# NCTU - CS Digital System Lab.

# FPGA LAB 10 _ Frogger _ VGA

## Data Preparation

1.Prepare following files by yourselves:

A. Frogger.v

B. Frogger.ucf

## Design Description

In this lab, you should design “the frog crossed the street”, which is the same as the following figure, and show it on the screen.

There are three streets, one rail, two river courses, and one cave. Initially, the frog (orange) should be at the bottom and rightmost of the screen. When the game start, you can press the direction keys to where you want to go.

There are four rules you should follow:

**1.** If the frog was rubbed or hit by the car or train, and the game is over.

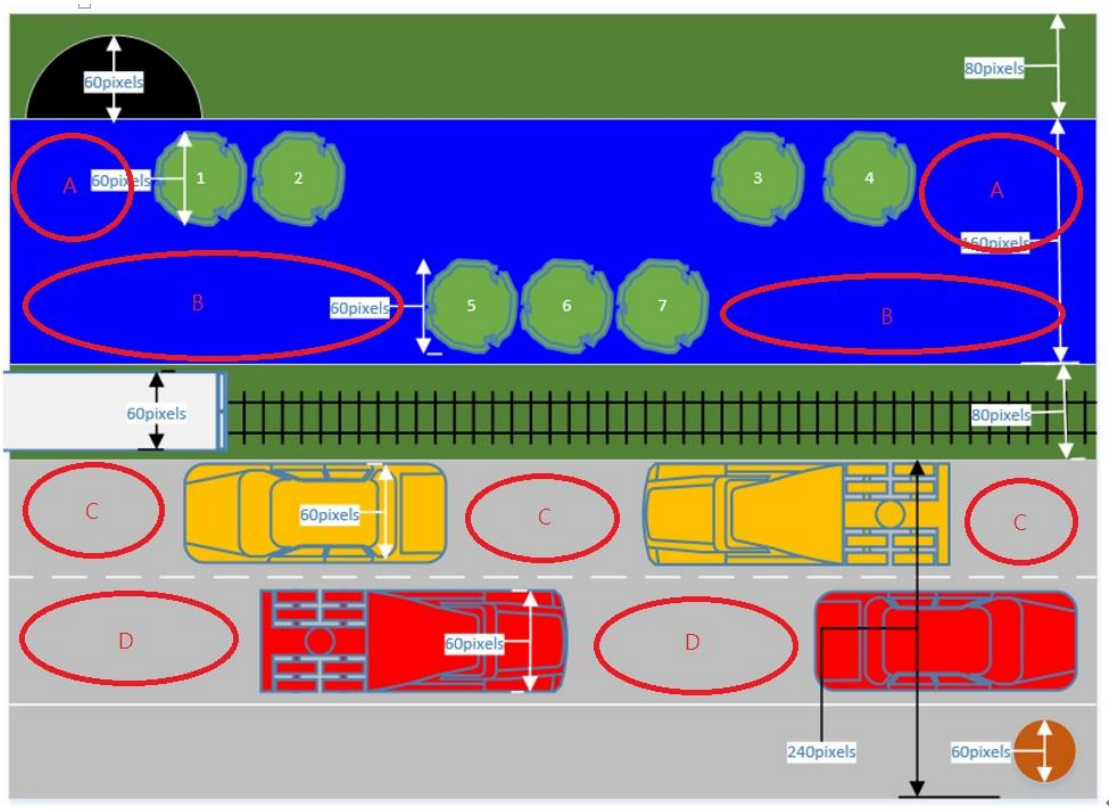
**2.** If the frog moves too late to stop on the leaves and it will fall into the river, then the game is over.

**3.** The other side of the river is a cave that is the end.

**4.** You can use the different object to present the cars, train, and leaves but their action and color must be the same.

(The objects in the picture are attached to the attachment)

Finally, you should display **the words “Game Over”** on the screen when the game is over.




## Specifications

1. Top module name : Frogger.v
2. It is **asynchronous** reset
3. The North button on ours fpga board is **start button** of this game.
4. Initially, the frog (orange) should be at the bottom and rightmost of the screen.
5. When the game start, the player can press the direction keys of keyboard to go where you want to go.
6. The number 1-4 leaves always move to right.
7. The number 5-7 leaves always move to left.
8. The white train moves always move to right.
9. The yellow cars move always move to left.
10. The red cars always move to right.

11. The distance of the same letters must be the same.
12. The length of each car must be the same.
13. The rate of red car's movement is **six pixels per one second**.
14. The rate of yellow car's movement is **eight pixels per one second**.
15. The rate of train's movement is **six pixels per one second.**
16. The rate of all leaves' movement is **eight pixels per one second**.
17. The game is over if the frog was rubbed or hit by the car or train.
18. The game is over if the frog moves too late to stop on the leaves.
19. You should display **"Game Over"** on the screen when the game is over.
20. You should implement this lab in the **ISE environment**.
21. Add white lines on roads and river courses.
22. The color of the road changed to black.

## Grading Policy

Function Validity: 80%

Questions: 20%

## Note

Name to the file name of .v file and .rar file before upload file on e3 platform:

1. LAB 10_0556123_陳小明.v
2. LAB 10_0556123_陳小明.rar