**Internet of Everything (IoE)**

**SENSORS**

**Sensors**

* What are the sensors?
* Sensor Family
* Architecture of a Single Node Sensor.
* **Def:**

Sensors are sophisticated devices that are frequently used to detect and respond to electrical or optical signals. A Sensor converts the physical parameter (for example: temperature, blood pressure, humidity, speed, etc.) into a signal which can be measured electrically.

In the broadest definition, a sensor is a device, module, machine, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics, frequently a computer processor. A sensor is always used with other electronics.

**Criteria to choose a Sensor:**

* Accuracy
* Environmental condition – usually has limits for temperature/ humidity
* Range – Measurement limit of sensor
* Calibration – Essential for most of the measuring devices as the reading changes with time
* Resolution – Smallest increment detected by the sensor
* Cost
* Repeatability – The reading that varies is repeatedly measured under the same environment

**Classification of Sensors**

The sensors are classified into the following criteria:

* Primary Input quantity (Measurand)
* Transduction principles (Using physical and chemical effects)
* Material and Technology
* Property
* Application

**Classification based on property is as given below:**

* Temperature – Thermistors, thermocouples, RTD’s, IC and many more.
* Pressure – Fiber optic, vacuum, elastic liquid-based manometers, LVDT, electronic.
* Flow – Electromagnetic, differential pressure, positional displacement, thermal mass, etc.
* Level Sensors – Differential pressure, ultrasonic radio frequency, radar, thermal displacement, etc.
* Proximity and displacement – LVDT, photoelectric, capacitive, magnetic, ultrasonic.
* Biosensors – Resonant mirror, electrochemical, surface Plasmon resonance, Light addressable potentio-metric.
* Image – Charge coupled devices, CMOS
* Gas and chemical – Semiconductor, Infrared, Conductance, Electrochemical.
* Acceleration – Gyroscopes, Accelerometers.
* Others – Moisture, humidity sensor, Speed sensor, mass, Tilt sensor, force, viscosity.

**Classification based on Application is as given below:**

* Industrial process control, measurement and automation
* Non-industrial use – Aircraft, Medical products, Automobiles, Consumer electronics, other type of sensors

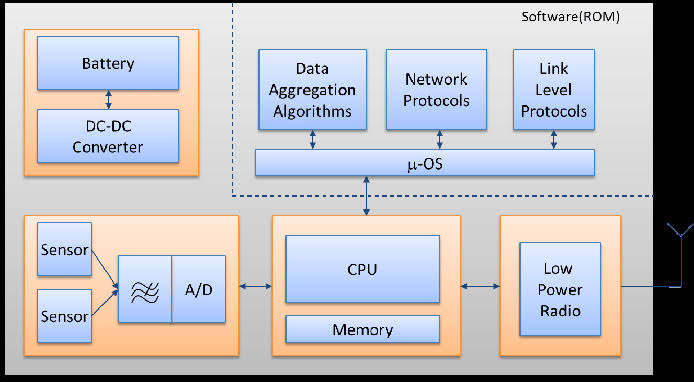
**Classification based on power or energy supply requirement of the sensors:**

* Active Sensor – Sensors that require power supply are called as Active Sensors. Example: LiDAR (Light detection and ranging), photoconductive cell.
* Passive Sensor – Sensors that do not require power supply are called as Passive Sensors. Example: Radiometers, film photography.

**In the current and future applications, sensors can be classified into groups as follows:**

* Accelerometers – These are based on the Micro Electro Mechanical sensor technology. They are used for patient monitoring which includes pace makers and vehicle dynamic systems.
* Biosensors – These are based on the electrochemical technology. They are used for food testing, medical care device, water testing, and biological warfare agent detection.
* Image Sensors – These are based on the CMOS technology. They are used in consumer electronics, biometrics, traffic and security surveillance and PC imaging.
* Motion Detectors – These are based on the InfraRed, Ultrasonic, and Microwave / radar technology. They are used in videogames and simulations, light activation and security detection.

**Wireless Sensor Node:**

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