

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

Introduction to Actuators Learning Module

This booklet contains four units:

Pre-test (Knowledge Probe)

Introduction to Actuators Primary Knowledge (PK) unit

Activity – What are Actuators?

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 “actuators” – 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 actuators and how they are used in everyday devices. Two related learning modules cover MEMS transducers and sensors.

Target audiences: High School, Community College, University

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Website: www.scme-nm.org

Introduction to Actuators

Knowledge Probe

Instructor Guide

Notes to the Instructor

This is the pre-assessment for the *Introduction to Actuators Learning Module*.

Introduction to Actuators is a Learning Module consisting of the following:

- **Knowledge Probe (Pre-assessment)**
- Introduction to Actuators
- Activity: What are Actuators?
- Final Assessment

This companion Instructor Guide (IG) contains both the questions and answers for the assessment questions. The answers are indicated in **red**.

Introduction

This learning module is one of three SCME modules that discuss the types of components found in microelectromechanical systems (MEMS). This module covers “actuators” – 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 actuators and how they are used in everyday devices. Two related learning modules cover MEMS transducers and sensors.

The purpose of this assessment is to determine your current understanding of actuators.

1. The output of an actuator is
 - a. current
 - b. motion**
 - c. heat
 - d. variable
2. Which of the following BEST describes an actuator? A device that
 - a. quantifies a value on its input and produces a readable output.
 - b. produces a readable output representative of a change.
 - c. converts one form of energy to another form of energy.
 - d. converts a change on the input into a proportional movement.**

3. Which of the following is a mechanical actuator?
 - a. Motor
 - b. Generator
 - c. Tire jack
 - d. Comb drive

4. Which of the following is an electrostatic actuator?
 - a. Motor
 - b. Generator
 - c. Tire jack
 - d. Comb drive

5. Which of the following is NOT a transducer and an actuator?
 - a. Motor
 - b. Generator
 - c. Bi-metallic strip
 - d. Comb drive

6. In microtechnology piezoelectric thin films are combined with metallic thin films to make
 - a. thermal switches
 - b. comb drives
 - c. strain gauges
 - d. RTDs

7. The property that determines how much a material expands when heated is called its _____ coefficient.
 - a. expansion
 - b. molecular
 - c. temperature
 - d. material

8. Which of the following micro-components could NOT be used to actuate?
 - a. Diaphragm
 - b. Comb drive
 - c. Cantilevers
 - d. Strain gauge

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