Structural Health Monitoring (SHM)
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Lecture – 53
Acquisition system and Networking for SHM – Part 1

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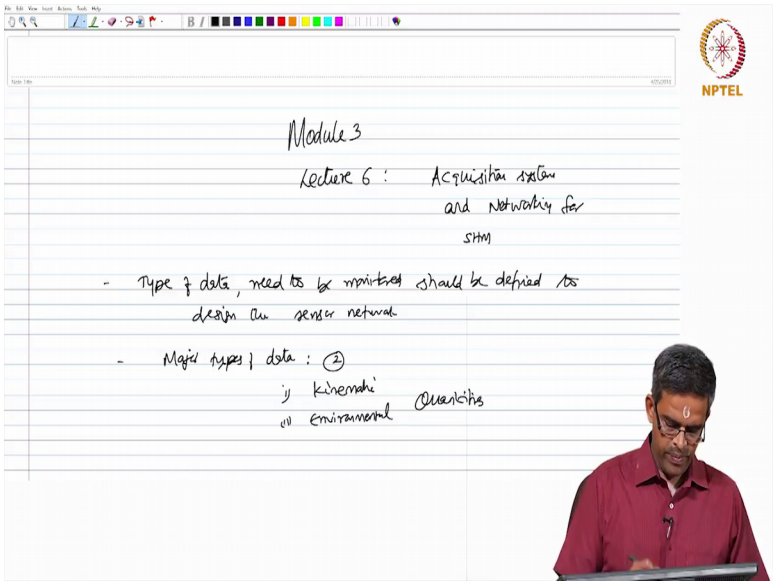

Friends, welcome to the next lecture on module 3 which is lecture 6: we will talk about Acquisition System and Networking for SHM.

In the last lecture we said that the type of data, need to be monitored should be defined to design the sensor network. Now, there are two types of data which are major which are acquired are of two: one is kinematic and two is environmental quantities, ok.

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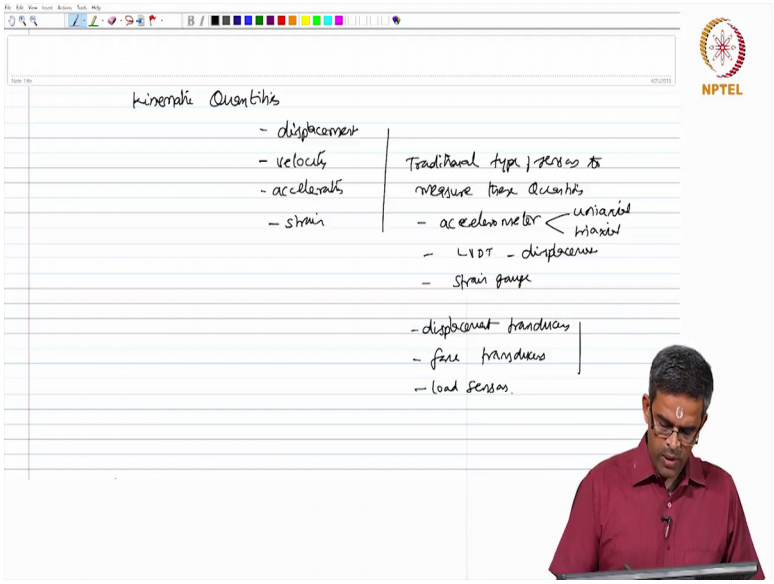

Kinematic quantities into displacement velocity acceleration strain measurements etcetera. So, one can use traditional type of sensors to measure these quantities. For example, one can use accelerometer, both uniaxial triaxial, one can use LVDT- linear variable differential transformer to measure the displacements, one can use strain gauges to measure the strain etcetera, ok. One can use displacement transducers, force transducers to measure dynamic responses. One can also use load sensors to measure the variation in the loads.

