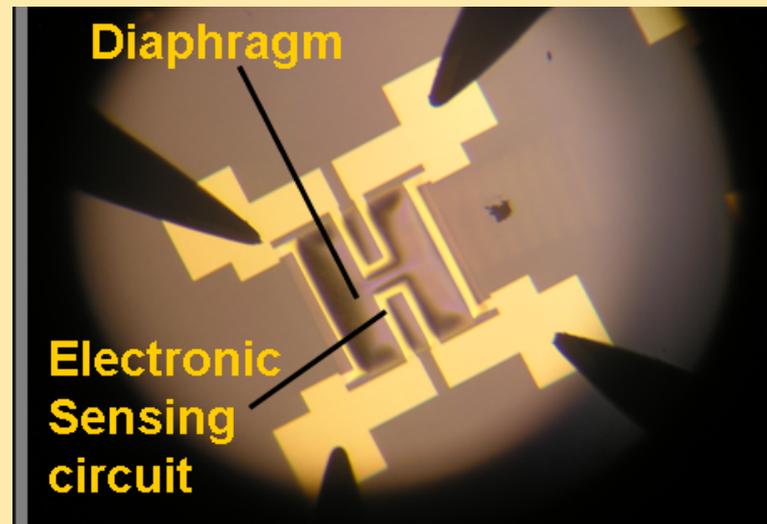


# INTRODUCTION TO SENSORS



Micro-Pressure Sensor

# Unit Overview

The following topics will be discussed:

- ❖ What are Sensors?
- ❖ Types of Sensors
- ❖ Type of micro-sensors

# Introduction

A sensor is a device that receives and responds to a signal.

- ❖ The signal could be heat, light, motion, or chemical.
- ❖ A sensor converts the signal into an analog or digital representation of the input signal.
- ❖ Sensors detect and/or measure many different conditions.

What are some sensors that you have used?

# Introduction

Humans are equipped with 5 different types of sensors.



