

Adeniran Mustageemat Adedamola
18/ENG02/007

Computer Engineering
EEE 319

1) Sensors are widely used in biomedical applications, measuring patient's vitals are easy and accurate because advancement of sensors. There are various kinds of sensors used for biomedical applications some of which are:

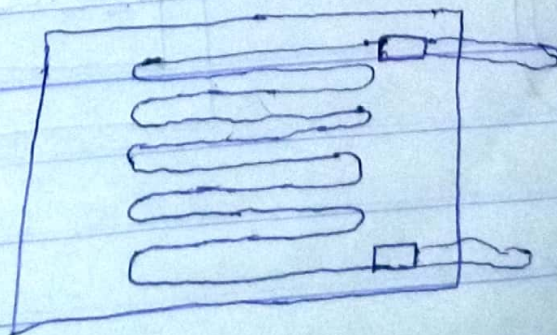
- i) Biosensors: Used to effectively monitor body motions such as respiration
- ii) Radiation sensors: used to uptake radiation e.g X-rays and gamma rays for imaging and treatment
- iii) Mechanical sensors: used to target a large number of physical variations e.g force, mass, pressure e.t.c They detect external pressure in human beings
- iv) Thermal sensors: Used to measure body temperature
- v) Magnetic sensors: they can be used to test blood flow and coagulation.

b) Actuators: These are devices that convert electric signal into physical output placed at the outer soul. It operates in reverse direction of a sensor. It requires a sensor, when there is input from the sensor it reacts and produces a response.

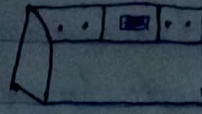
Examples are:

- i) Alarms
- ii) Displays
- iii) Electroactive polymer

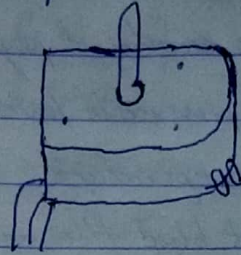
2) a) Strain gauge: A device used to measure strain on an object. It is used to measure torque applied by a motor engine fan



b) Force Sensors: Uses load cells to weigh objects and prevent machinery from overloading



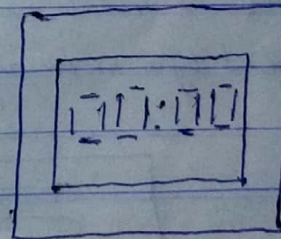
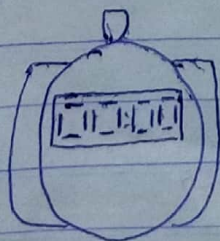
c) Pressure Sensors: Used for pressure measurement of gases or liquids



d) Vector Sensor: A device used to detect sound in water and convert acoustic energy into electrical energy.



e) Digital Indicator: Allows users to view temperature, humidity and other various signals. It is used in load cells, transducer and various measuring components.



3) Dialysis is the process of removing excess water, solutes from the blood whose kidneys can no longer perform their functions properly. This is referred to as renal replacement therapy.

Dialysis may need to be noted when there is sudden loss of kidney functions which is known as acute kidney.

Principle

Dialysis works on the principle of the diffusion of solutes and ultrafiltration of fluid across a semi-permeable membrane. Diffusion is a property of substances in water. Substances in water tend to move from an area of high concentration to an area of low concentration.

Passive diffusion occurs when a high to low concentration gradient is present between the patient's blood and dialysis solution used.

Ultrafiltration ensures excess fluid is cleared from the body through the use of a positive (blood) or negative (dialysate) pressure gradient, moving fluid from a high to low region. The main types of RRT established renal failure are

- * Haemodialysis (HD)
- * Haemodiafiltration (HDF)
- * Peritoneal Dialysis (PD)
- * Kidney transplantation

b) An endoscope is an illuminated optical, typically slender and tubular instrument used to look deep into the body and used to look deep into the body and used in procedures called an endoscopy. Endoscopes use tubes which are only a few millimetres thick to transfer illumination in one direction and high-resolution images in real time in the other direction, resulting in minimally invasive surgery.

Principle

The endoscopy procedure uses an endoscope to examine the interior of a hollow organ or cavity of the body. Unlike many other medical imaging techniques, endoscopes are inserted directly into the organ. A patient may be fully conscious or anaesthetised during the process or procedure. Examples include:

- 1) Cystoscope (bladder)
- 2) Nephroscope (kidney)

1) Bronchoscope

2) Arthroscopy (joints)

3) Colonoscopy (colon)

4) Laparoscopy (abdomen or pelvis)