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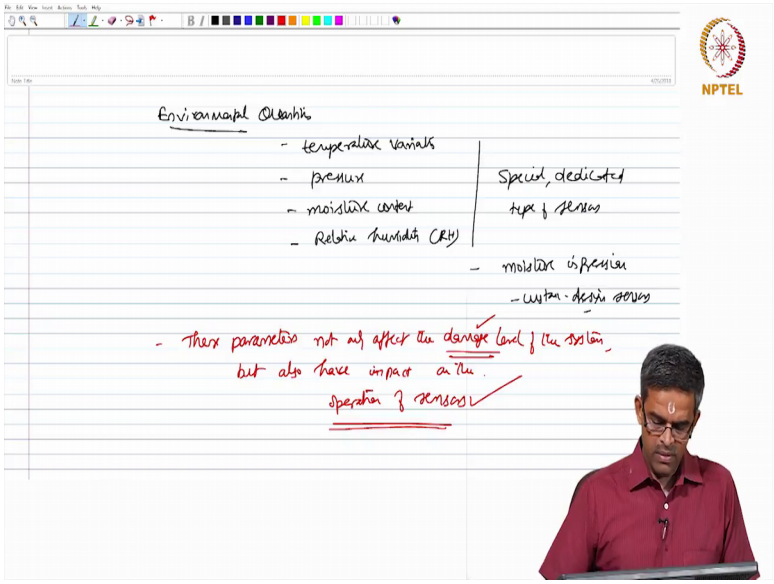

However, to measure environmental quantities like temperature variation, pressure, moisture content, relative humidity etcetera you need special dedicated kind of sensors

In the last lectures we said how the moisture ingression can be captured using custom design sensors. So, there are special types of sensors, which are used to measure environmental quantities. But a very important statement, these parameters not only affect the damage level of the system but we will also have impact on the operation of the sensors that is a more important thing; forget about the structural part they will have damaged influence on the structure that is fine, but they can also impact the functionality of the sensor itself. So, you have to be very careful in selecting the sensor type.

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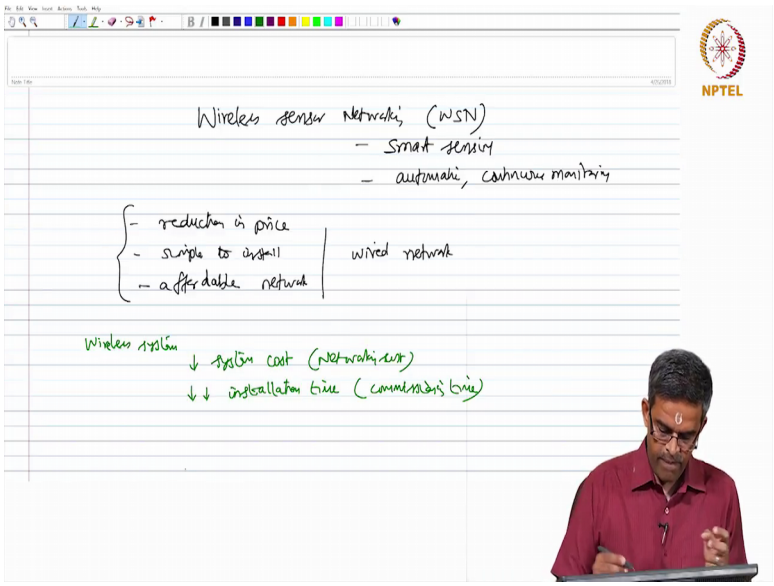

Now, we already said that wireless sensor networking is one of the advanced option in terms of smart sensing, it is very useful for automatic and continuous monitoring which may be a requirement in most of these strategic structures. There are many advantages we saw them reduction in price, simple to install, and affordable network.

In view of wired network in comparison to wired network wireless sensor networking is far superior. Further, wireless systems has low system cost that is very important the networking cost I mean to say the networking cost and they have very very low installation time that is very very important for us that is commissioning time is very short a very compact. It is an advantage for us.

