# Experiment 6

**Name: Ehsan Rezaee**
**Student number: 972023015**

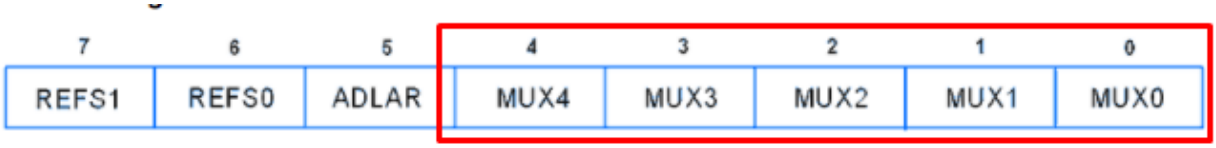
## Question 1 - part one

**Show a temperature in lcd with module LM35**

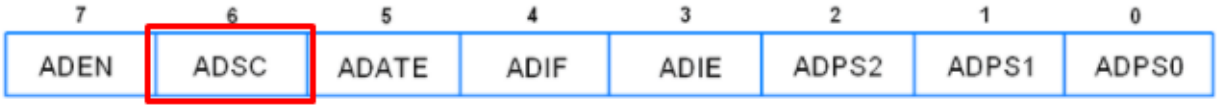
First we need analog to digital convert -> For setup this in atmega16 we need use these steps:

1- Enable ADC with **ADCSRA** Register and bit **ADEN**

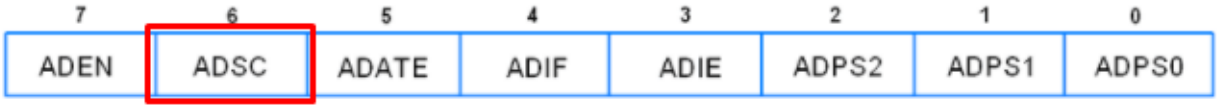

2- Use ADMUX to set which analog port to use:



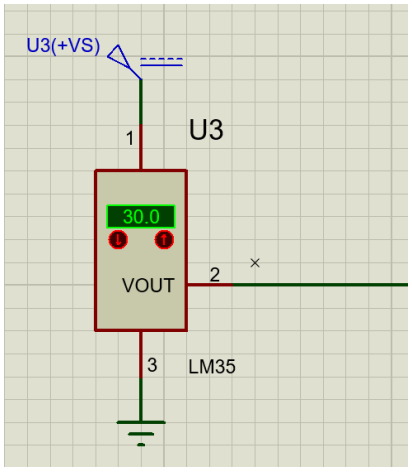

3- Start conversion with enable ADSC in ADCSRA Register



4- Wait until the conversion to check this we need use ADSC bit in ADCSRA Register




Second we use a bottom circuit that can increase or decrease temperature:




**Note:** Each step of LM35 is 10mv and also we know atmega16 have 1024 resolution so use this formula:

$$10mv = \frac{Vref}{1024} \rightarrow \text{Vref} = 10.24$$

**Note2:** Result video of project attached in directory.

**References:**

- **Avr Atmega Atmega1632 Adc | Avr Atmega**
- **Avr Atmega Lm35 Temperature Sensor Interfacing With Atmega1632 | ...**

# Question 1 - part two

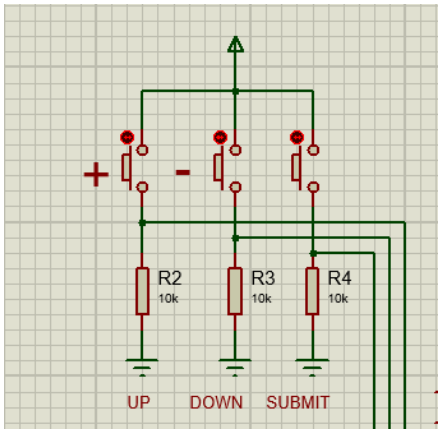
**Add a cooling system when the temperature gets higher than the custom value.**

In this part first we need to initialize a sensor temp when the microcontroller runs, and for this we use a 3 push button:

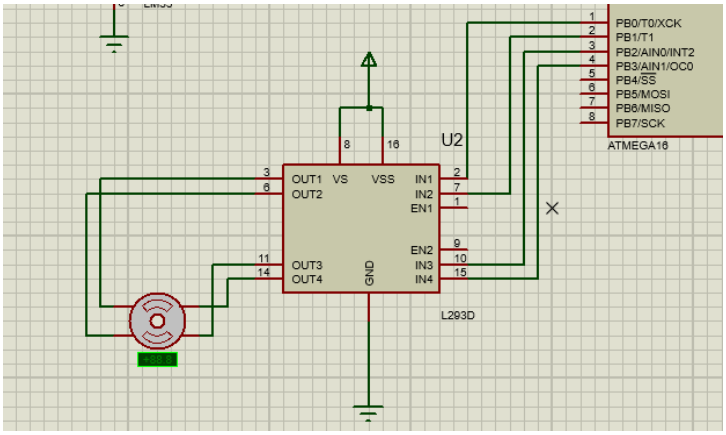
UP -> Increase default temp sensor value

DOWN -> Decrease value

Submit -> Submit and start system




Second we need to add a stepper motor that only starts when the LM35 gets higher than the sensor value (initialized in the first step)




**Note:** Result video of project attached in directory.