TRANSUDERS

a PowerPoint Presentation
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Outline of Presentation:

I. What is a Transducer?
   a) Active Transducer
   b) Passive Transducer

II. Devices Used as a Transducer
    a) Microphone
       1. Kinds of Microphones
    b) Speaker
       2. Types of Speakers
    c) Magnetic Tape Player/ Recorder
    d) Phonograph/ CD/ VCD/ DVD
    e) Potentiometer
    f) Operational Amplifier

III. Applications of Transducers
     a) Audio/ Video Equipment
     b) Level controls/ indicators/ detectors
What are Transducers?

Transducers are electrical devices that convert input energy into output energy of a different manifestation. Any device that converts energy may be considered as a transducer.
What are Transducers?

Transducers may be classified into:

Active Transducers  Passive Transducers
Active Transducers

The active type of transducers converts one form of energy to another form without any use of energy. It directly produces electric signals without an external energy source; it does not require an external power. Active transducers convert physical quantities like temperature, pressure and speed.
Examples...

Thermocouple

Photovoltaic Cell
Part I-b.1

Passive Transducers

The passive type of transducers requires an external source of power to operate, apart from that supplied by any of the actuating signals, which power is controlled by one or more of these signals. Energy is supplied through a separate voltage source. Most of the transducers nowadays are passive.
Examples...

Differential Transformer

Sensor for measuring shear across the cavity between facade and wall

Resistance Strain Gauge

2 strain gauges measure the bowing of the steel spring
Part II

Devices Used as Transducers

- Phonograph/CD/VCD/DVD
- Magnetic Tape Player/Recorder
- Speaker
- Microphone
- Potentiometer
- Operational Amplifier
A microphone is a transducer that converts sound energy into an electrical signal. Sound information exists as patterns of air pressure; the microphone changes this information into patterns of electric current.
Kinds of Microphones

A. Condenser, Capacitor or Electrostatic Microphone

In a condenser microphone, also called a capacitor or electrostatic microphone, the diaphragm acts as one plate of a capacitor, and the vibrations produce changes in the distance between the plates.

B. Dynamic Microphone

Dynamic microphones work via electromagnetic induction. They are robust, relatively inexpensive and resistant to moisture. This, coupled with their potentially high gain before feedback makes them ideal for on-stage use.
Kinds of Microphones

C. Carbon Microphone

Carbon microphones use a capsule or button containing carbon granules pressed between two metal plates. A voltage is applied across the metal plates, causing a small current to flow through the carbon.

D. Piezoelectric Microphone

Piezoelectric transducers are often used as contact microphones to amplify sound from acoustic musical instruments, to sense drum hits, for triggering electronic samples, and to record sound in challenging environments, such as underwater under high pressure.
Kinds of Microphones

E. Fiber Optic Microphone

A fiber optic microphone converts acoustic waves into electrical signals by sensing changes in light intensity, instead of sensing changes in capacitance or magnetic fields as with conventional microphones.

F. Laser Microphone

Laser microphones are often portrayed in movies as spy gadgets. A laser beam is aimed at the surface of a window or other plane surface that is affected by sound. The slight vibrations of this surface displace the returned beam, causing it to trace the sound wave.
Kinds of Microphones

G. Liquid Microphone

Early microphones did not produce intelligible speech, until Alexander Graham Bell made improvements including a variable resistance microphone/transmitter. Bell's liquid transmitter consisted of a metal cup filled with water with a small amount of sulfuric acid added. A sound wave caused the diaphragm to move, forcing a needle to move up and down in the water. The famous first phone conversation between Bell and Watson took place using a liquid microphone.

