



## **Microprocessors Course Project**

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Deadline:

1401/4/19

# Temperature Control System

The goal of this project is to design a temperature monitoring system that controls and regulates the temperature of a particular environment.

We need **two** ATmega32 microcontrollers, one to read the value of temperature and another to take action upon it. Therefore, the two chips must be connected using a communication protocol (SPI is advised in this case). The tasks of each chip are mentioned below:

The Master:

- Receives two temperature values A and B from LM35 sensors. (Temperatures range between 0 to 100 degrees.)
- **Constantly** compares the two values, and as long as  $A_{IN0} > A_{IN1} \rightarrow ACO = 1$  of A to digital. ADATE = Analog To Digital Auto Trigger Enable = 1, Free Running Mode  
The conversion should happen in real-time and as fast as possible therefore, **no use of comparator interrupts is recommended.** ACI = 0, ACIE = 0
- Sends the digital value of A to the slave.
- Prints the digital value of A on a 16x2 alphanumeric LCD.

The Slave:

- Receives the temperature value from the master.
- For temperatures between 25 and 55 degrees, the cooler motor must be turned on, starting with a duty cycle of 50% plus 10% for every additional 5 degrees. (E.g., for a temperature of 37 degrees, the duty cycle is 70%)
- Turns the heater on if the temperature is lower than 20 degrees.
- Makes a red warning LED blink if the temperature is higher than 55 degrees (the cooler must stop working at this point).