# CS223 Project

Design a 4 bit CPU consisting of 16 instructions namely (*ADD,SUB, AND, NOT, OR*, LOAD, STORE, *J, JZ, CALL, RETURN*, MOVR1toR2, MOVR1toR3,MOVR2toR1,MOVR3toR1) with three register R1, R2 and R3. You can design the circuit with micro-instruction control or FSM/hardwired control (which clock cycle what micro-operations). **MUL instruction not required.**

   (a) Design I/O subsystem for CU with 8 bit address and 4 bit data bus. Data and Address may be supplied from DIP switches and also Data/Address to be displayed on three 7-segment displays.
   (b) Interface 4 register, an ALU and a memory chip to above designed I/O subsystem

Data Path of 4 Bit CPU
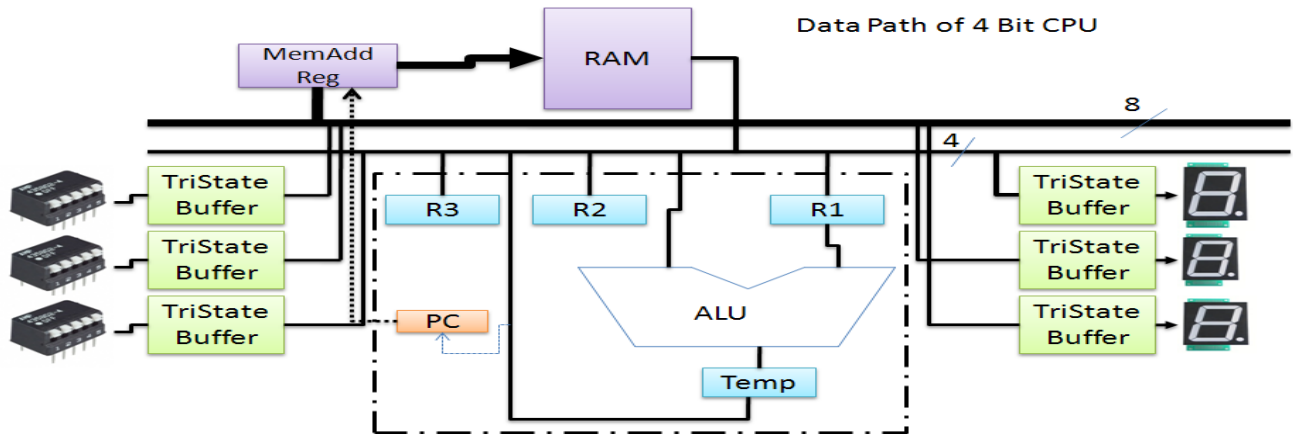
You should be able to run two program (a) multiplications of two number and display the result at LEDS (b) recursive sum up to N (SUM N=N+SUM(n-1) till N==0).

As EPROM **programmers cum eraser are** not working properly, so you have to use a single RAM for both storing program and micro-program. It may be tricky to use in this way. It is mandatory to use PC parallel port to download user program and control memory to RAM using a C/CPP program. FRC connector is available in the lab.

```
#include<stdio.h>
#include <dos.h>
void main()  {
outportb(0x378,0xFF); //0x378 is parallel port
                //& 0xFF is data
delay(5);
}
```

➢ TCC –o download.exe download.cpp
➢ Download.exe   Prgram.exe

You can have a FILE which contain binary of your program starting at address A1 and sequence of micro-control operations for 4bit CPU starting at address A2. From parallel port first generate address then download data to the RAM. For writing 2KB data you may require 5*2000=10000ms=10s. Data can be viewed by connecting LEDs : Pin2 --- LED ---Pin18, pin3 ---LED---pin19, …

Pin	Direction
2	Data 0 In/Out Data.0
3	Data 1 In/Out Data.1
4	Data 2 In/Out Data.2
5	Data 3 In/Out Data.3
6	Data 4 In/Out Data.4
7	Data 5 In/Out Data.5
8	Data 6 In/Out Data.6
9	Data 7 In/Out Data.7