

Module 4

Lecture 10:

Future Scope of Structural Health Monitoring

STM is growing field

- Civil Engg
- Civil Engg
- Mechanical
- Mech Eng sys

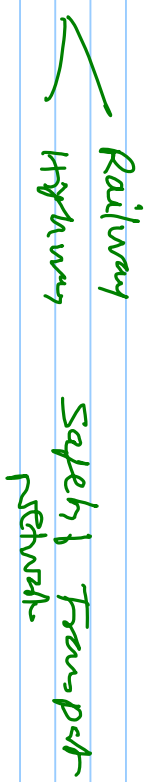
* offshore & petroleum Engg

- STM - offshore platforms
✓ large scale

- detecting any local damage in the structure

- It becomes very important in cost & aging infrastructure

- Safety || STM - reliability

- long-term monitoring
 - bridges 
 - Railway
 - Highways
 - Safety Transport network
 - pipe lines - detect - gas leaks - & is pressure
 - climatic changes - ^{with} wave direction
 - wind speed
- Structural control - on integral part of infrastructure E.g.,
 - maintain, areas & acknowledge the control
 - CSM - smart structures

Alert Monitoring System

- Disaster Management
- Damage Prediction

~~Alert Monitoring~~ - Advanced - & ultra modern

- Very modern & advanced

- use of novel type of sensors
- adv in communication, prediction
- adv in precision/detection work with specialized tools

~~Alert Monitoring~~ - necessity & major infrastructure

focus 1 the

— development smart structures

drawbacks

visual inspections

- inspection methods are becoming increasingly challenging
- time - consuming
- expensive
- more complex
- under water structures, inaccessibility

Advantages (from SHM)

Preventive maintenance

- scheduled for repair
- reduce the damage for repair
- avoid any major repair

✓ SHM is mandatory

if one needs a standard and a structure

- Rebuilds / repositions the existing structure,
-

Sensor technologies (STM)

- drugs are well advanced
- well-integrated with ~~processors~~ processors.
- well-integrated with real-time control mechanisms.
- overall safety & serviceability standards are enhanced

Advanced technologies.

- wireless sensor network (WSN)
- needs STM max compact, advanced

Environmentally friendly

STM algorithms

- are adaptable to the improved computing environment, smart sensor technology

→ Damage local insurance criterion (DLAC) method.

- decentralized approach for WSN

fundamental block of wireless s/w is a low-cost sens'n unit.

wireless element, (wireless radio) and mobile computer (embedded

micro controller) communication/processor - very cost effective.

- senses of modern type

- ~~self~~ responsibility of their own measured data

- blame game

packet loss
many data
many is a packet

X stopped

senses for multifunctional materials

- piezoresistivity in single walled carbon nanotube (SWCNT)

- new dimensions for strain sensing.

Carbon Nanotubes - alternative / attack, sub & embedded sensors in composites.

- i) they have added resistivity
- ii) \uparrow strain capability

- Signal processing & Adaptive System, Identification Techniq.
used in modern system -
great advantage.

- Data compression techniques, makes the data compact, fast,
password protected & also reliable.

Senses

- measure damage, even @ very low scale
- long-term decisions

Fault detection & Control

often the ability to control system

- designed with an integrity hardware & sensors with
- ↑ reliability

Post-processing of the measured data)
Finite Element Model updates.

- necessary to choose a proper ~~ten~~ model to simulate the damage (predicted failure) &
from a bench mark value for the Control
Shocks

- Advanced.

sensor posn. technology

uniform distribution
(uniform distribution means)
low cost compatibility

Recall adware -

- a combination of Natural Exfiltration Technique (NEXT) with Eigen System Realization Algorithm (ESRA) to carry out damage detect under adversarial groups

Common problem

effect of environmental conditions on test performance

Principal Component Analysis (PCA)

- much - variance explained method that can reduce the effect of environmental factors on test performance
- humidity
- temperature, etc

large size the information

* distributed health monitoring system

- excessive strain

- delayed & at

- load distributed (temp variation)

on the structure (long-term loads)

Summary

- Keynes spread is (4) molecules
 - Basis of SHy
 - tensor techy
 - methods: measurements
 - low scale applicati
 - real time moving the SHy
 - Edgeat SHy list
 - Plant Mark's — digital parents

- Various : tens specified
 - layout style
 - tens digits
 - wired / wireless
- Advantages given - valid data with wired tens