Detects  
Light



Detects  
Sound



Detects  
Certain Chemicals



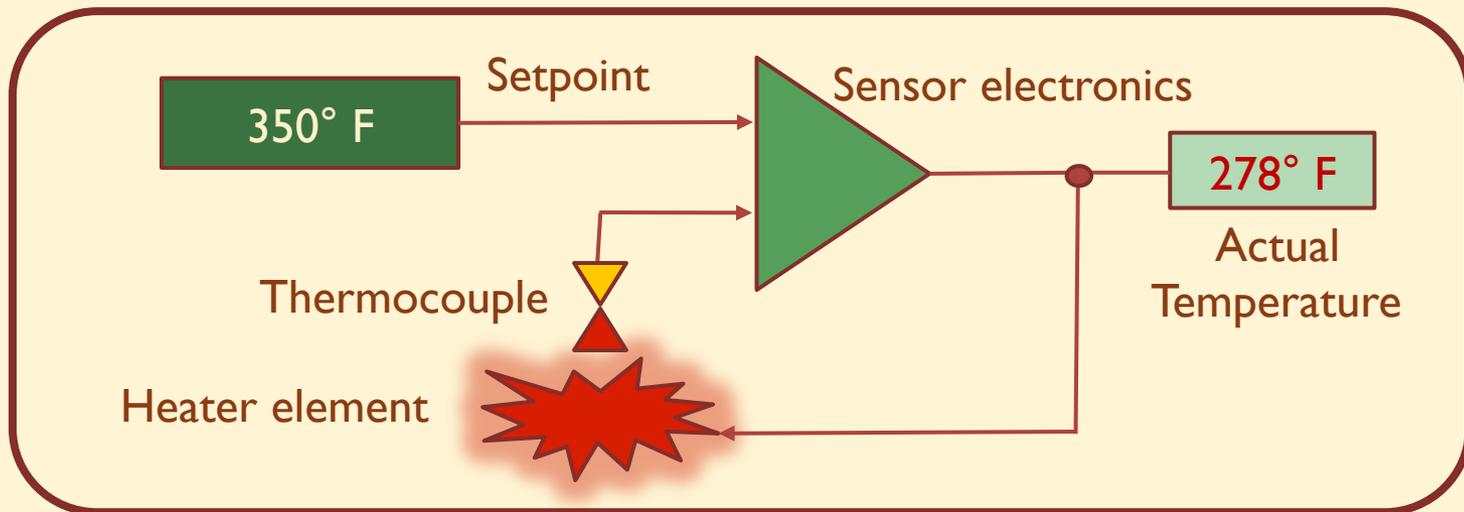
Detects  
Pressure & Temperature



***Human Sensors***

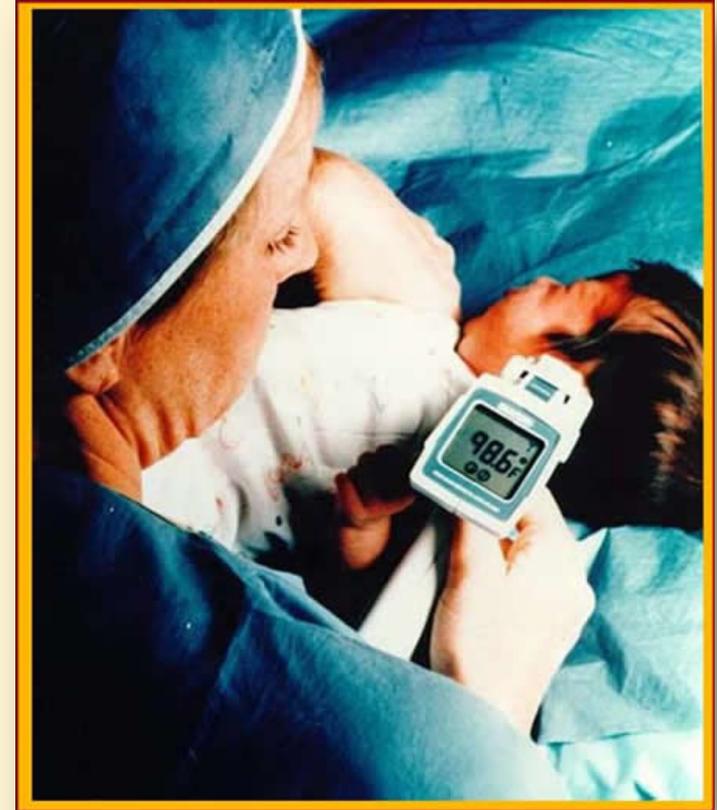
# Basic Concepts of Sensors

- ❖ Detect the presence of energy
- ❖ Detect changes in or the transfer of energy
- ❖ Detect by receiving a signal then responding to that signal
- ❖ Convert a signal into a readable output



