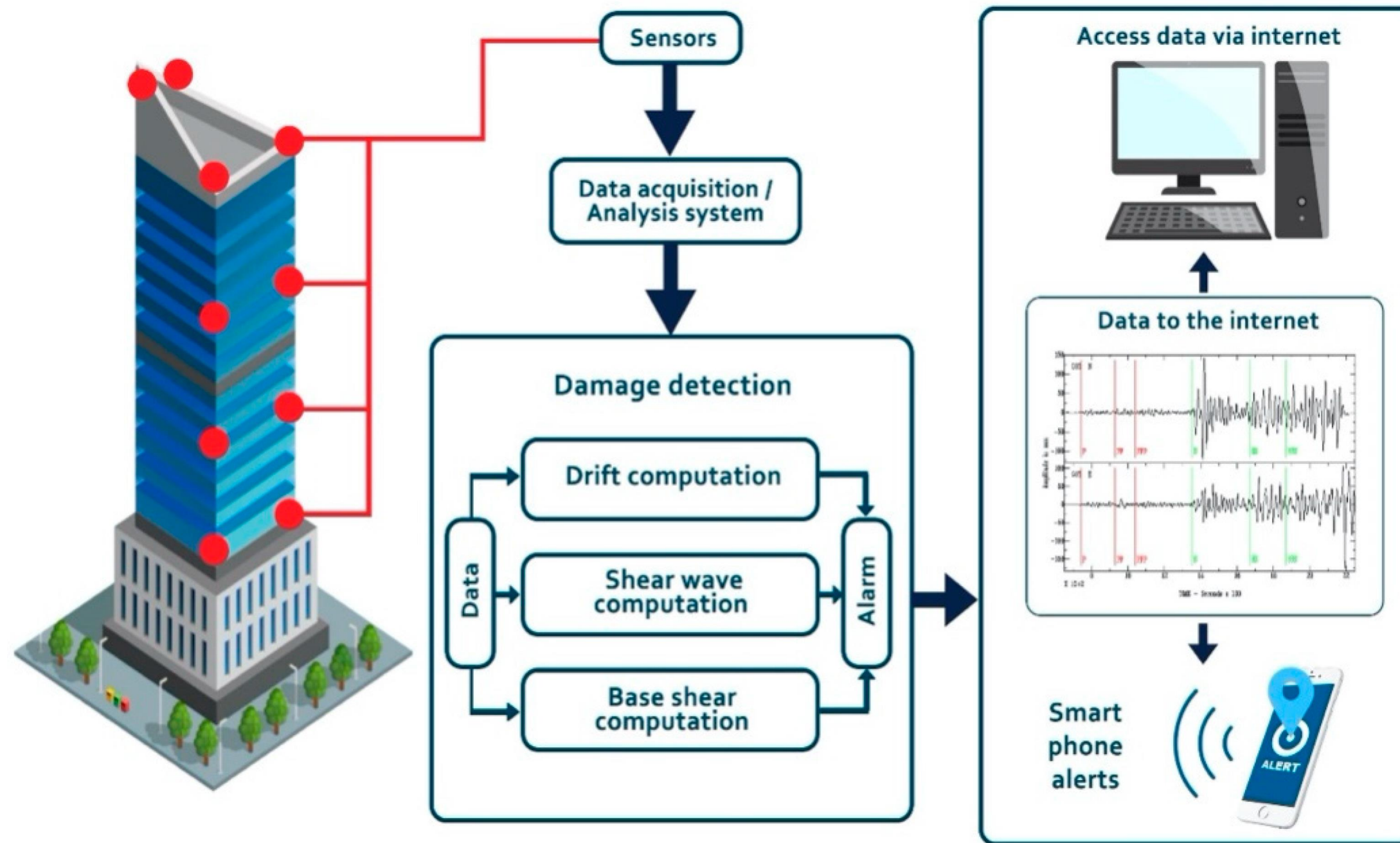
- Case Studies





# ACTIVITY

- Case Studies







## KEY TECHNOLOGIES IN IOT-ENABLED SHM



- Real-time monitoring and early detection of issues
- Improved decision-making based on data analytics
- Reduced manual inspections and maintenance costs
- Increased lifespan of structures



## CHALLENGES AND SOLUTIONS



- Data security and privacy concerns
  - **Solutions:** Encryption, secure communication protocols
- Data management and storage
  - **Solutions:** Cloud storage, data compression techniques
- Sensor reliability and maintenance
  - **Solutions:** Redundant sensor networks, regular calibration



## FUTURE TRENDS IN IOT-ENABLED SHM



- Advances in sensor technology
- Increased use of AI and machine learning for predictive maintenance
- Integration with smart city infrastructure
- Development of more robust and reliable wireless communication systems



Reference: <https://th.bing.com/th/id/OIP.CtDNuI-xLjU8vsOksADcwgAAAA?rs=1&pid=ImgDetMain>



# Assessment



**1. Define SHM**

**2. Benefits of SHM**

**3. Future Trends in SHM**



# REFERENCES



1. **Farrar C, Worden K (2012) Structural health monitoring: a machine learning perspective. Wiley, Hoboken**
2. **[https://toptech.sa/wpcontent/uploads/2022/09/healthmonitoring\\_pic.jpg](https://toptech.sa/wpcontent/uploads/2022/09/healthmonitoring_pic.jpg)**
3. **[https://www.vallen.de/wpcontent/uploads/2019/06/Process\\_Flow\\_6.png](https://www.vallen.de/wpcontent/uploads/2019/06/Process_Flow_6.png)**
4. **<https://th.bing.com/th/id/OIP.CtDNuIxljU8vs0ksADcwgAAAA?rs=1&pid=ImgDetMain>**



# THANK YOU