H. MEMS Microphone

The MEMS (MicroElectrical-Mechanical System) microphone is also called a microphone chip or silicon microphone. The pressure-sensitive diaphragm is etched directly into a silicon chip by MEMS techniques, and is usually accompanied with integrated preamplifier.
A loudspeaker, or speaker, is a transducer that converts an electrical signal into sound. A system's speaker is the component that takes the electronic signal stored on things like CDs, tapes and DVDs and turns it back into actual sound that we can hear.
Kinds of Speakers

A. Floor-standing Speakers

Floor-standing, or tower, speakers have been around for years and in many ways remain the standard against which all other speaker types are judged. In general, they are larger than other types of speakers, reproduce a wide range of frequencies; including a deep bass, and they are usually more efficient, giving you more volume per watt of amplifier power.

Tower speakers tend to be more expensive than bookshelf speakers, but they're hard to beat for big, room-filling sound. If you're interested in towers but don't want to take up too much floor space, look for one of the many slimline models out there — several have a footprint of less than one square foot.
Kinds of Speakers

B. Bookshelf Speakers

Bookshelf speakers are a good alternative to floor-standing models. With bookshelf speakers, you get smaller speakers that you can place on stands or on shelves.

Bookshelf speakers are almost always 2-way. Some audio fans prefer them because, when stand-mounted, they provide tight overall sound and accurate stereo imaging. However, because of their size, they cannot produce the low bass frequencies that floor-standing models can. As a result, many folks choose to add a powered subwoofer to reinforce the deep bass, especially for home theater.
C. Subwoofer & Satellite Systems

Satellites can be mounted on the wall or ceiling, or can be placed on stands or shelves. Because they’re so small, they almost always handle only highs and mids. The combination of satellite speakers and a subwoofer takes up little floor space, and delivers a rich and full sound.

The subwoofer is, of course, much bigger than the satellites. But because of the omni-directional properties of low-frequency sound waves, you can place the subwoofer in an out-of-the-way location without sacrificing performance. Check out our article on choosing a subwoofer for more information.
Kinds of Speakers

D. In-wall, In-ceiling, & Outdoor Speakers

In-wall and in-ceiling speakers work in the same way as regular speakers, but they're mounted in a frame and set into the wall (or ceiling). Instead of a separate speaker cabinet, they use the wall itself as the cabinet.

Outdoor speakers are a popular way to bring your favorite music outside, without having to lug a boombox out to the patio. They are weather-resistant, so they can be placed under the eaves of your house as well as on covered porches or decks. A speaker with plenty of power handling and a wide frequency response will perform best in a large open space.
A Magnetic Tape Player/Recorder is an electrical device used for recording sounds on magnetic tape and usually also for reproducing them, consisting of a tape deck and one or more amplifiers and loudspeakers. Magnetic tape is a medium for magnetic recording, made of a thin magnetizable coating on a long, narrow strip of plastic. Most audio, video and computer data storage is this type.
A phonograph is a device used to play recorded sounds from records. CDs (Compact Disk), VCDs (Compact Disk Digital Video), and DVDs (Digital Video Disk) are used to record or store audio, video or other types of data.
An potentiometer is a device which senses the resistance by flow of a minute current through itself; it measures voltage. Potentiometers operated by a mechanism can be used as position transducers, for example, in a joystick.
Operational Amplifier

An operational amplifier, or op-amp, is a device that produces a voltage on its output terminal that is typically millions of times larger than the difference in voltage between its input terminals.
Part III

Applications of Transducers

Audio/ Video Equipment

Level Controls/ Indicators/ Detectors
Audio transducers and buzzers are used in electronic equipment, toys and various warning devices as sounding components. Electromagnetic transducers generate either a single continuous sound or intermittent tones and are available with either self-contained or external drive circuitry. Some audio transducers can transmit signals, some can receive signals, and some can both transmit and receive signals. Video transducers are used in electronic equipments like TV’s and Computer monitors.
Level Controls/Indicators/Detectors

Transducers are also used as level controls, indicators, and detectors. Transducers are used in electronic equipments like pressure indicators, mechanical pressure gauges, smoke detectors, weight indicators, and alarms.
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