EIPC
NEE-403
Unit-3

DATA ACQUISITION SYSTEM

INTRODUCTION

- DATA ACQUISITION is the process of sampling signals that measure real world physical conditions and converting the resulting samples into digital numeric values that can be manipulated by a computer.

- Data acquisition systems (abbreviated with the acronym DAS or DAQ) typically convert analog waveforms into digital values for easy processing.

INTRODUCTION

The components of data acquisition systems include:

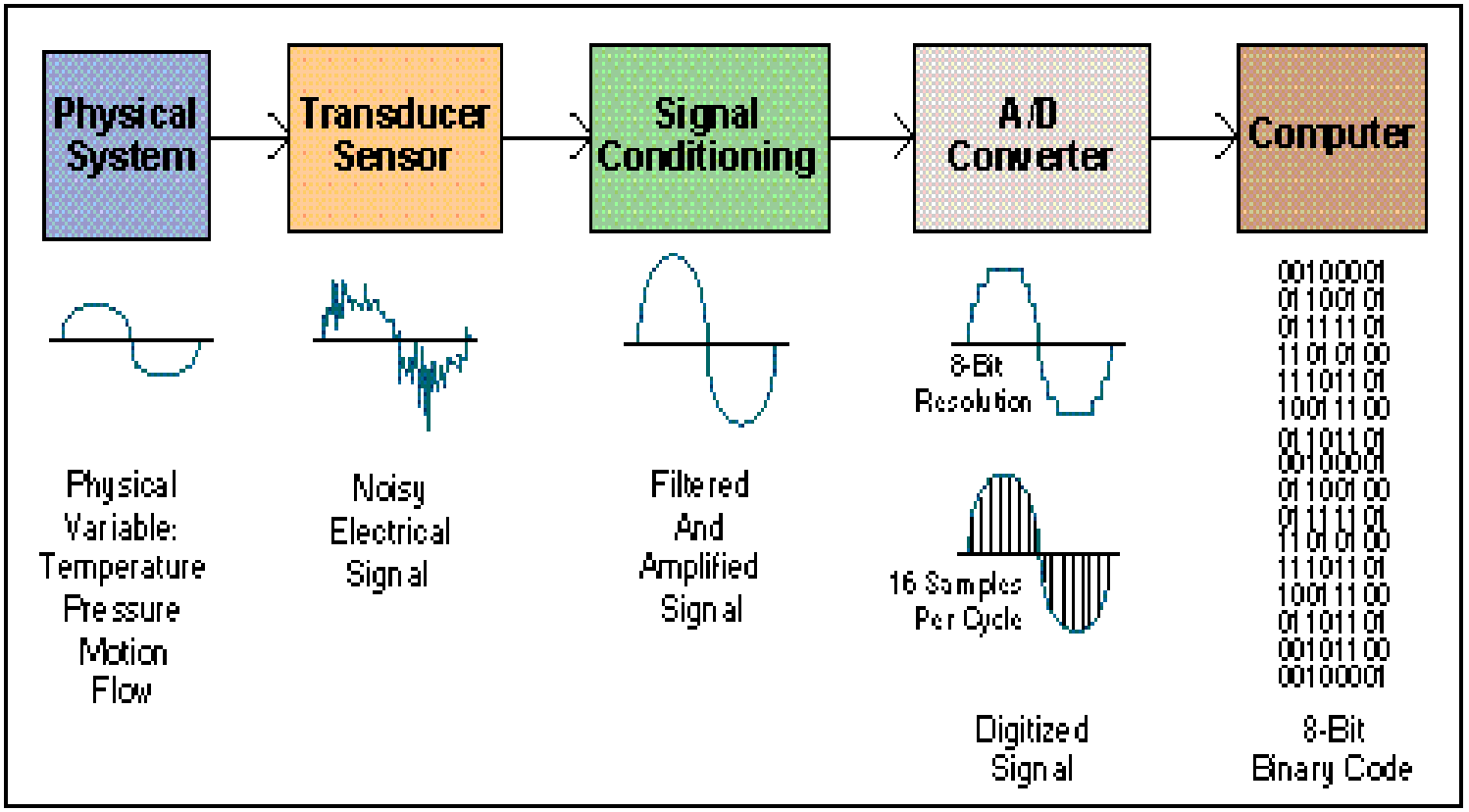
- Sensors that convert physical parameters to electrical signals.
- Signal conditioning circuitry to convert sensor signals into a form that can be converted to digital values.
- Analog-to-digital converters, which convert conditioned sensor signals to digital values.

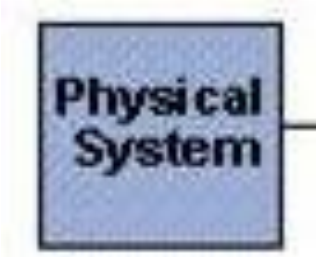
OBJECTIVE

- DAS must acquire the necessary data, at correct speed and at correct time.
- It must monitor the complete plant operation to maintain on line and safe operations.
- It must be able to collect, summarise and store data for diagnosis of operation and record purpose.
- It must be flexible and capable of being expanded for future requirements.
- It must be able to compute unit performance indices using on-line, real time data.
- It must be reliable, easy to operate and must be user friendly.

BLOCK DIAGRAM

Digital DAS
BLOCK DIAGRAM

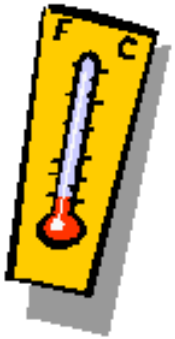




PHYSICAL SYSTEM/CONDITIONS

Physical condition that can be used as input of DAS or which can be represented in Digital form are as under…

- Temperature
- Pressure
- Light
- Force



- Displacement
- Level
- Electric signals
- ON/OFF switch

TRANSDUCERS

- A transducer converts temperature, pressure, level, length, position, etc. into voltage, current, frequency, pulses or other signals.

- A transducer thus converts the physical conditions in electrical waveform for easy signal processing

Actuators

- An actuator is a device that activates process control equipment by using pneumatic, hydraulic or electrical power. For example, a valve actuator opens and closes a valve to control fluid rate.

SIGNAL CONDITIONING

- Signal conditioning circuits improve the quality of signals generated by transducers before they are converted into digital signals by the PC's data-acquisition hardware.

- Most common signal conditioning functions are amplification, linearization, cold-junction compensation, filtering, attenuation, excitation, common-mode rejection, and so on.

Signal Conditioning

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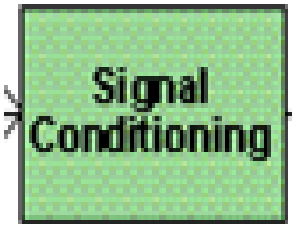
- Examples of signal conditioning are signal scaling, amplification, linearization, cold-junction compensation, filtering, attenuation, excitation, common-mode rejection, and so on.

Signal Conditioning

- One of the most common signal conditioning functions is amplification.
- For maximum resolution, the voltage range of the input signals should be approximately equal to the maximum input range of the A/D converter. Amplification expands the range of the transducer signals so that they match the input range of the A/D converter. For example, a x10 amplifier maps transducer signals which range from 0 to 1 V into the range 0 to 10 V before they go into the A/D converter.



Signal Conditioning

Electrical signals are conditioned so they can be used by an analog input board. The following features may be available:

- Amplification
- Isolation
- Filtering
- Linearization

Thank You