



## SMART SENSOR

A smart sensor is an analog/digital transducer combined with a processing unit and a communication interface. It consists of transduction element, signal conditioning electronic and controller/processor that support some intelligence in a single package.

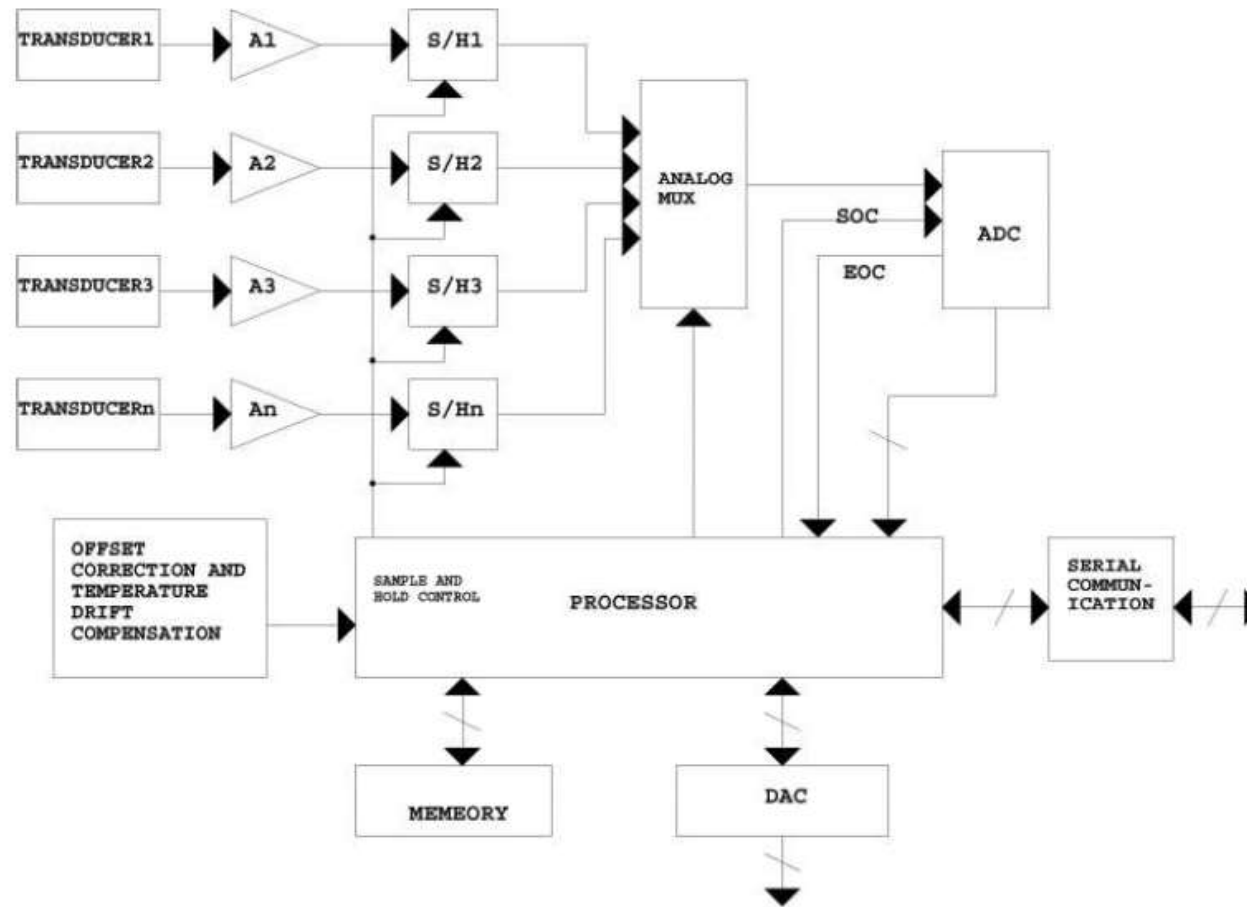
This integrated sensors which has electronics and the transduction element together on one silicon chip, this system can be called as system-on-chip (SoC). The main aim of integrating the electronics and the sensor is to make an intelligent sensor, which can be called as smart sensor. Smart sensors then have the ability to make some decision.



## General Architecture of Smart Sensor

The basic architectural components of smart sensor are listed as follows:

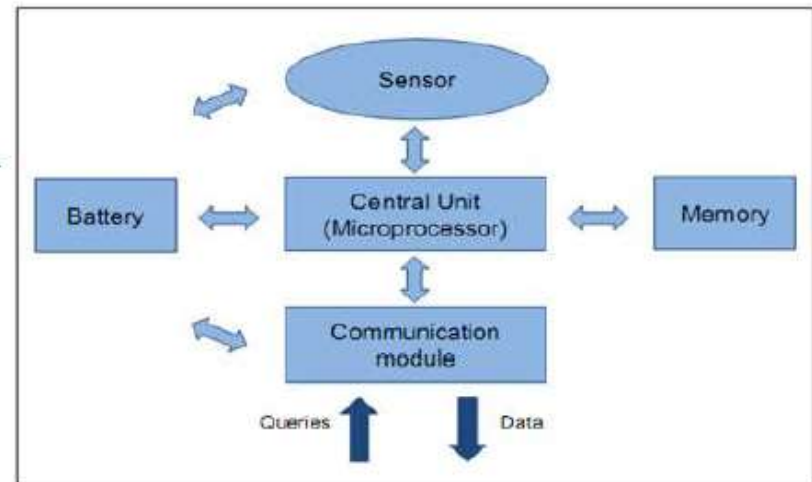
- Sensing element/transduction element,
- Amplifier,
- Sample and hold,
- Analog multiplexer,
- Analog to digital converter (ADC),
- Offset and temperature compensation,
- Digital to analog converter (DAC),
- Memory,
- Serial communication
- Processor



GENERAL ARCHITECTURE OF SMART SENSOR

## Five main parts of sensor node are:

- The central unit: It is in the form of microprocessor which manages the tasks.
- Battery: Is the source of energy
- A Transceiver: Interacts with the environment and collects data.
- Memory: Used as storage media for storing data or processing data.
- Communication module: It includes transceivers and forwards queries and data to and from central module. [2]







## Information Coding/Processing

- The signals recorded by many sensors are typically low in amplitude, Integration of interface electronics and signal processing circuitry at the sensor site (monolithic or hybrid) serves a number of functions, including signal amplification, impedance transformation, signal filtering and buffering, and multiplexing.
- CMOS amplifiers are perhaps the most suitable since they provide high gain and high input impedance through a relatively simple and compact circuit and are readily compatible with integration of high-density digital circuitry on the same chip.
- In addition to signal amplification, impedance transformation and signal filtering are also required.



## Data Compensation

- The main circuit block required before digital control and manipulation of sensor data can take place is the analog-digital converter.
- Once the sensor data is digitized, a variety of signal processing schemes can be used to correct for a number of errors and shortcomings. These include offset cancellation, auto-calibration, self-testing, fault detection and correction and linearity correction.
- Auto-calibration is a very desirable function for smart sensors. Most sensors should be adjusted for changes in gain and offset.
- Reliability and accuracy.



# Top Smart Sensors -

- Temperature Sensors
- Proximity Sensor
- Pressure Sensor
- Gas & Smoke Sensor
- Accelerometer Sensors
- Level Sensors
- Image Sensors
- Motion Detection Sensors
- Optical Sensors
- Gyroscope Sensors