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**BE1325 Homework 4**

1. Find ten biomedical instruments used in clinics and laboratories and explain what sensing principles are used.

* **Electronic Thermometer**- thermal sensor.

This device changes its resistance with changes in temperature. A computer or other circuit measures the resistance and converts it to a temperature, either to display it or to make decisions about turning something on or off.

* **Pressure transducer**-mechanical sensor

It measures the pressure of a fluid, indicating the force the fluid is exerting on surfaces in contact with it. Pressure transducers are used in many control and monitoring applications such as flow, air speed, level, pump systems or altitude.

* **PH meter**- chemical sensor

It is an instrument used to measure acidity or alkalinity of a solution. It is measured on a scale of 0 to 14.

* **Pulse oximeter**- optical sensor

It measures how much of the hemoglobin in blood is carrying oxygen.

* **Electroretinography**-contact lens electrodes

It is an eye test that detects function of the retina.

* **Accelerometers**- Motion, Vibration

It uses electric fields to speed up and increase the energy of a beam of particles, which are steered and focused by magnetic fields.

* **Tactile sensors**- Mechanical sensor

Itis a device that measures information arising from physical interaction with its environment.

* **Infrared gas sensors**- chemical sensor

It is a method for detecting combustible hydrocarbon gas with infrared light. The detector consists of a source of infrared light, an optical filter to select the proper wavelength and an optical infrared receiver.

* **GPS**- Position sensor

GPS receivers use a constellation of satellites and ground stations to compute position and time almost anywhere on earth.

* **Ionization detectors**- radiation sensor

Ionization smoke detectors use an ionization chamber and a source of ionizing radiation to detect smoke.

**More on sensors**

Thermal sensor-it is critical in life and our body has a way to control temperature

Mechanical sensor-measures force and therefore can measure pressure (Force/Area)

Chemical sensor- Chemical sensors are designed to measure the presence and sometimes the concentration of specific chemicals.

Optical sensor- are electric detectors that convert light into an electric signal

Contact lens electrodes/electrical- A device which gives an output by detecting the changes in quantities or events can be defined as a sensor. Generally, sensors produce an electrical signal or optical output signal corresponding to the changes in the inputs.

Motion vibration-measures sudden movement vibration

Position sensor-is any device used to measure the distance traveled by the starting from its reference position

Radiation sensor-measures the ionization of beta radiation, gamma radiation and alpha with matter that create electrons and positive charge

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