EEEN 20050 Digital Electronics

Homework 2: Digital Clock Design

In Lab 4, you have designed a digital clock that can display hours, minutes and seconds in decimal numbers on a 7-segment LED display as "HH:MM:SS". In this homework, you would need to add the following functionalities into the digital clock:

1. Include the option for the clock to be changed from 24-hour mode to 12-hour mode. In 12-hour mode, use "A" on LED indicates AM and "P" indicates PM.
2. Include an alarm feature where a LED flashing is activated at a chosen time. The user should be able to set the time, e.g., via pushing the buttons to set the time as you usually do with a real clock. The alarm can be turned off manually or keep as active for 30 seconds and then off.
3. Include a count-up/count-down timer. For instance, for counting up, you can push a button to start counting (e.g., in seconds) and push again, it stops. For counting down, you may set a time (e.g., 2 minutes) and push the button, it will start counting down until the time is finished.

Design the circuit and simulate it in Logisim to check whether it works properly. Use your student number to name the files as below:

(1) *Student Number*_ Digital Clock_Homework2.circ
(2) *Student Number*_Homework2_Report.doc or .pdf
(3) Zip two files together, name the file as *Student Number_Homework2*.zip

This is an open assignment, which is up to you to find suitable solutions to finish the design. You may ask questions, but we won't give you a clear answer how to do it in detail. The knowledge you gained from this course should be enough to accomplish this task.

Treat this as a real product you are designing. Try to make the design as neat as possible and design a good interface to facilitate users to operate the clock.

In the report, you should give detailed design procedures for each step. You should also write an additional note to show the user how the clock can be operated, e.g., a short user manual you usually receive when you buy a watch/clock.

The report and circuit simulation file must be submitted to Brightspace by 9:00 PM on Tuesday 1st December. This homework count 15% of your final grade.