Lab Class 3
23.09.2021

- **Synchronous counters.**
  Toggle flip-flops. Monostable multivibrators.

Preliminary Activity

- To see how the final stopwatch will look like, please upload *startStopLapReset_LCD.bit* on the FPGA board via impact and try it!

Problems

1. Implementation of a synchronous module **toggle flip-flop**.
2. Implementation (by means of a toggle flip-flop) of a *toggle pushbutton* to switch on/off an LED.
3. Observation of the bouncing effect in a pushbutton.
4. Implementation of a synchronous module **monostable multivibrator**.
5. Implementation, by means of a monostable multivibrator and an improved *toggle pushbutton*, of a timer to switch on an LED for a given time (equal to 1 s, or programmable through the switches).
6. Implementation (by means of a toggle flip-flop) of an improved *toggle pushbutton* to switch on/off an LED, without bouncing effect.

At the end of each step show the result to the lecturer.

Upon eliminating the unuseful files (only *.v*, *.ucf*, *.xise* are necessary), compress each working folder via
`tar czf labClass_3_<names>.tgz <Folder>`
and upload the resulting compressed file to the Moodle platform.

Additional problems (proposed as a homework)

- Continuation of the development of a stopwatch with 1/100 s resolution and start/stop, lap, reset commands (via 3 pushbuttons).

Upon eliminating the unuseful files (only *.v*, *.ucf*, *.xise* are necessary), compress each working folder via
`tar czf labClass_3_<names>_additional.tgz <Folder>`
and upload the resulting compressed file to the Moodle platform.

At the first favorable circumstance, show the result to the lecturer.