Laboratory 2 Report

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Course code: 1DT301

# Contents

1 Task 1

Switch –Ring counter / Johnson counterWrite a program which switch between Ring counter and Johnson counter. You should not use Interruptin this lab. The pushbutton must be checked frequently, so there is no delay between the button is pressed and the change between Ring/Johnson. Use SW0 (PA0) for the button. Each time you press the button, the program should change counter.

The code can be found on GitHub, press this link Task1

1.1 Flowchart 1
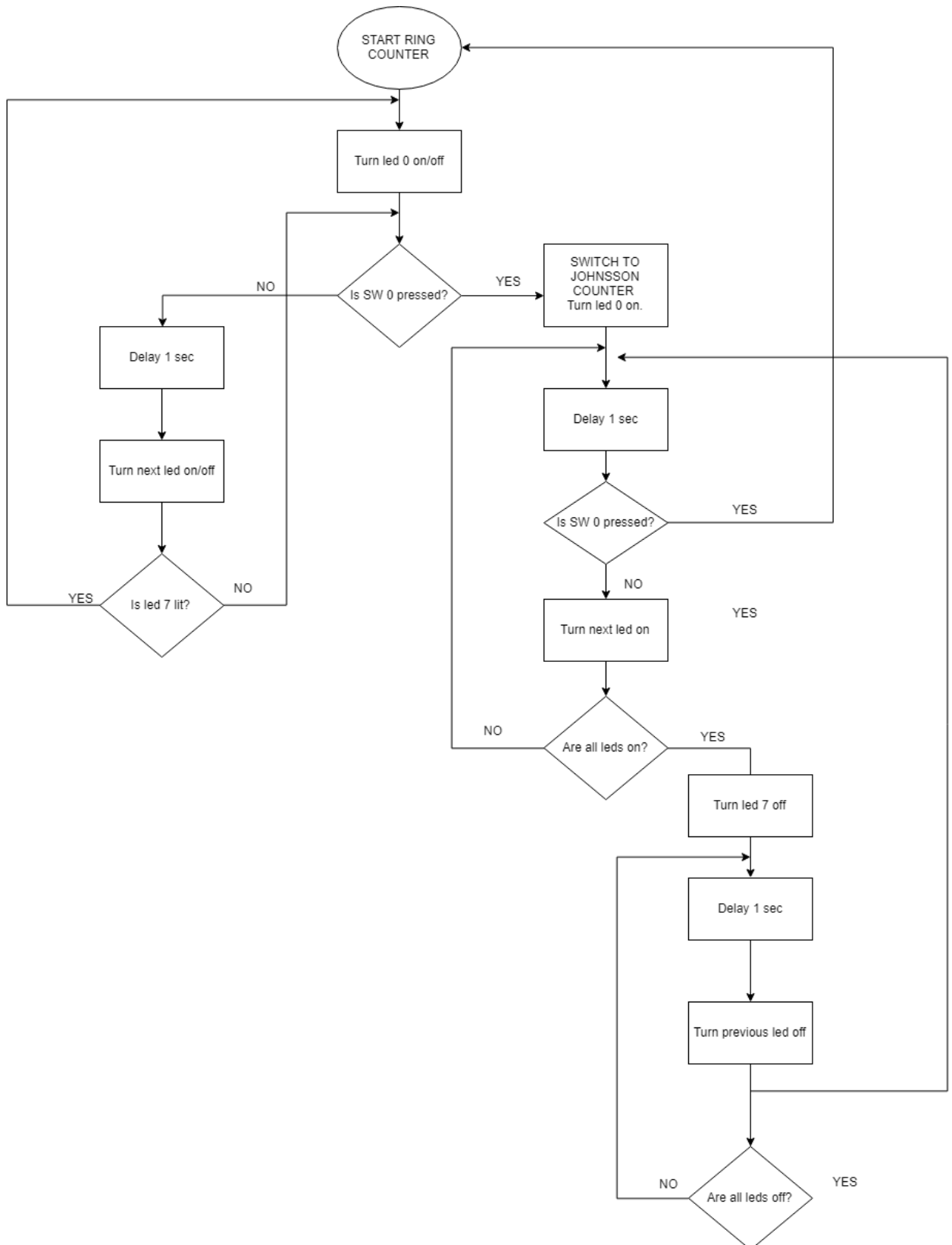
2 Task 2

Electronic dice.You should create an electronic dice. Think of the LEDs placed as in the picture below. The number 1 to 6 should be generated randomly. You could use the fact that the time you press the button varies in length.
The code can be found on GitHub, press this link Task2

2.1 Flowchart 2

START

Is switch 0 pressed?

YES

Increase binary value

Display binary value

Is switch 0 released?

