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jdefo002\_lab1\_challenge.c

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1  /*
2  * jdefo002_lab1_challenge.c - April 8, 2013
3  * Name: Joshua DeForest-Williams E-mail: jdefo002@ucr.edu
4  * CS Login: jdefo002
5  * Partner Name: Ariana DeJaco E-mail: adeja001@ucr.edu
6  * Lab Section: 022
7  * Assignment: Lab#1 Exercise# Challenge
8  * Exercise Description: Challenge problem. LSB used for if weight > 140. Second
9  *                       LSB used to check if difference between A and C is > 80.
10 *                       6 MSB are used to show weight. Accumulate
11 * rate except for 3kg b/c the first two bits are already used.
12 */
13 #include <avr/io.h>
14 #include <avr/sfr_defs.h>
15 // DDR = Data Direction Register. Shows which bits are outputs and which are inputs.
16 // Inputs = 0. Outputs = 1.
17 // Current Port Definitions
18 #define LED_DDR          DDRD
19 #define LED_INPORT        PIND
20 #define LED_OUTPORT       PORTD
21 #define SENSORA_DDR       DDRA
22 #define SENSORA_INPORT    PINA // PINA is when you read
23 #define SENSORA_OUTPORT   PORTA // PORTA is when you write
24 #define SENSORB_DDR       DDRB
25 #define SENSORB_INPORT    PINB
26 #define SENSORB_OUTPORT   PORTB
27 #define SENSORC_DDR       DDRC
28 #define SENSORC_INPORT    PINC
29 #define SENSORC_OUTPORT   PORTC
30
31 // Additional macros not defined in sfr_defs.h
32 #define SET_PORT_BIT(OUTPORT, BIT)      OUTPORT |= (1 << BIT)
33 #define CLEAR_PORT_BIT(OUTPORT, BIT)    OUTPORT &= ~(1 << BIT)
34
35 int main(void)
36 {
37     SENSORA_DDR = 0x00;
38     SENSORB_DDR = 0x00;
39     SENSORC_DDR = 0x00;
40     LED_DDR = 0xFF;
41
42     unsigned long totalWeight;
43     unsigned char ACDifWeight;
44
45     while(1)
46     {
47         totalWeight = 0;
48         ACDifWeight = 0;
49
50         totalWeight += PINA;
51         totalWeight += PINB;
52         totalWeight += PINC;
53
54         if(PINA > PINC)
55         {
56             ACDifWeight = PINA - PINC;
57         }
58         else
59         {
60             ACDifWeight = PINC - PINA;
61         }
62
63         if(totalWeight > 140)
64         {
65             SET_PORT_BIT(LED_OUTPORT, 0);
66         }
67         if(ACDifWeight > 80)
68         {
69             SET_PORT_BIT(LED_OUTPORT, 1);
70         }
71     }
72 }

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71
72     while(totalWeight > 3)
73     {
74         if(totalWeight >= 128)
75         {
76             SET_PORT_BIT(LED_OUTPORT, 7);
77             totalWeight -= 128;
78         }
79         else if(totalWeight >= 64)
80         {
81             SET_PORT_BIT(LED_OUTPORT, 6);
82             totalWeight -= 64;
83         }
84         else if(totalWeight >= 32)
85         {
86             SET_PORT_BIT(LED_OUTPORT, 5);
87             totalWeight -= 32;
88         }
89         else if(totalWeight >= 16)
90         {
91             SET_PORT_BIT(LED_OUTPORT, 4);
92             totalWeight -= 16;
93         }
94         else if(totalWeight >= 8)
95         {
96             SET_PORT_BIT(LED_OUTPORT, 3);
97             totalWeight -= 8;
98         }
99         else if(totalWeight >= 4)
100        {
101            SET_PORT_BIT(LED_OUTPORT, 2);
102            totalWeight -= 4;
103        }
104    }
105 }
106
107 }

