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# Assessment

## MEMS for Environmental and Bioterrorism

### Applications

### Instructor Guide

#### Notes to Instructor

This assessment evaluates the participants' knowledge of MEMS Environmental and Bioterrorism Applications. This assessment could be given as a pre-test, post-test or both. By using it as a pre-test and post-test, you can determine what was learned by completing the PK and activity in this Learning Module.

This assessment is part of *the MEMS Environmental and Bioterrorism Applications Learning Module*:

- MEMS Environmental and Bioterrorism Applications Primary Knowledge (PK)
- MEMS Environmental and Bioterrorism Applications: Activity
- **MEMS Environmental and Bioterrorism Applications Assessment**

#### Introduction

The purpose of this assessment is to evaluate your understanding of MEMS Environmental and Bioterrorism Applications after having read the PK and completed the activity associated with this learning module.

**There are six (6) discussion questions.**

1. Name two major events that have occurred that have spurred the development of MEMS sensor technology for the environment and bioterrorism?

***Answer:***

***Answers will vary. Examples are 9/11, global warming, the energy crisis, Mideast wars, and the Indian Ocean tsunami.***

2. Describe three application of MEMS sensors in factories and buildings.

*Answers will vary. Examples include - to detect and monitor motion or the presence of people, identify high/low traffic areas, temperature fluctuations, or gas leaks. For the structures, MEMS can be used to identify changes in the foundation or structural components of the building, air leaks, power surges, or cracks in the walls, roofs or ceilings.*

3. Describe two applications of MEMS in the military.

*Answers will vary. Examples include to detect airborne chemicals, or to detect movement in a specific area (like a neutral zone or around a protected building).*

4. Describe an application for smart dust and how it would work.

*Answers will vary. An example would be to detect movement in a protected area. Smart dust sensors would be placed throughout the area. The sensors would detect movement or vibrations. Anyone entering the area would be detected and his exact movement would be monitored.*

5. List one MEMS application that is or could be used in each of the following environments and the type of sensor that would work for the stated application.

- marine
- land
- air

**Answer**

- *Marine - Detection of tsunamis or underwater earthquakes using pressure and vibration sensors. Tracking of marine animals, ships, submarines using hydrophones or temperature sensors.*
- *Land - Detection of oil and gas reserves using an accelerator. Detection and monitoring of ice melts using temperature sensors.*
- *Air - Detection of chemicals in the air using the eNose. Detection of global warming using light and temperature sensors.*

6. Based on what you have learned in this unit, what types of MEMS sensors could you see in your home or office that would make it safer? (Describe at least two examples)

***Answer***

***This is an open-ended question, so the answers will vary. Examples could be as follows:  
A temperature sensor in the stove could indicate that burners are still too hot to touch.  
A CO<sub>2</sub> sensor to set off an alarm in case of a gas leak.***

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