SNS COLLEGE OF TECHNOLOGY

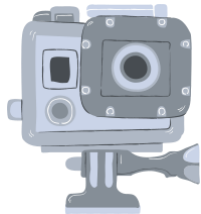**(An Autonomous Institution)**

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DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

UNIT 4

SMART GRID TECHNOLOGIES –
Web based Power Quality Monitoring

19EEE308 – SMART GRIDS
III year / VI Semester

01/08

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- REAL TIME POWER QUALITY MONITORING SYSTEM
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POWER QUALITY MONITORING

- It is a multi-pronged approach to identifying, analyzing and correcting power quality problems.

- Helps to identify the cause of power system disturbances.

- Helps to identify problem conditions before they cause interruptions or disturbances, in some cases.

- Objectives for power quality monitoring are generally classified into:

  - Proactive approach

    - Intended to characterise the system performance.

    - Helps to understand and thus match the system performance with customer neeeds.

  - Reactive approach

    - Intended to characterise a specific problem.

PORTABLE MONITOR

PERMANENTLY INSTALLED FULL SYSTEM MONITOR

REAL TIME (POWER QUALITY) MONITORING SYSTEM

This permanent monitoring system has the following components :

1) Measurement instruments

- Involves both the voltage recorder and disturbance analyser.

- Has a trigger circuit to detect events.

- Includes a data acquisition board to acquire all the triggered and sampled data.

2) Monitoring workstation

- Used to gather all information from the measuring instruments.

- Periodically send information to a control workstation

3) Control workstation

- This station configures the parameters of measuring instruments.

- Gathers and stores the data coming from the remote monitoring workstations.

- Does the data analysis and export.

4) Control software

- This software drives the control workstation.

- Does the analysis and processing of data.

- Algorithms used for processing varies according to the system used.

- Algorithms used may be based on wavelet transforms or

5) Database server

- Database management system should provide fast and concurrent access to many users without critical performance degradation.

- Also, it should avoid any form of unauthorized access.

6) Communication channels

- Selection of communication channel strongly depends on monitoring instruments, connectivity functions and on their physical locations.

- Some of the possible channels are fixed telephone channels by using a modem and mobile communication system by using a GSM modem.

# CONFIGURATION OF REAL TIME POWER QUALITY MONITORING SYSTEM
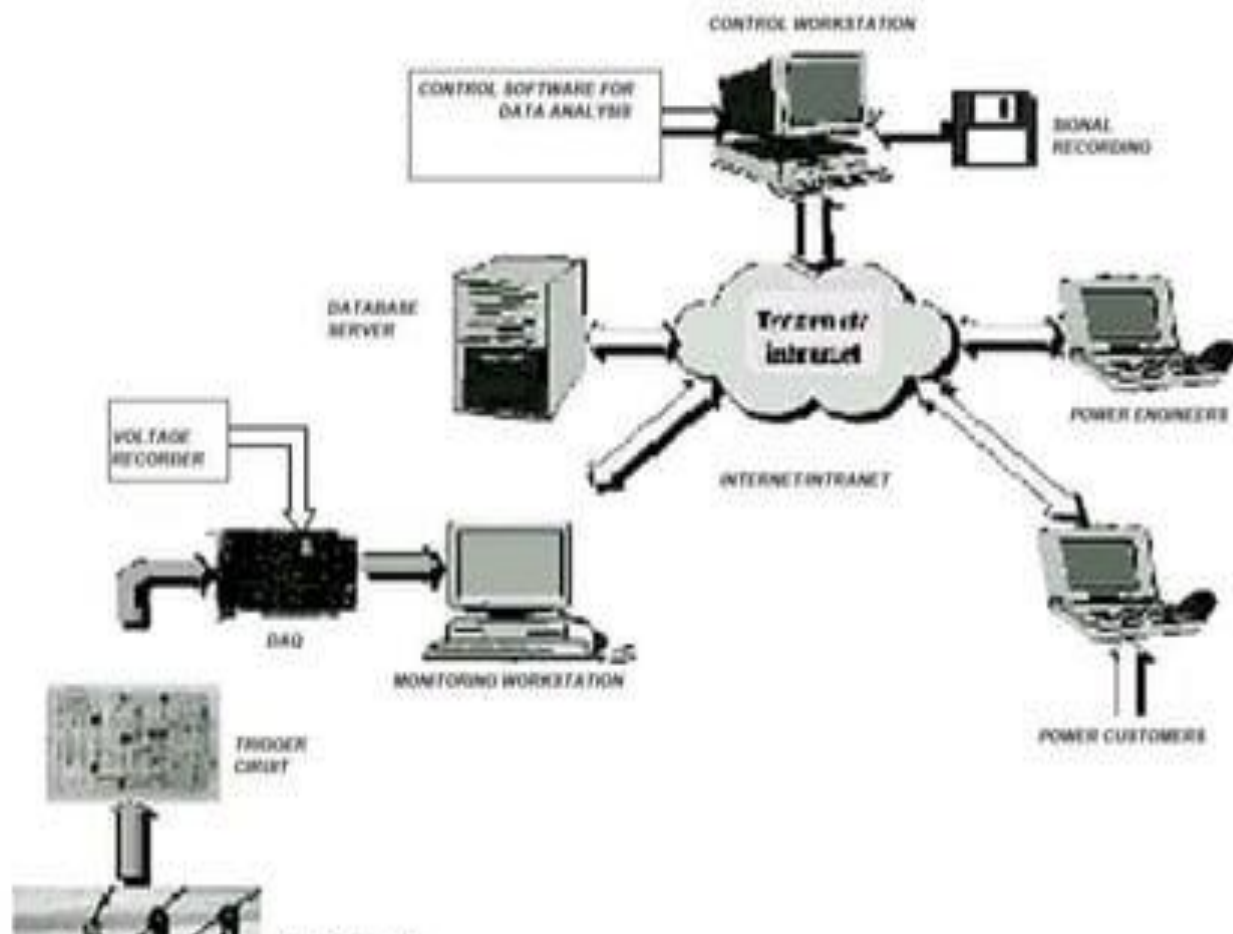
DATA ANALYSIS OF POWER QUALITY MEASUREMENTS