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jdefo002\_lab1\_part1.c

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```

1  /*
2  *  jdefo002_lab1_part1.c - April 8, 2013
3  *  Name: Joshua DeForest-Williams E-mail: jdefo002@ucr.edu
4  *  CS Login: jdefo002
5  *  Partner Name: Ariana DeJaco E-mail: adeja001@ucr.edu
6  *  Lab Section: 022
7  *  Assignment: Lab#1 Exercise# Part 1
8  *  Exercise Description: Program that illuminates an LED connected to PB0 if the
   *  garage door is open at night.
9  */
10
11
12 #include <avr/io.h>
13 #include <avr/sfr_defs.h>
14
15 #define IS_GARAGE_DOOR_SET (bit_is_set(PINA, PINA0))
16 #define IS_LIGHT_SENSOR_SET (bit_is_set(PINA, PINA1))
17 #define SET_LED          PORTB |= (1 << PINB0)
18 #define CLEAR_LED        PORTB &= ~(1 << PINB0)
19
20 int main(void)
21 {
22     DDRA = 0x00;
23     DDRB = 0x01;
24     PORTB = 0x00;
25
26     while(1)
27     {
28         if(!(IS_LIGHT_SENSOR_SET) && IS_GARAGE_DOOR_SET)
29         {
30             SET_LED;
31         }
32         else
33         {
34             CLEAR_LED;
35         }
36     }
37 }

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jdefo002\_lab1\_part2.c

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1  /*
2  * jdefo002_lab1_part2.c - April 8, 2013
3  * Name: Joshua DeForest-Williams E-mail jdefo002@ucr.edu
4  * CS Login: jdefo002
5  * Partner Name: Ariana DeJaco E-mail:adeja001@ucr.edu
6  * Lab Section: 022
7  * Assignment: Lab#1 Exercise# Part2
8  * Exercise Description: Program outputs in binary on port C the number of avail
   able spaces.
9  */
10
11
12 #include <avr/io.h>
13 #include <avr/sfr_defs.h>
14
15 // Current Port Definitions
16 #define LED_DDR          DDRC
17 #define LED_INPORT       PINC
18 #define LED_OUTPORT      PORTC
19 #define SENSOR_DDR       DDRA
20 #define SENSOR_INPORT    PINA
21 #define SENSOR_OUTPORT   PORTA
22
23 // Additional macros not defines in sfr_defs.h
24 #define SET_PORT_BIT(OUTPORT, BIT)      OUTPORT |= (1 << BIT)
25 #define CLEAR_PORT_BIT(OUTPORT, BIT)    OUTPORT &= ~(1 << BIT)
26
27 int main(void)
28 {
29     SENSOR_DDR = 0x00;
30     LED_DDR = 0xFF;
31
32     char freespaces;
33
34     while(1)
35     {
36         freespaces = 0;
37         for(char i = 0; i < 4; i++)
38         {
39             if(!(bit_is_set(SENSOR_INPORT, i)))
40             {
41                 freespaces++;
42             }
43         }
44
45         LED_OUTPORT = freespaces;
46     }
47 }

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jdefo002\_lab1\_part3.c

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1  /*
2  *  jdefo002_lab1_part3.c - April 8, 2013
3  *  Name: Joshua DeForest-Williams jdefo002@ucr.edu
4  *  CS Login: jdefo002
5  *  Partner Name: Ariana DeJaco  E-mail:adeja001@ucr.edu
6  *  Lab Section: 022
7  *  Assignment: Lab#1 Exercise# Part3
8  *  Exercise Description: Extension of the second part of this lab that writes th
9  *  e available spaces number to only PC3..PC0,          and to set PC7 to 1 if the lot
10 *  is full.
11 */
12 #include <avr/io.h>
13 #include <avr/sfr_defs.h>
14
15 // DDR = Data Direction Register. Shows which bits are outputs and which are inp
16 uts. Inputs = 0. Outputs = 1.
17
18 // Current Port Definitions
19 #define LED_DDR          DDRC
20 #define LED_INPORT       PINC
21 #define LED_OUTPORT      PORTC
22 #define SENSOR_DDR       DDRA
23 #define SENSOR_INPORT    PINA
24 #define SENSOR_OUTPORT   PORTA
25
26 // Additional macros not defines in sfr_defs.h
27 #define SET_PORT_BIT(OUTPORT, BIT)    OUTPORT |= (1 << BIT)
28 #define CLEAR_PORT_BIT(OUTPORT, BIT)  OUTPORT &= ~(1 << BIT)
29
30 int main(void)
31 {
32     SENSOR_DDR = 0x00;
33     LED_DDR = 0x8F;
34
35     char freespaces;
36
37     while(1)
38     {
39         freespaces = 0;
40         for(char i = 0; i < 4; i++)
41         {
42             if(!(bit_is_set(SENSOR_INPORT, i)))
43             {
44                 freespaces++;
45             }
46         }
47
48         if(freespaces == 0)
49         {
50             LED_OUTPORT = 0x80;
51         }
52         else
53         {
54             LED_OUTPORT = freespaces;
55         }
56     }

```