# Thermal Sensors

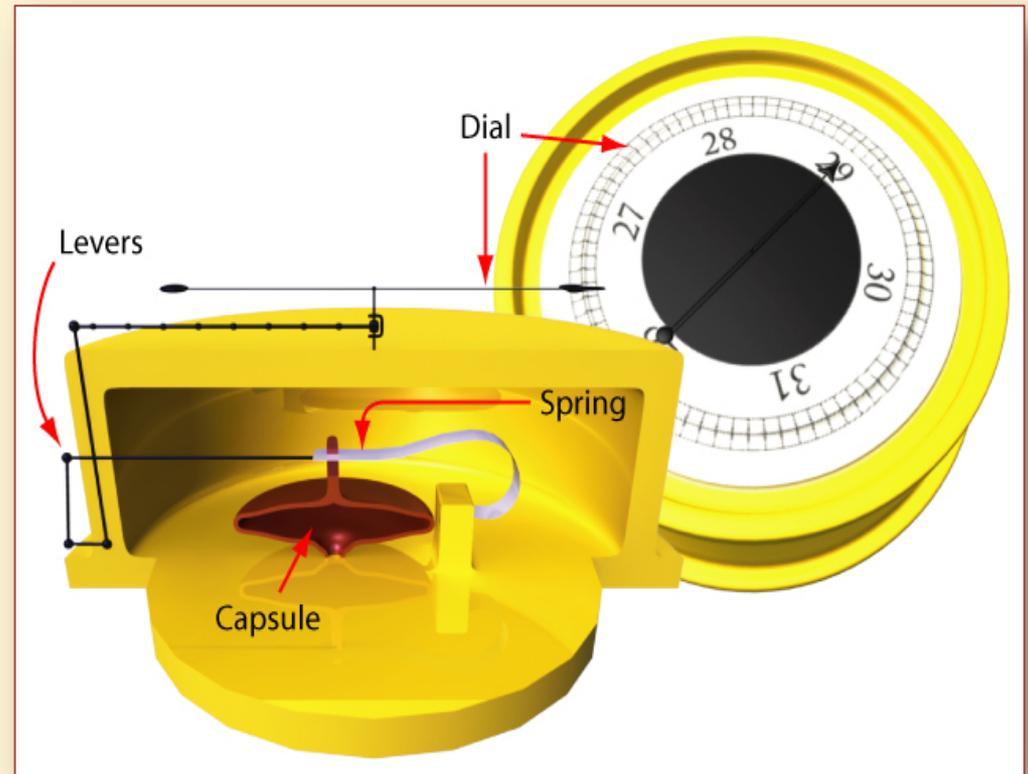
- ❖ Thermometer
- ❖ Thermocouple gauge
- ❖ Resistance Temperature Detectors (RTDs)



*Infrared ear thermometer  
[Image courtesy of NASA Jet Propulsion Laboratory]*

# Mechanical Sensors

- ❖ Pressure sensor
- ❖ Barometer
- ❖ Altimeter
- ❖ Liquid flow sensor
- ❖ Gas flow
- ❖ Accelerometer
- ❖ Aneroid Barometer



*Diagram of Aneroid Barometer*

# Electrical Sensors

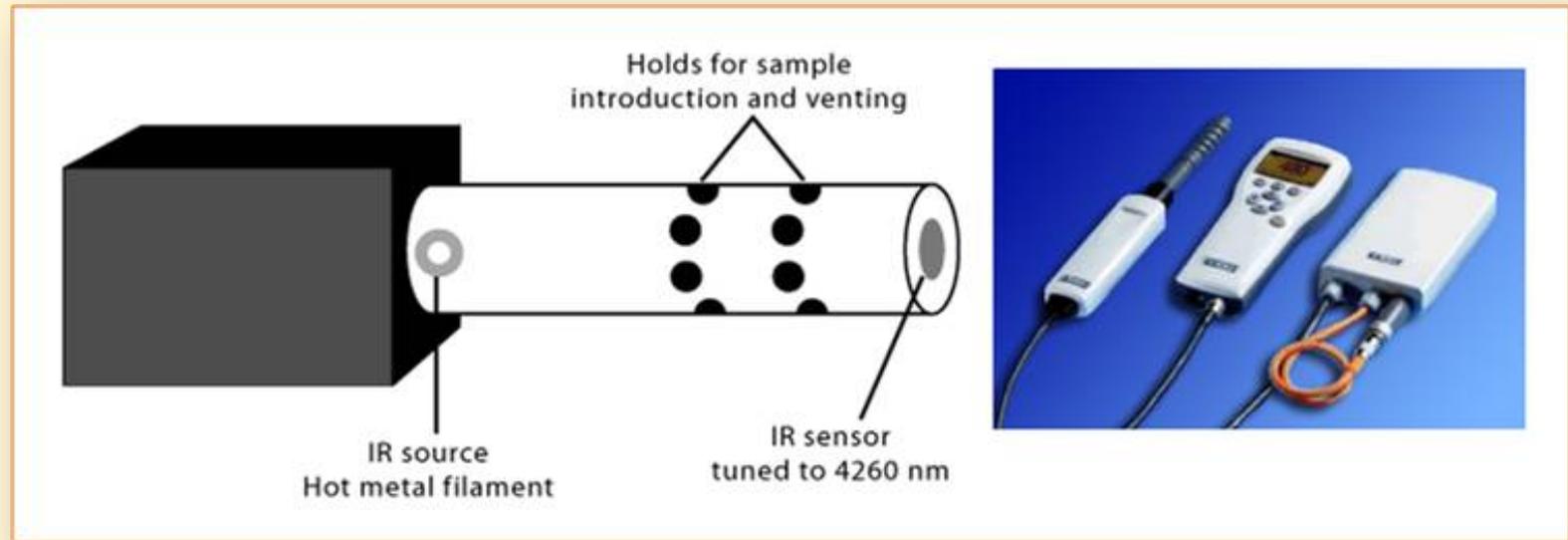
- ❖ Ohmmeter
- ❖ Voltmeter
- ❖ Galvanometer and ammeter
- ❖ Watt-hour meter

