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**Southwest Center for Microsystems Education (SCME)  
University of New Mexico**

# **Introduction to Transducers Learning Module**

This booklet contains four units:

Pre-test (Knowledge Probe)

Introduction to Transducers Primary Knowledge (PK) unit

Activity – What are Transducers?

Final Assessment

*This learning module is one of three SCME modules that discuss the types of components found in microelectromechanical systems (MEMS). This module covers “transducers” – what they are, how they work and how they are used in both macro and micro-sized systems. An activity provides further exploration into specific transducers and how they are used in everyday devices. Two related learning modules cover MEMS sensors and actuators.*

Target audiences: High School, Community College, University

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# Introduction to Transducers

## Knowledge Probe

### Participant Guide

#### Introduction

*This learning module is one of three SCME modules that discuss the types of components found in microelectromechanical systems (MEMS). This module covers “transducers” – what they are, how they work and how they are used in both macro and micro-sized systems. An activity provides further exploration into specific transducers and how they are used in everyday devices. Two related learning modules cover MEMS sensors and actuators.*

The purpose of this assessment is to determine your current understanding of transducers. This knowledge leads to an understanding of applications and functions of transducers in microsystems applications.

1. A thermocouple is a device that converts heat energy into electrical energy. A thermocouple is a(n) \_\_\_\_\_.
  - a. sensor
  - b. transducer
  - c. actuator
  - d. transducer and actuator
2. Which of the following BEST describes a transducer? A device that
  - a. senses a change in its input and produces a readable output.
  - b. quantifies a change between an input and output.
  - c. converts one form of energy to another form of energy.
  - d. converts a change on the input into a proportional movement.
3. An electric motor converts electrical energy into rotary motion. An electric motor is a(n)
  - a. sensor
  - b. transducer
  - c. actuator
  - d. sensor and transducer
  - e. transducer and actuator
4. Which of the following BEST describes an electrochemical transducer?
  - a. Converts the energy from a chemical change or reaction to electrical energy.
  - b. Converts electrical energy into chemical energy seen either as a change or a reaction.
  - c. Converts motion or convection within a chemical into electrical energy.
  - d. Converts electrical energy into motion or convection within a chemical.

5. Strain gauges, galvanometers, and generators are all what type of transducer?
  - a. Electrostatic
  - b. Electromechanical
  - c. Thermoelectric
  - d. Electromagnetic
  
6. Which of the following devices is an electrostatic transducer?
  - a. Cathode ray tube (CRT)
  - b. Incandescent light bulb
  - c. Comb drive
  - d. Hydrophone
  
7. Quartz crystal is a device that converts
  - a. mechanical stress into electrical energy
  - b. electrical energy into motion or movement
  - c. mechanical stress into heat
  - d. heat into motion or movement
  
8. One solution for long-lasting batteries in the micro-scale is to build a battery that consists of a
  - a. two-dimensional array of stacked, paper-thin flat electrodes.
  - b. two-dimensional array of low aspect ratio stacked carbon posts.
  - c. three-dimensional array of low aspect ratio carbon posts.
  - d. three-dimensional array of high aspect ratio carbon posts.

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