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| **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  Made possible through grants from the National Science Foundation Department of Undergraduate Education #0830384, 0902411, and 1205138.  Any opinions, findings and conclusions or recommendations expressed in this material are those of the authors and creators, and do not necessarily reflect the views of the National Science Foundation.  Southwest Center for Microsystems Education (SCME) NSF ATE Center  © 2010 Regents of the University of New Mexico  Content is protected by the CC Attribution Non-Commercial Share Alike license.  Website: [www.scme-nm.org](http://www.scme-nm.org) |  |  |  |

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

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**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

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**Introduction to Actuators**

**Knowledge Probe**

**Participant Guide**

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|  | 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)*).* |