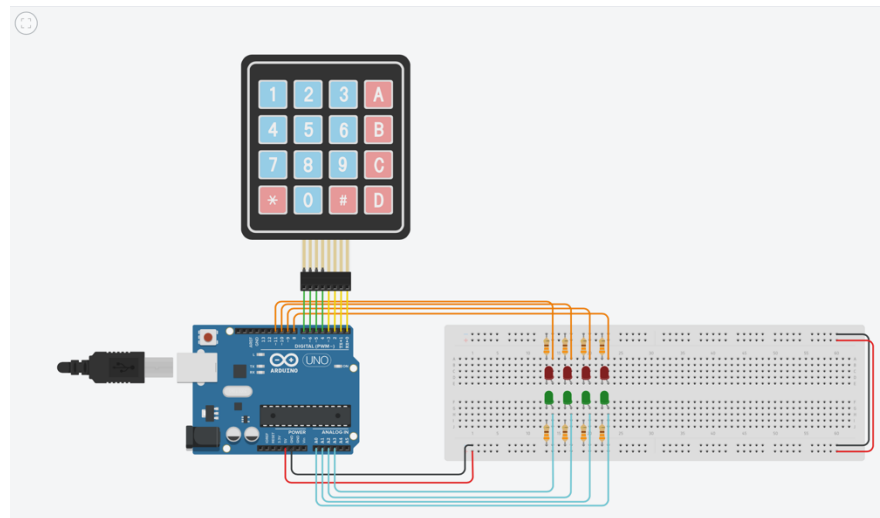


Lab 5

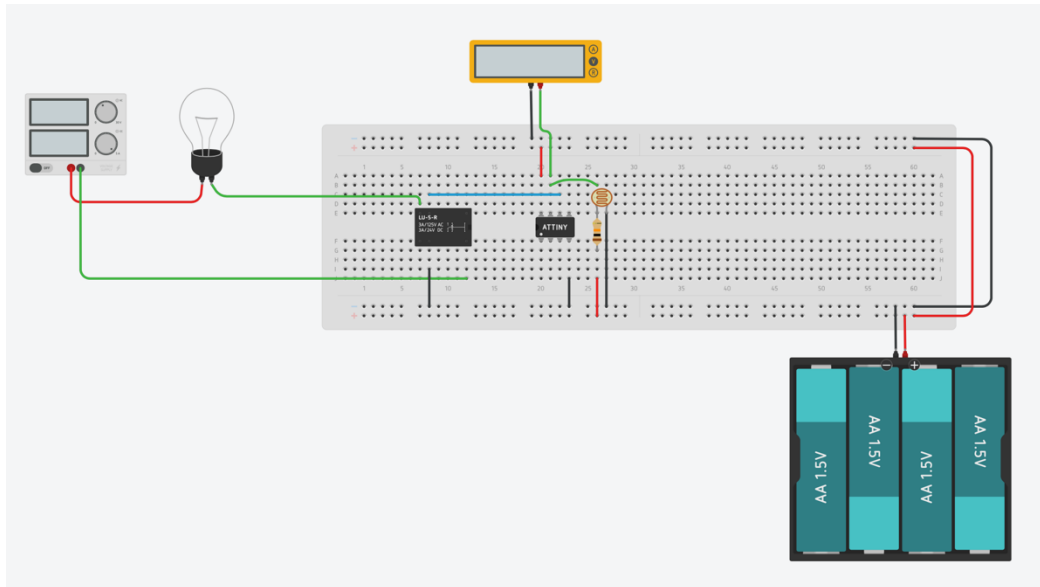
Problem 1: Use ATmega328P to receive input from keypad



```

1 // C++ code
2 //
3 void setup()
4 {
5     DDRD = 0x0F;
6     PORTD |= 0xF0;
7
8     DDRB |= 0x0F;
9     DDRC |= 0x0F;
10    PORTB &= 0xF0;
11    PORTC &= 0xF0;
12 }
13
14 unsigned char col = 0x01, temp;
15 unsigned char row;
16
17 void loop()
18 {
19     while((PIND & 0xF0) == 0xF0) //if does not have any presses
20     {
21         PORTD = 0xF0 | ~(col & 0x0F); //up | down
22         //not operator because we want to shift the 0 value
23         temp = col;
24         col = (col << 1);
25         _delay_ms(20);
26         if(col == 0x10)
27         {
28             col = 0x01;
29         }
30         row = PIND & 0xF0;
31     }
32
33     //shift col value back
34
35     PORTB = 0xF0 | ~(temp & 0x0F);
36     PORTC = 0xF0 | (row >> 4);
37
38 }
39 
```

Problem 2: ต่อดวงจรมีไฟสนามด้วย ATTiny และเขียนโปรแกรมควบคุมให้หลอดไฟทำงานเมื่อมีแสงต่ำ



```

1 // C++ code
2 //
3 void setup()
4 {
5     //set reference voltage to AVcc (REFS0 = 1)
6     //set the input channel
7     ADMUX |= (1<<REFS0|1<<MUX0);
8
9     //open the ADC (ADEN = 1)
10    //set the prescaler = 128 (ADPS2 = 1, ADPS1 = 1, ADPS0 = 1)
11    ADCSRA |= (1<<ADEN)|(1<<ADPS2)|(1<<ADPS1)|(1<<ADPS0);
12
13
14    DDRB |= (1<<DDB1); //set PB1 as output
15    DDRB &= ~(1<<DDB2); // set PB2 as input
16
17 }
18
19
20 void loop()
21 {
22     //start conversion
23     ADCSRA |= (1<<ADSC);
24
25     //wait for ADIF
26     while (ADCSRA&(1<<ADSC));
27
28     //get the ADC value from photoresistor and calculate
29     //output 0 - 1024
30     //input 6 volt
31     uint16_t adcValue = ADC/1024.0 * 6;
32
33     //if the ADC > 1 (no light) then, the bulb works.
34     if(adcValue > 1){
35         PORTB |= (1<<PINB1);
36     }
37     //else close the bulb
38     else PORTB &= ~(1<<PINB1);
39 }

```