**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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Southwest Center for Microsystems Education (SCME) NSF ATE Center

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Website: [www.scme-nm.org](http://www.scme-nm.org)

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**Introduction to Actuators**

**Knowledge Probe**

**Instructor Guide**

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|  | 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. |

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|  | 1. The output of an actuator is    1. current    2. motion    3. heat    4. variable |
|  | 1. Which of the following BEST describes an actuator? A device that    1. quantifies a value on its input and produces a readable output.    2. produces a readable output representative of a change.    3. converts one form of energy to another form of energy.    4. converts a change on the input into a proportional movement. |
|  | 1. Which of the following is a mechanical actuator?    1. Motor    2. Generator    3. Tire jack    4. Comb drive |
|  | 1. Which of the following is an electrostatic actuator?    1. Motor    2. Generator    3. Tire jack    4. Comb drive |
|  | 1. Which of the following is NOT a transducer and an actuator?    1. Motor    2. Generator    3. Bi-metallic strip    4. Comb drive |
|  | 1. In microtechnology piezoelectric thin films are combined with metallic thin films to make    1. thermal switches    2. comb drives    3. strain gauges    4. RTDs |
|  | 1. The property that determines how much a material expands when heated is called its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ coefficient.    1. expansion    2. molecular    3. temperature    4. material |
|  | 1. Which of the following micro-components could NOT be used to actuate?    1. Diaphragm    2. Comb drive    3. Cantilevers    4. Stain gauge |

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|  | *Support for this work was provided by the National Science Foundation's Advanced Technological Education (ATE) Program through Grants. For more learning modules related to microtechnology, visit the SCME website (*[*http://scme-nm.org*](http://scme-nm.org)*).* |