▶ Analysis is done by the control software and the method of analysis depends on the type of disturbance.

▶ Main objective of an analyser is to identify the type of event.

▶ Analyser looks for parameters in the measured data to characterise the waveform.

▶ Since individual inspection of all wave shapes is not easy due to the large size of database, a few characteristics are extracted from the measured data, mainly magnitude and duration.

▶ Since database has a lot of information and recorded data, analyser extracts only the relevant disturbances.

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▶ Analyser groups the captured events in a number of classes.

▶ These classes are made by comparing the captured waveforms with the ideal waveforms.

▶ This classification is called disturbance classification.

▶ By comparing the captured events with libraries of power quality variation characteristics and correlating with system events, causes of variations can be determined.

▶ Every electrical disturbance has an associated waveform which describes its characteristics, which provides important clues to locate the source of electrical problem.

METHODOLOGY OF DATA ANALYSIS
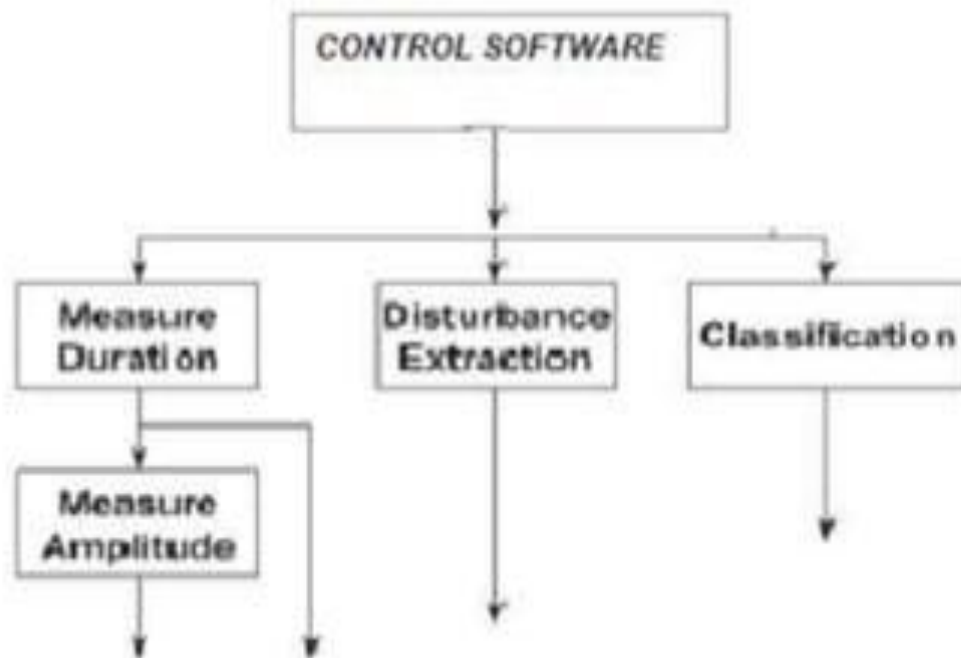
BENEFITS OF POWER QUALITY MONITORING

▶ Ensures power system reliability.

▶ Identify the source and frequency of events.

▶ Helps in the preventive and predictive maintenance.

▶ Evaluation of incoming electrical supply and distribution to determine if power quality disturbances are impacting.

▶ Determine the need for mitigation equipments.

▶ Reduction of energy expenses and risk avoidances.

▶ Process improvements-monitoring systems allows to identify the most sensitive equipments and install power conditioning systems wherever necessary.

CONCLUSION

Electric power quality,which is a current interest to several power utilities all over the world,is often severely affected by various power quality disturbances like harmonics and transient disturbances.Deterioration of power quality has always been a leading cause of economic losses and damage of sensitive equipments.

Various types of power quality disturbances are analysed.Automatic Power Quality Disturbance Classifiers are discussed in detail,along with different classification approaches,with a case study. Power Quality Monitoring systems and techniques are presented,emphasizing the 'real time monitoring systems'.Data analysis and benefits of

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