Lesson 1
The Sensor

Sensor Technology

- A technology for designing the sensors and associated electronic readers, circuits, and devices

Physical parameter **Sensing**

Senses a change in physical parameter

- Temperature
- Pressure
- Light intensity
- Metal proximity to an object
- Smoke in proximity

Physical parameter **Sensing**

- Acceleration
- Orientation
- Location
- Vibrations
- Smell, organic vapours or gases.
-

Transducer as Sensor

- Converts physical energy like heat, sound, strain, pressure, vibrations and motion into the electrical energy
- Voice and changes in the sound, and is used to record voice or music

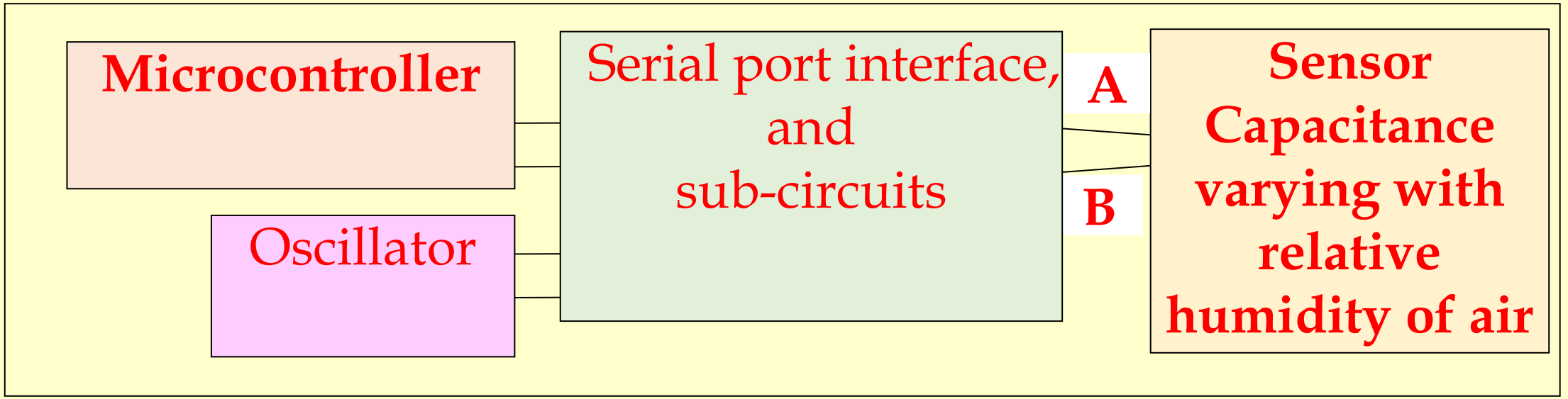
The electronic circuit for the sensor

- Connecting to the input at a sensor
- Circuit input receives the output of a sensor/transducer
- The circuit output variation is according to the variation in physical condition

Sensor Circuit

- Receives the energy in form of variations in the currents, voltages, their phase-angles or frequencies.
- Sensor measures the variations in the parameters with respect to a reference or normal condition and provide the value of sensed parameter after appropriate calculations

Physical Parameter variation with the Physical condition at the sensor



The microcontroller electronic-circuit port connected to interface and sub-circuits; and receiving input from a capacitive sensor whose capacitance value is varying with the relative humidity of air and the circuit sensing the variation in relative humidity

Smart Sensor

- A sensor with a built-in integrated circuit (microcontroller, and sensor) to directly give the output as physical parameter on giving input supply voltages and other signals as commands

Smart Sensors Examples

- A smart sensor for temperature giving output in term of hex-digit as 10 UART serial bits according to temperature in degree Celsius; 01100100 for 100 C and 00100100 for 36 C after taking calibration coefficients also into account
- RH% in terms of hex-digits as 10 UART serial bits after computations as per the temperature of measurement 00111100 for RH = 60%

Sensing the change of a State

Sensing circuit sensing 0 or 1 as per one of the two states. The change of state, for example,

- light to darkness
- finger touch
- proximity or far
- completion of a revolution of a wheel
- tyre pressure below threshold or above the threshold

Integrated Multi-parameters Sensor board/Kit

- Bosch XDK 110 development kit, which includes devices
- Eight number micro-electromechanical system (MEMS)

"Accelerometer, magnetometer and gyroscope, coupled with relative-humidity (RH), pressure (P), temperature (T), acoustic and digital light-sensors"

Sensor

- Sensor senses a specific physical condition when that exhibits the measurable change in a characteristic circuit parameter on the change in specific physical condition or environment
- For example, a temperature sensor senses the change in temperature when that exhibits the measurable change in a characteristic circuit parameter, resistance,

Summary

We learnt

- Sensor
- Variation of a physical parameter with the physical condition to be sensed
- Sensing of temperature, pressure, vibrations, proximity, gas, relative humidity
- Sensing of circuit parameters: current, voltage, resistance, capacitance, phase angle or frequency

Summary

We learnt

- Smart Sensor
- Integrated Circuit Multi-parameter Sensing Circuit Board

End of Lesson 1 on The Sensor