

HOMework 1

Due date:

Sunday, September 22, 14:30

1- Answer the following question, using NUCLEO manual and datasheet:

- a. If you need information about the connection within the NUCLEO board (e.g. at which microcontroller pin is LD2 connected?) which document would you use?
- b. At which page of the NUCLEO manual do you find the correspondence of extension connectors pins and microcontroller pins?
- c. Which is the meaning of different blinking speed and colors of LD1 in the NUCLEO board?
- d. What is the Jumper J6 used for?
- e. What is a solder bridge?
- f. What do you have to do if you want to use PH0 and PH1 as normal GPIO?
- g. On your NUCLEO board how is the LSE clock configured? Can you use PC14 and PC15 as normal GPIO?
- h. If you want to send/receive data with a virtual serial port (to communicate with a computer), which pins do you select and which solder bridge should be connected/disconnected?
- i. In the NUCLEO board schematics which is the component name of the F401RE microcontroller and of the ST-Link microcontroller?
- j. Which pin of the morpho connector can be connected to PA6?

2- Look at the STM32F401RE data-sheet and answer the following questions:

- a. Which is the meaning of each part of the name STM32F401RE?
- b. Which is the package of the STM32F401RE?
- c. What voltages are allowed as Vdd power supply? Which is the maximum acceptable variations between different pins of Vdd? What is and how is Vbat used?
- d. Which is the typical current consumption (order of magnitude)?
- e. Which peripherals are connected to AHB1, APB1 and APB2?

- f. Which is the difference in terms of clock frequency between APB1 and APB2?
- g. How many channels does the ADC have? How many bits? Which is the maximum sampling frequency (and how is it affected by Vdda)?
- h. What is the Analog Watchdog?
- i. Which are the values of the S&H resistance and capacitance?
- j. Which is the maximum CPU clock frequency?
- k. Which is the range of operating frequencies of HSE and LSE clocks?
- l. List all the communication interfaces (and also how many of them).
- m. Which are the typical clock frequencies for the I2C and SPI interfaces?
- n. What is the NVIC? How many priority levels can it manage?
- o. How large is the embedded flash memory? And the SRAM memory?
- p. What is the DMA? Which peripherals can use the DMA? How many streams are supported at maximum? What is the circular buffer management?
- q. What is the RTC?
- r. What is PIN60 in the STM32F401RE?
- s. What is an alternate function? Make some examples.
- t. Which is the maximum source/sink source current of the GPIOs? What are the output voltage levels of GPIOs?
- u. Which is the value of the internal reference voltage?