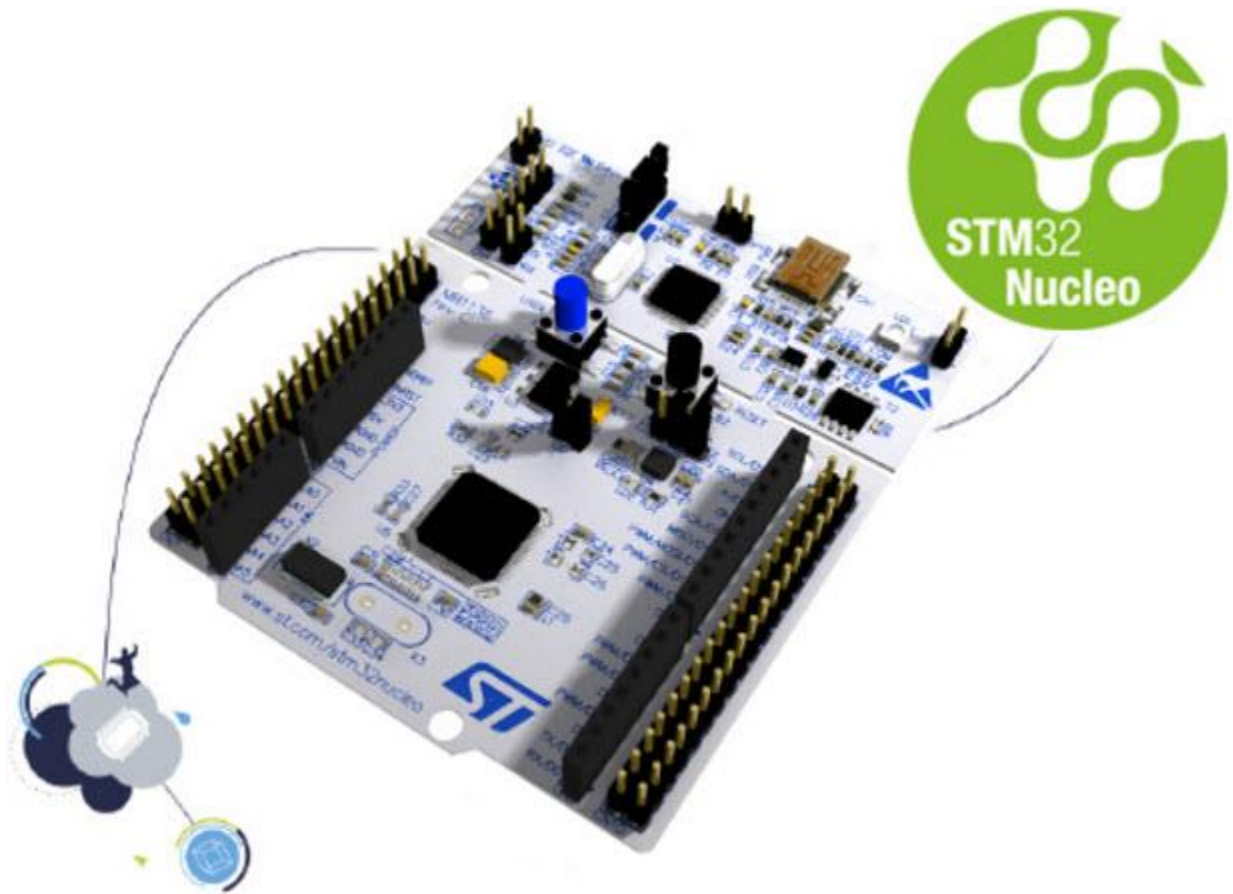


Technical report

Assignment 1:GPIO

By Veselin Atanasov



Teachers: Rene Bakx, Robert Verhijen

Date:10-09-2024

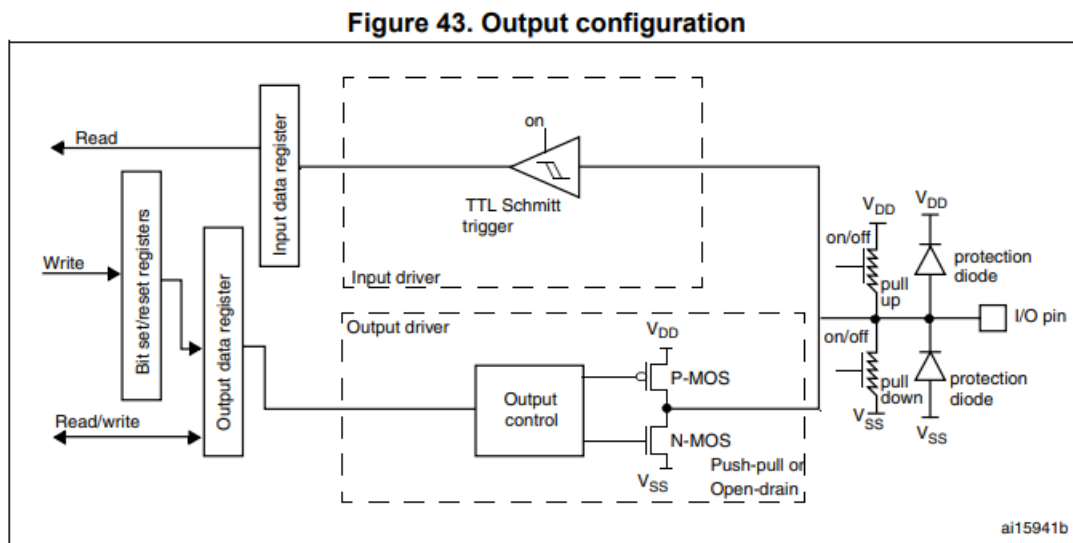
Contents

Introduction	3
Connection diagram	3
Description	4
Conclusion	4
References	5

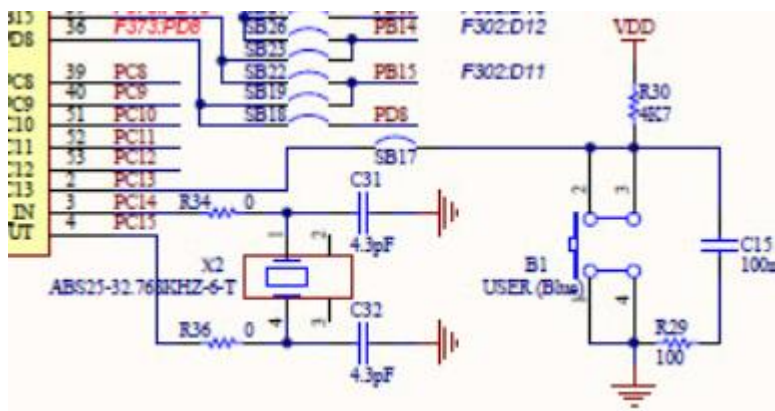
Introduction

The assignment is to create a small program to show utilization of GPIO functionality using CMSIS and the STM32 NUCLEO F303RE board, by analyzing the documentation of the board. The goal I set, is to create a program which alternates between two states: TOGGLE and BLINK.

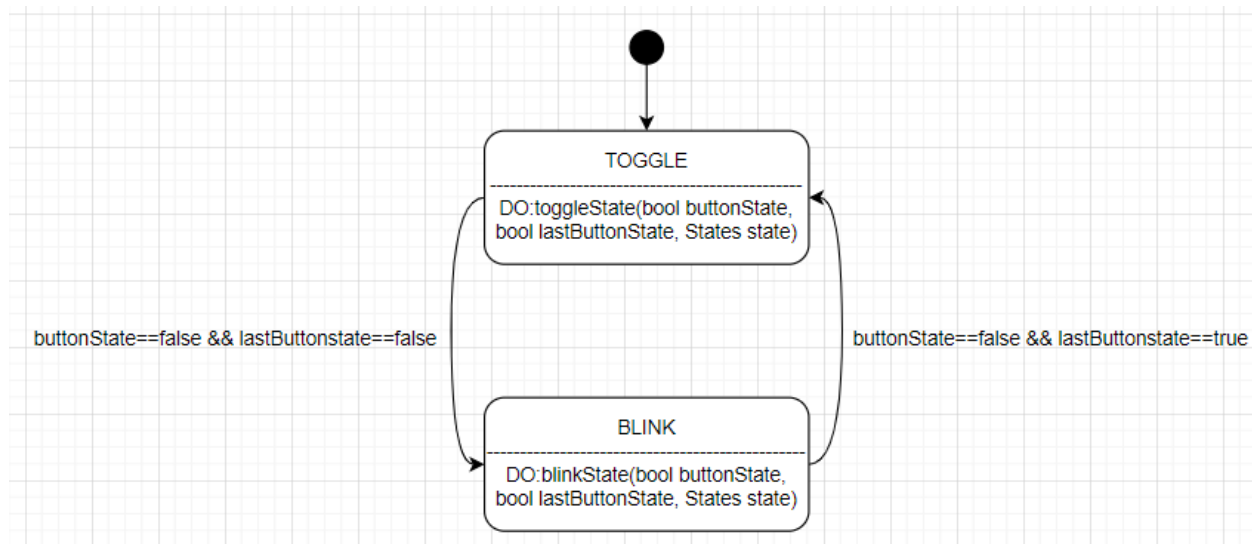
Connection diagram



This figure shows the schematic of a pin



The schematic of the PC13 pin



Code state diagram

Description

In the toggle state, the led will be toggled on and off using the button and in the blink state the led will blink with a frequency of 0.5Hz while the button is held down. The transition of states depends on the button is pressed and held down or not.

The first thing to do is set up the timers and the pins. The timers are set up by the SystemClock_Config() function and the pins are set up by the GPIOX_Init() function. The GPIOX_Init() is pretty much the same as the "Hello, world!" example the difference being that now also PC13 is set up. First the timer on PORT C is set by setting the 19th byte in AHBNER register, then the bits on the 26th and 27th position in the MODER register are cleared. These operations set up the PC13 pin to input(PC13 corresponds to the B1 button on the board).

To read the state on the 13th pin(bit) of the C port IDR register(the ODR register is used for writing to pins) and & operation is done with a mask of 0x01. The result then is passed to a boolean variable. Also there is a lastButtonState variable to save the last state of the button. This variable is important for state transitioning(see code state diagram). When the button is pressed in the toggle state the 5th bit on the ODR register of PORT A is flipped, which in result changes the state of the led(on/off). When the button is held down the state changes to blink and in this state while the button is held down the state of the led flips every second, if the button is released, the state is changed to toggle.

Conclusion

In conclusion, this assignment was a good introduction to the STM32 board, its GPIO capabilities and CMSIS. It also required to do some datasheet reading which is very important in our profession.

References

STM32 datasheet

PC13 schematic - <https://www.arrow.com/en/reference-designs/nucleo-f303re-stm32-nucleo-development-board-with-stm32f303ret6-mcu-supports-arduino-and-st-morpho-connectivity/f2ac4e6d8de39a386daa24f3790ab658fb336eeefaf9>