YES

Increase binary value

Display binary value
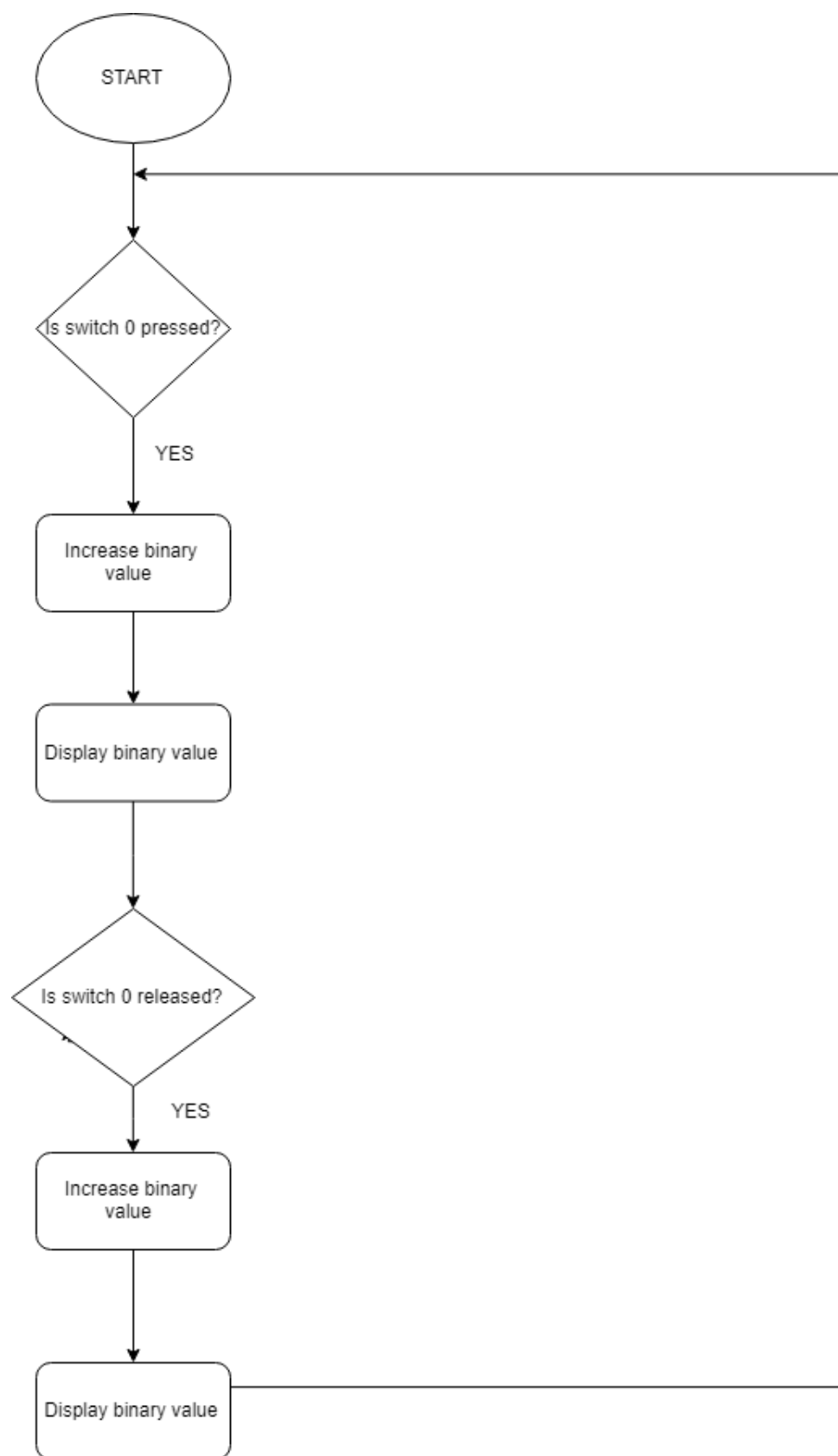
3 Task 3

Write a program that is able to count the number of changes on a switch. As a change we count when the switch SW0 goes from 0 to1 and from 1 to 0, we expect therefore positive and negative edges. We calculate the changes in a byte variable and display its value on PORTB.
The code can be found on GitHub, press this link Task3

