FACULTY OF ELECTRICAL ENGINEERING AND
COMPUTING
DEPARTMENT OF CONTROL AND COMPUTER ENGINEERING

Computer Architecture 1R

2nd Laboratory Exercise

December 2024

1 Task

In the computer system, there is an ARM processor, the GPIO1 module at address **0xFFFF0F00**, the GPIO2 module at address **0xFFFF0B00**, and the RTC module at address **0xFFFF0E00**. On **port A** of the **GPIO2** module, LED diodes and a button are connected as follows:

- bit 0 - button

- bit 5 - red

- bit 6 - yellow

- bit 7 - green

To **port B** of the **GPIO1** module, an LCD display described in the lectures is connected. The task is to implement the functionality of a simple coffee machine using this system. The machine can only make coffee with milk according to the cycles whose states are defined in Table 1.

Table 1: Overview of Possible States

#	State Description	LED State			LCD Output
		Red	Yellow	Green	
1	Machine ready for operation	0	0	0	WELCOME
2	Heating the machine	1	0	0	HEATING
3	Pouring coffee	0	1	0	COFFEE
4	Pouring milk	0	0	1	MILK
5	Coffee is done	1	1	1	DONE

The initial state of the machine is **state 1**. The cycle (**state 2 - state 5**) is started by pressing the button within the simulation. When the cycle ends, the machine should return to **state 1** and wait for the button to be pressed again. States 2, 3, 4, and 5 each have an equal duration of exactly **10 seconds**, during which the LED diodes specified in Table 1 are lit. The cycle duration must be measured using the RTC module, which operates in **interrupt mode** and is connected to the **IRQ** pin. The input to the RTC module is connected to a pulse generator with a frequency of **265 Hz**.

The output describing each state should be implemented with separate **subroutines**, where each subroutine for displaying a character on the LCD uses the **LCDWR** subroutine explained in the lectures.

2 Submission

Submit your **own** solutions by sending it by e-mail either in their original format named **lab2.a** or in a .zip archive at the e-mail address **matko.batos@fer.hr** by Wednesday, December 18th 2024 at 23:59.

For any questions, we are available via email.