*Schematic and photograph of a Galvanometer used for sensing electrical currents*



# Chemical Sensors

- ❖ Carbon dioxide detector
- ❖ Oxygen sensor



*Schematic and Photo of a Carbon Dioxide Sensor*

# Optical Sensors

- ❖ Photodetectors
- ❖ Proximity Detectors
- ❖ Infra-red sensor

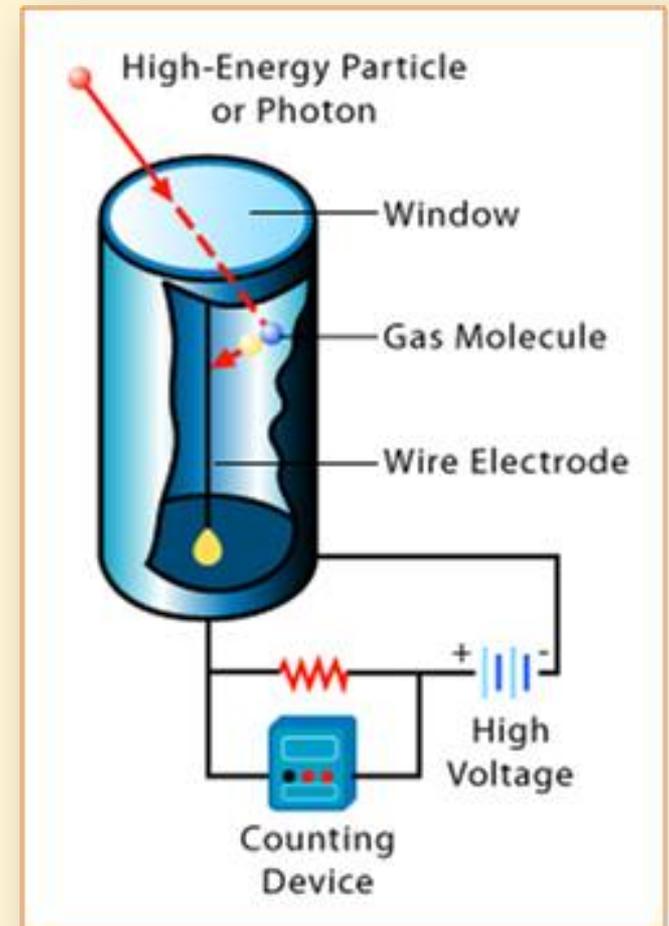


Solar cell and the solar cells on the International Space Station  
*[Public Domain]*