3.1 Flowchart 3
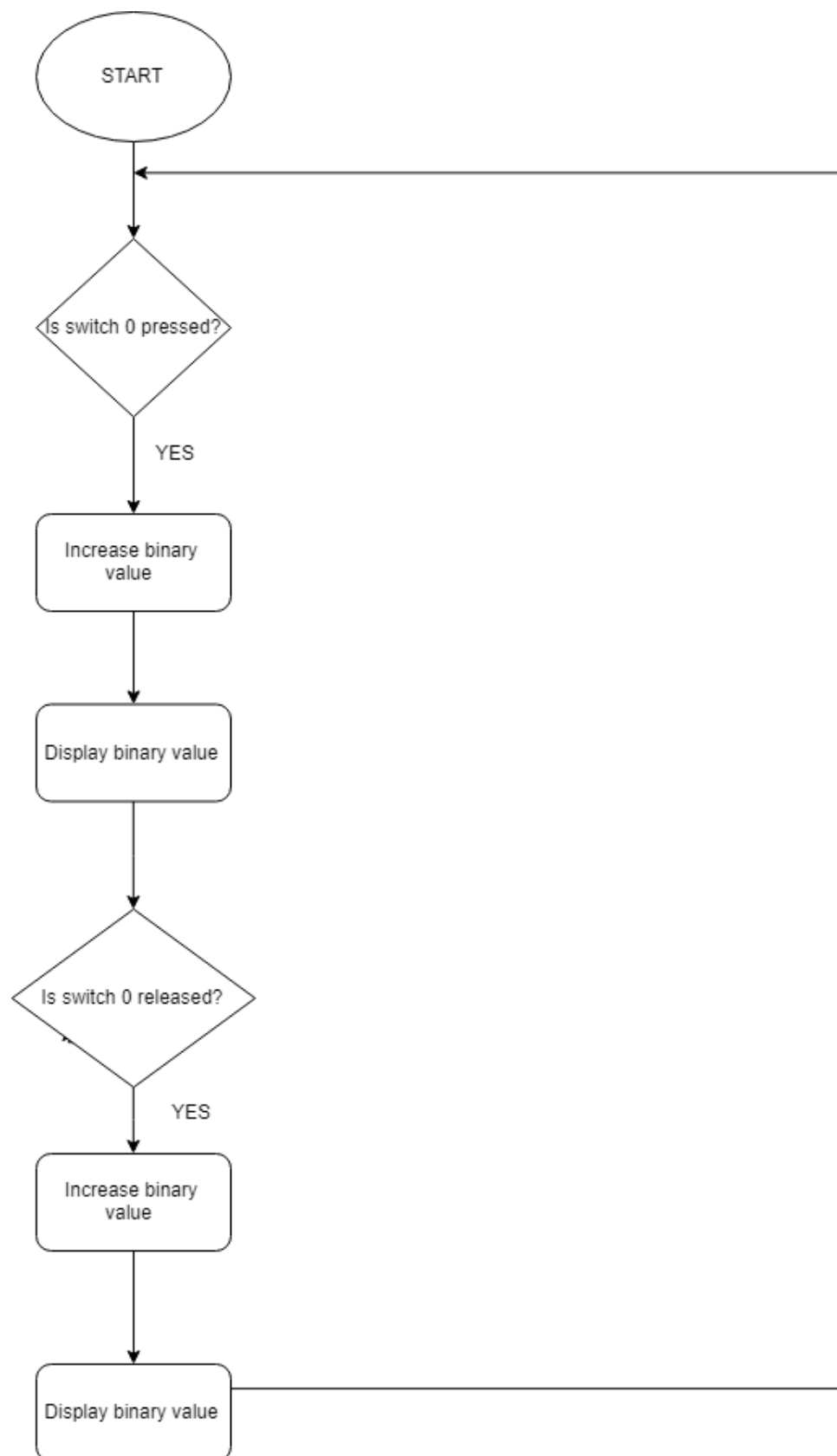
4 Task 4

Modify the program in task 5 in Lab 1to a general delay routine that can be called from other programs. It should be named wait_milliseconds.The number of milliseconds should be transferred to register pair R24, R25.
The code can be found on GitHub, press this link Task4

4.1   Flowchart 4

```
        ┌──────────────────────┐
        │     START RING       │
        │      COUNTER         │
        └──────────────────────┘
                  │
                  ▼
        ┌──────────────────────┐
        │   Prepare R24:R25    │
        └──────────────────────┘
                  │
                  ▼
        ┌──────────────────────┐
        │   Turn led 0 on/off  │
        └──────────────────────┘
                  │
                  ▼
        ┌──────────────────────┐
        │    Delay 1 msec      │
        └──────────────────────┘
                  │
                  ▼
        ┌──────────────────────┐
        │ Call wait_miliseconds│
        │      subroutine      │
        └──────────────────────┘
                  │
                  ▼
        ┌──────────────────────┐
        │  Subtract 1 until    │
        │   register pair      │
        │    exhausted         │
        └──────────────────────┘
                  │
                  ▼
        ┌──────────────────────┐
        │ Turn next led on/off │◄─────────┐
        └──────────────────────┘          │
                  │                        │
                  ▼                        │
              ◇ Is led 7 lit? ◇            │
         YES  /            \  NO           │
         ◄───                ───────────────┘
```

START RING COUNTER

Prepare R24:R25

Turn led 0 on/off

Delay 1 msec

Call wait_miliseconds subroutine

Subtract 1 until register pair exhausted

Turn next led on/off

YES

Is led 7 lit?

NO