



SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF MECHANICAL ENGINEERING



SENSORS AND INSTRUMENTATION



Guess Today's Topic????





TRANSDUCER



- A transducer is an electronic device that converts energy from one form to another. The process of converting energy from one form to another is known as transduction.





TRANSDUCER





TRANSDUCER



Why do we need a transducer?

To determine the exact magnitude of physical forces such as temperature and pressure is difficult. But, if these physical forces are converted into an electrical signal, then their values can be easily determined using a meter. The primary function of transducers is to convert a physical force into an electrical signal so that it can be easily handled and transmitted for measurement.





TRANSDUCER



Advantages of converting a physical quantity into an electrical signal

Here, we have listed the various advantages of converting a physical quantity into an electrical signal:

- Electrical signals are easily transmitted and processed for measurement.
- Electrical signals process less friction error.
- Small power is needed to control the electrical systems.
- Amplification and attenuation of electrical signals are easy.
- The measuring instrument used for measuring the electrical signal is very compact and accurate.





TRANSDUCER



Parts of Transducer

A transducer consists of the following two important parts:

- Sensing element
- Transduction element

Transducers have other vital parts such as signal processing equipment, amplifiers and power supplies.





TRANSDUCER



Sensing Element

It is the part of a transducer that responds to the physical sensation. The response of the sensing element depends on the physical phenomenon.

Transduction Element

The transduction element of the transducer converts the output of the sensing element into an electrical signal. The transduction element is also called the secondary transducer.





TRANSDUCER



Types of Transducers

There are two types of transducers, as follows:

- Input Transducer
- Output Transducer

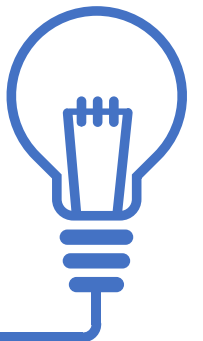
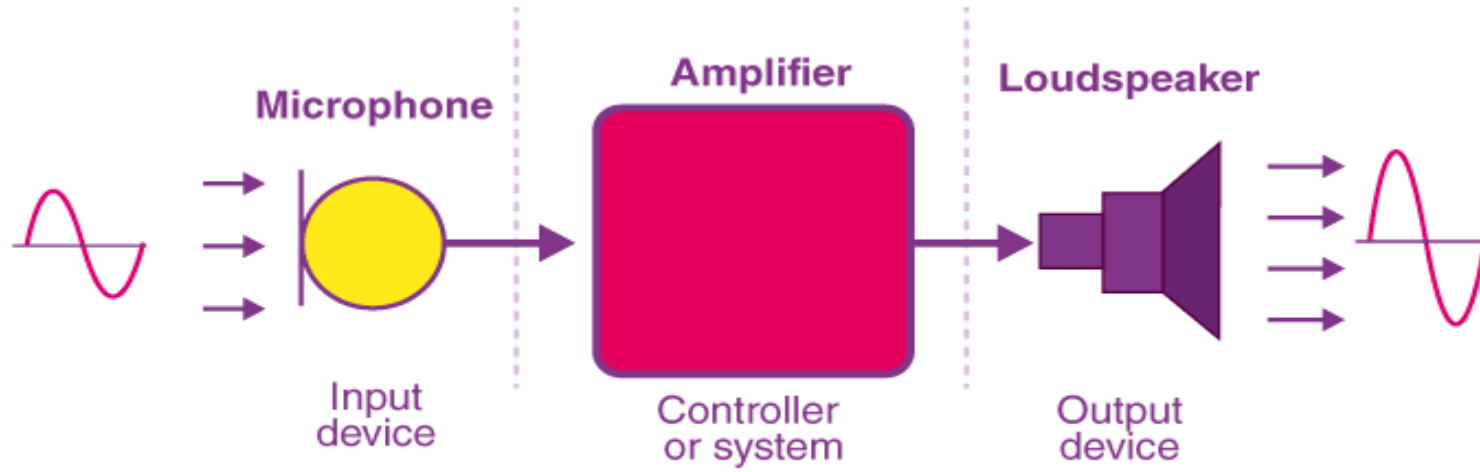
What is an Input Transducer?

An input transducer or a sensor takes in physical energy and converts it into an electrical signal that can be read. A microphone, for example, converts physical sound waves into an electrical signal that can be transferred through wires.





TRANSDUCER





TRANSDUCER



What is an Output Transducer?

An output transducer, or an actuator, takes in electrical signals and converts them into other forms of energy. A lamp converts electricity into light and a motor, on the other hand, converts electricity into motion.

Factors to consider while selecting a transducer

- Transducers should have high input impedance and low output impedance to avoid the loading effect.
- A transducer should be highly sensitive to desired signals and insensitive to unwanted signals.
- Transducers should be able to work in corrosive environments.
- The transducer circuit should have overload protection to withstand overloads.





TRANSDUCER



Transducer Efficiency

Transducer efficiency is defined as the ratio of output power in the desired form to the total power input. Mathematically, the ratio is represented as follows:

$$E=Q/P$$

P represents the input in the above ratio, and Q represents the power output in the desired form. The efficiency of the transducer always falls between 0 and 1.

No transducer is 100% efficient; some power is always lost in the conversion process. This loss is manifested in the form of heat. In incandescent lamps of certain wattage, only a few watts are transformed into visible light. Most of the power is dissipated as heat. Due to this, an incandescent lamp is a bad transducer in terms of efficiency.





TRANSDUCER



Applications of Transducer

- A transducer measures load on the engines
- They are used to detect the movement of muscles; this process is known as acceleromyograph.
- Transducers are used in an ultrasound machine.
- The transducers in a speaker convert electrical signals into acoustic sound.
- A transducer is used in the antenna to convert electromagnetic waves into an electrical signal.





*Thank
you*

