Lab 9: VGA

Objective

- ✓ Implement the VGA display function

Prerequisite

- ✓ Fundamentals of logic gates.
- ✓ Logic modeling in Verilog HDL.
- ✓ VGA displaying techniques

Experiments

1. VGA displaying functions.
   - 1.1 Inputs of the VGA controller are **clk, reset, en** and outputs of the VGA controller are hsync, vsync, vga_red[3:0], vga_green[3:0], vga_blue[3:0].
   - 1.2 At the beginning or when **reset** (button) is pressed, the VGA display shows the image (e.g. amumu.jpg). The VGA image stay still until **en** (button) is pressed.
   - 1.3 Pressing odd times **en** button to start/resume scrolling. Pressing even times **en** button to pause scrolling. Counter for **en** press is reset to zero when **reset** is pressed.

2. Calculator display.
   - 2.1 Combine the key board controller and VGA displaying controller to design a calculator with 2-digit addition/subtraction/multiplication. The display function should be the same as usual calculator or APP in the smartphone.

3. TETRIS element generator
   - 3.1 Generate basic elements of TETRIC (as follows) randomly in the VGA monitor, and plot each of them in the center of the first row of the display, which is a 10 x 20 (WxH) square 2D playing space.
   - 3.2 Each generated basic elements moves down by the step of a square at the speed of 1Hz. Finally, they disappear below the playing space. When a basic element disappears, a new basic element is generated again and fall down again repeatedly.
   - 3.3 (Bonus) The same function of 3.1 and 3.2 are designed except that basic elements are stacked up until they are higher than the height of the playing space.