# Other Types of Sensors

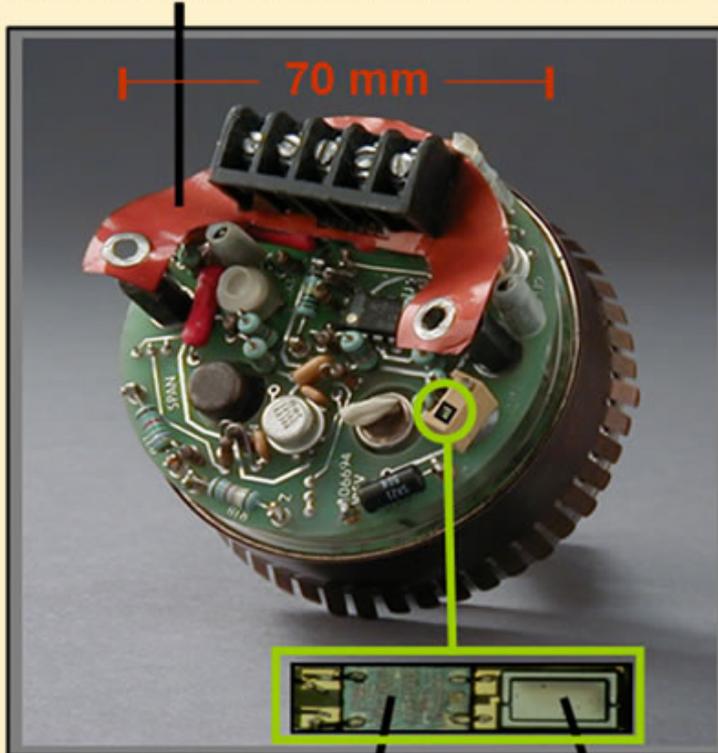
- ❖ Acoustic wave sensors
- ❖ Seismometers
- ❖ Motion sensors
- ❖ Speedometers
- ❖ Geiger counters
- ❖ Biological sensors

***Geiger Counter: Detects Atomic Radiation***

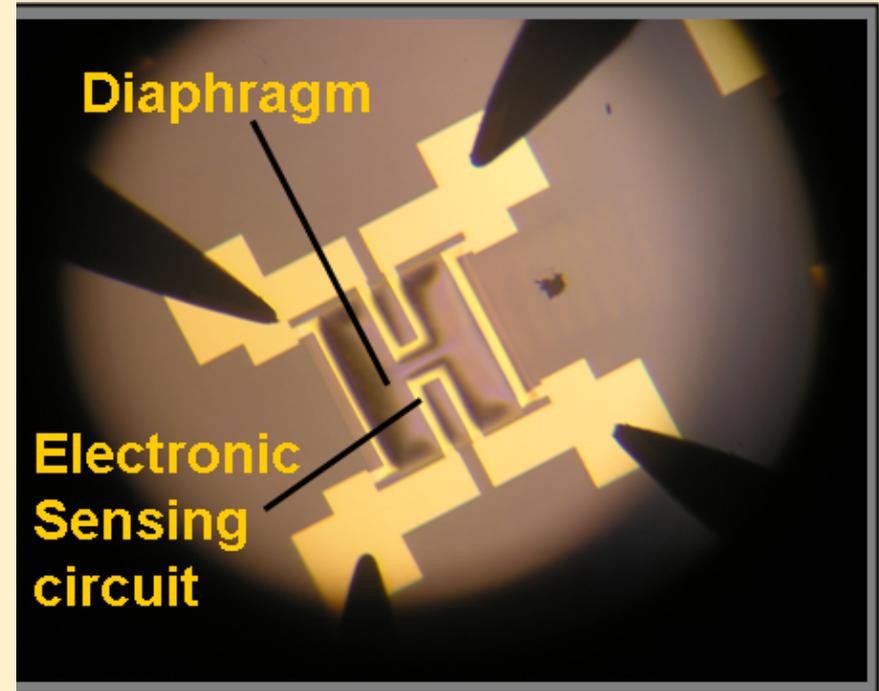


# Macro vs. Micro Sensors

Macro-sized PS (electronics shown below/  
diaphragm is encased below the electronics)



MEMS PS: electronics / diaphragm



Example of a Diaphragm  
MicroPressure Sensor [University  
of New Mexico, MTTC]

# Question

- ❖ *Is it possible for a device to be defined as both a sensor and a transducer?*
- ❖ *Describe an example.*

# Summary

- ❖ A sensor is a device that receives and responds to a signal.
- ❖ This signal must be produced by some type of energy, such as heat, light, motion, or chemical.

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