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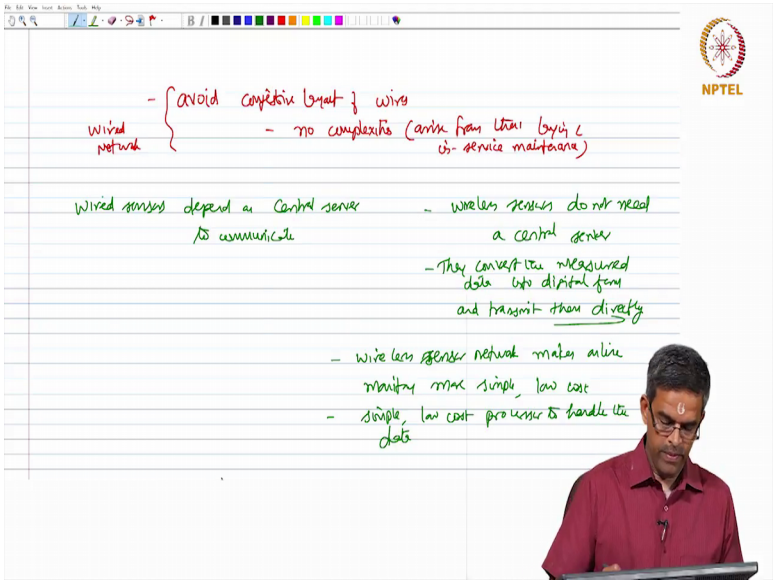

In addition, one can avoid congestive layout of wires. So, there are no complexities that may arise from their laying and in service maintenance, which are common problems with wired sensors. Further, wired sensors depend on a central server to communicate. Whereas, wireless sensors do not need a central server then what do they do.

They convert the data; they convert the measured data into digital form and transmit them directly. Therefore, wireless sensor networking makes online monitoring more simple, low cost and you can have a simple low cost processor to handle the data.

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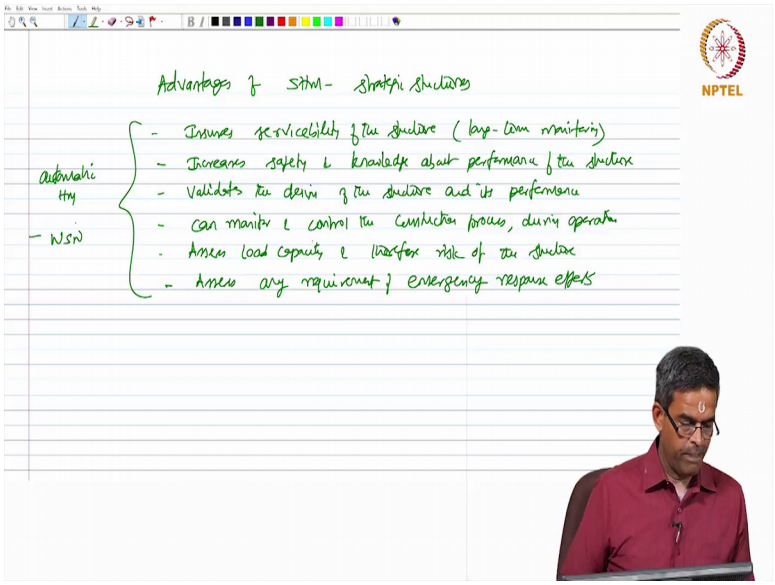

We also said there are many advantages of structural health monitoring applied to strategic structures. It ensures serviceability of the structure through long term monitoring. It increases safety and knowledge about performance of the structure. It validates the design of the structure and its performance. It can monitor and control the construction process during operation as well. It can assess the load capacity and therefore the risk of the structure. It can assess any requirement of emergency response efforts.

All these are to be possible once you do an automatic health monitoring which is generally done using wireless sensor networking now.