

Experiment 2: Basic Inputs

Due date : 22.11.2020 23:59

Res. Asst. T. Tolga Sari
sarita@itu.edu.tr

1 Introduction

In this experiment, you will generate various led patterns that can be created in the figure 1 depending on the state of the switches. You can look up which registers do what using [this reference](#). You can reach the design by clicking [this link](#).

- You can not use `digitalWrite` and `pinMode` functions.
- You can not use block programming provided by tinkercard.
- You must only use registers (like `PORTD`, `PIND` etc.).

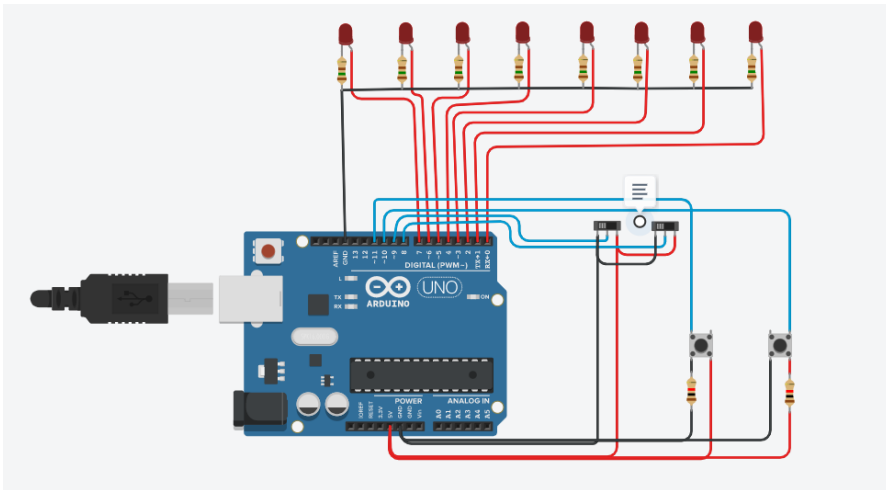


Figure 1: Circuit diagram.

2 Part 1

In this part you will code a simple 8-bit timer that counts up if no button is pressed and counts down if any button is pressed. Notice that one of the resistors of these buttons are pullup and other one is pulldown. An example counting up sequence is given in table 1. This part does not use switches.

time	led pattern
n	11111101
n+1	11111110
n+2	11111111
n+3	00000000
n+4	00000001
...	...

Table 1: Example sequence of leds with 1 meaning led is open and 0 meaning led is closed.

3 Part 2

In this part, you will write a code that generates the sequences in table 2 according to the switch positions, in this table L means switch outputs logical low and H means switch outputs logical high. If switch positions change during run time, your designs must change the pattern accordingly and start over. This part does not use buttons.

time	led pattern	time	led pattern	time	led pattern	time	led pattern
0	0000000 1	0	1 0000000	0	1 0000000	0	0000000 1
1	000000 1 0	1	0 1 000000	1	000000 1 0	1	000000 1 0
2	00000 1 00	2	00 1 00000	2	00 1 00000	2	00000 1 00
3	0000 1 000	3	000 1 0000	3	0000 1 000	3	0000 1 000
4	000 1 0000	4	0000 1 000	4	0000 1 000	4	00000 1 00
5	00 1 00000	5	00000 1 00	5	00 1 00000	5	000000 1 0
6	0 1 000000	6	000000 1 0	6	000000 1 0	6	0000000 1
7	1 0000000	7	0000000 1	7	1 0000000	7	1 0000000
8	0 1 000000	8	1 0000000	8	1 0000000	8	0 1 000000
9	00 1 00000	9	0 1 000000	9	000000 1 0	9	00 1 00000
10	000 1 0000	10	00 1 00000	10	00 1 00000	10	000 1 0000
11	0000 1 000	11	000 1 0000	11	0000 1 000	11	00 1 00000
12	00000 1 00	12	0000 1 000	12	0000 1 000	12	0 1 000000
13	000000 1 0	13	00000 1 00	13	00 1 00000	13	1 0000000
14	0000000 1	14	000000 1 0	14	000000 1 0	14	0000000 1
15	000000 1 0	15	0000000 1	15	1 0000000	15	000000 1 0
16	00000 1 00	16	1 0000000	16	1 0000000	16	00000 1 00
...

(a) Switch Position LL (b) Switch Position LH (c) Switch Position HL (d) Switch Position HH

Table 2: Example sequence of leds with 1 meaning led is open and 0 meaning led is closed.

4 Submission

- You should upload your experiment codes and report on Ninova, and please, do not send your experiment files via e-mail.
- You must upload each part's code separately to the ninova.
- Your reports must be written with Latex format. Latex report template is available on Ninova. You can use any Latex editor whichever you want. If you upload your report without Latex file, you directly get 0 as your report grade. You should upload both .pdf and .tex files of your report.
- Finally, please do not forget that late submissions are not accepted.