BU-ALI SINA UNIVERSITY

Assignment 2(Calculator)

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1 IMAGE INTERPRETATION

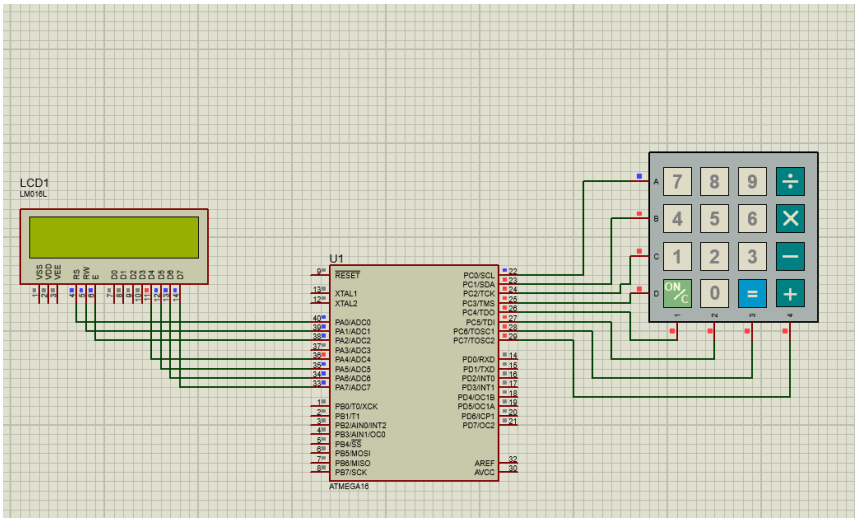

Figure 1.1: Simulation picture

1.1 What is the Project about?

it is a 2 operands calculator that we use keypad and lcd and bind them to ATmega16

2 KEYPAD

2.1 how does keypad work?

first we make all 8 ports pull-up(1) and change Data direction register(DDR) to make first 4 ports output and last 4 ports inputs and we constantly make one of first 4 ports 0 in loop and if one of key is pushed we can get it in our inputs.

```
PORTC|=0x0f;
PORTC&=~(sh<<(i));

for(n=0;n<4;n++)
{
if(!(PINC&(sh<<(n+4))))
{
    cal(keypad[i][n]);
    while(!(PINC&(sh<<(n+4))));
}
}
i++;
i=i%4;
```

3 CALCULATOR

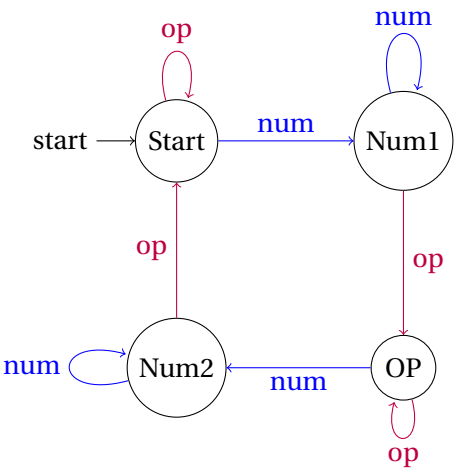

Figure 3.1: State machine for calculator

3.1 variables

```
enum State {Start, Num1, Op, Num2};
// Declare your global variables here
int n1,n2;
char op;
enum State st;
```

3.2 functions

```
//clear state
void clear();
//clear lcd and print integer on lcd
```

```
4 void print_int(int n);
5 //base on [op] calculate n1[op]n2
6 void operate();
7 //get character from keypad and do action base on state
8 void cal( char c);
```