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# BioMEMS Overview Activity

## Instructor Guide

### Notes to Instructor

This BioMEMS Overview Activity allows the participants to demonstrate their knowledge of bioMEMS and the fields in which there are bioMEMS applications. This activity is supported by a primary knowledge unit and final assessment. It is recommended that the participants review the PK and that you provide an overview of BioMEMS prior to starting this activity.

This activity is part of the bioMEMS Overview Learning Module.

- BioMEMS Overview PK
- **BioMEMS Overview Activity**
- BioMEMS Overview Assessment

### Description and Estimated Time to Complete

This activity provides the opportunity for you to demonstrate your understanding of the various applications in which bioMEMS are being applied and considered. It is recommended that you read the BioMEMS Overview PK prior to starting this activity.

#### Estimated Time to Complete

Allow approximately 30 minutes to complete this activity.

### Introduction

BioMEMS is a subset of microelectromechanical systems (MEMS) and microtechnology. BioMEMS applies to biological systems in general and, in particular, to human health. The evolution of microtechnologies coupled with the recent advances in the understanding of genomics, proteomics, and biotechnology techniques permit new and exciting opportunities for advancing the applications of bioMEMS devices.

Many areas are already benefitting from the use of microtechnology to improve health care and serve to enhance the understanding of biological systems. BioMEMS provides the opportunity to improve upon current methods, develop new ones, and potentially lower the cost of medical care.

## **Activity Objectives and Outcomes**

### Activity Objectives

- Create a bioMEMS illustration that demonstrates your knowledge of areas in which bioMEMS are currently used and have the potential to be used.

### Activity Outcomes

You will create a chart or tree that illustrates the various fields in which bioMEMS are currently used and areas of future use and some of the applications in each field.

### **Supplies**

You may choose to use pictures and a physical graphic to create your illustration or use a graphics program and create your illustration on the computer.

If you create a physical graphic, you'll need at least the following items:

Markers

Rulers

Poster board or stock paper

## **Activity: BioMEMS applications**

### **Description**

In this activity you will create an illustration that demonstrates your knowledge of bioMEMS area and their applications.

#### **1. Create a bioMEMS applications tree**

Create an illustration such as a bioMEMS tree, which illustrates the various areas into which bioMEMS have branched. To each area list existing and potential bioMEMS devices or applications.

Choose to use pictures or graphics to better illustrate the specific applications.

#### **2. Answer the Post-activity questions**

## Post-Activity Questions

1. What are the differences and similarities between MEMS and bioMEMS used in medical applications?
2. Describe a device that would be considered a combination of MEMS and bioMEMS.
3. Describe a potential application for bioMEMS and describe the bioMEMS devices that could be used for your application.

## Post-Activity Questions / Answers

1. What are the differences and similarities between MEMS and bioMEMS used in medical applications?  
*Answer: Similarities - MEMS devices that are used in medicine and biological settings are electromechanical devices such as MEMS non-molecular micropumps, accelerometers, and microcantilevers. These devices are currently being used diabetes therapeutics, in pacemakers, and biosensors, respectively. Outside of the medical arena, these same devices are being used for automotive and aerospace applications, chemical sensors, and in the food industry, just to name a few.*  
*Differences - BioMEMS devices can incorporate biological molecules as an integral part of the action of the device and they have to be biocompatible for in vivo use.*
2. Describe a device that would be considered a combination of MEMS and bioMEMS.  
*Answers will vary, but examples include biosensors that use microcantilevers with probe coatings of biomolecules, a variety of microfluidic devices, enose devices, drug delivery systems, and cell culture systems.*
3. Describe a potential application for bioMEMS and describe the bioMEMS devices that could be used for your application.  
*Answers will vary*

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