# Lab 04

# Temperature Sensor

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**Lab Location**
Sensor & Instrumentations Lab

**Lab Outcomes:**

By the end of this lab, students should be able to:

1. Design the hardware interface between LM35 temperature sensor and computer through parallel port
2. Calibrate the temperature sensor to display the data on computer using simple program

## 1.0    Temperature Sensor

You have been learned the entire basic component for the sensor instrumentation. Right now, we will integrate the entire component with the sensor. You will use all the knowledge starting from the Lab 01, Data Acquisition Programming, Lab 02, Analog to Digital Conversion using ADC0804, Lab 03, Operational Amplifier and Temperature Sensor Characteristic.
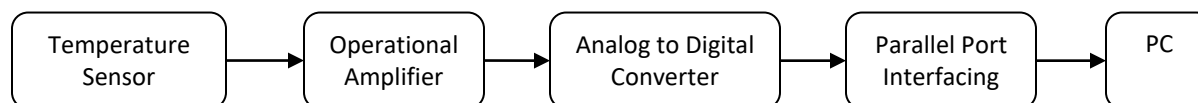
## 2.0    Integrate the entire system

| Temperature Sensor | → | Operational Amplifier | → | Analog to Digital Converter | → | Parallel Port Interfacing | → | PC |

Figure 1: Flow chart diagram for the temperature sensor instrumentation

The entire system can be representing by the flow chart diagram form Figure 1. You need to calibrate all the system to give exact temperature indicator program (in degree Celsius) from your PC. There no need to use filters for this sensor.

### 3.0      Experimental setup

You can start the experiment by starting with temperature sensor characteristic. Temperature sensor that you going to use is LM35. LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. After that, you can start to integrate the entire system to display the data at PC. You need to write and calibrate the temperature sensor to give exact temperature indicator program through computer.  Happy experimenting!!

### 4.0      Lab Activities

Students are required to;
1) Calibrate LM35 and display the data on PC through simple programing.
2) Record 5 values of temperature.

Write and submit the program used and the results obtained in this Lab at the end of the class.

### References

1. Analog Devices LM35 Datasheet

2. http://www.emesystems.com/OL2heat.htm