DigitLab04 Final Project 104-12-03

**Task Assignment**

Build up a module that would interact with users in a context of primitive video game, details of which are given below.

**[A] General descriptions**

(a) module outputs:

VGA and LEDs of the FPGA board;

(b) module inputs:

4 slide switches, 4 push button switches, and

Rotary-knob of the FPGA board;

(c) interactive behaviors of the module:

While activated, the activities of two actors in the game theme basically comprise

1] *the hunter* ( GP hereafter) cruising in either direction along the baseline of the display and meanwhile chasing the falling prey;

2] *the prey* ( TP hereafter) falling off from ceiling of the display;

3] a status board at upper-right portion of the display reflecting the number of TPs remaining to come out;

4] a scoring board by LEDs indicating the hunting score of GP,

of which the scenario is graphically shown below.

[ scenario while the module is activated ]

TP falling off **status board**

Falling TP

GP cruising and pursuing

in either direction

**LED scoring board**

**[B] Detailed requirements**

(a) GP, in the size of 32x32 pixels and with mouth facing upward, moves at the bottom of the display, either leftward or rightward as controlled by the rotation of the rotary-knob.

(b) TP, in the size of 20x20 pixels,

1] may be in the shapes of circle, square, or triangle;

2] may be in at least 3 colors of one’s choice;

3] starts showing up in sequence when the rotary-knob is pressed in a game round;

4] gets off the ceiling and starts falling at a speed of its own

5] vanishes when touching the baseline of the display;

6] vanishes when caught by GP.

(c) Every round of the game gets started by *RESET*, and ends when the last TP

gets caught by GP or when it touches the baseline of the display (i.e., when

the status board shows 0).

(d) In every round of the game, the rotary-knob need be pressed only once to initiate the TP falling sequence.

(e) When the rotary-knob is pressed, at least 10 TPs start appearing in sequence, at random locations along the ceiling (between 50 to 750), together with randomness in shapes, in colors, in time-gap of appearances between two successive TPs, as well as in the time-span a TP takes in its falling journey.

1] “randomness” required in the TP falling sequence is not the one in rigorous

mathematic sense;

2] visual “randomness” in the sequence would be deemed as acceptable if

\* in any particular round of the game, the shape/color variation, the distance and time-gap between every two GPs appear irregular,

\* in any two successive rounds of the game, “random” behavior in the leading sequence is different from that of the next,

\* any behaviors of more complexity than as stated above.

3] TP should disappear when it is caught by GP or when it touches the bottom line of the display.

(f) The status board starts with at least 10 on *RESET* and ends with 0. And when a new TP appears at display ceiling, the count decrements by 1.

(g) The scoring board starts with 0 on *RESET* and ends with the score GP achieves (which would be the initial value of the status board if GP does not miss any TP). And when GP seizes a TP, the scoring count increments by 1.

**[C] Rules of grading evaluation**

A total of 120 points will be earned by how well the operational requirements

to the target module are fulfilled, as specified below.

1. GP display:

with engorging mouth (10pt)

with still mouth (5pt)

1. GP cruising control:

leftward (5pt) // rotary-knob rotation

rightward (5pt)

1. TPs start appearing: (5pt) // rotary-knob pressed
2. Shapes of TP:

any one shape (5pt)

any two shapes (10pt)

all three shapes (20pt)

1. # of TPs in a round: (10pt) // 1 pt. for each TP,

// at least 10 in total;

1. LED scoring record: (5pt)

status board: (5pt)

1. TP vanishing on seizure: (5pt)

TP vanishing on touching ground: (5pt)

(h) “randomness” in TP sequence:

times + locations (5pt)

times + locations (10pt)

+ shapes + colors

+ falling-speed

1. Final score board at (400, 300) (20pt)

[ the final score board does not necessarily

made the same as the one shown here;

design out of one’s own ingenuity is encouraged ]

1. Extra bonus for any intriguing functionalities added [80pt top]

**[notes]** any parameters required in the module design but not specified in the requirement lists ([A] and [B]) are at one’s own disposal;

e.g., the use of all unmentioned input switches;

colors of GP, TP, boards, decimals;

TP shape(s) of your own (perhaps a pocket-monster-in-yellow ☺)

size, locations of boards;

speed of motions;

[**D] Schedule and check points** (tentative)

2016-01-08

CD: regular lecturing sessions

oral PPT-presentation by class members

IJK: project demonstration

2014-12-25

CD: regular lecturing sessions

oral PPT-presentation by class members

further revise to one’s proposal

IJK: demonstration of project partial results: visually showing code c omponents or system modules already workable

2014-12-18

CD: regular lecturing sessions

oral PPT-presentation by class members

revise to one’s proposal

IJK: demonstration of project partial results: visually showing code components already workable

2014-12-11

CD: project proposal in details, regarding

1) the scenario to appear during the proceeding of game

\* how the game is going to proceed once being activated

\* behaviors of actors in the theme and interactions in between

\* game status evolving as the game goes on

\* static and dynamic scenic details in the game ought to be addressed in graphic presentation.

\* control interfaces for the game player

\* overall code structure/individual code components

\*\* function of the components

\*\* inputs/outputs of all components

\*\* interconnections among components

\* etc., … all one can think of in advance

2) any new elements out of one’s own ingenuity, besides those

required in the specifications, to be added into the game

[note] \* the proposal should be prepared in no less than five pages

of PPT-form

\* a zone under E3-platform of the course “final-project-forum”

will be establish shortly, and submission of the PPT-form

to the forum will be due 12:00 12/11

\* coding parts may be skipped in the proposal due on 12/11 and added up one week later

IJK: routing lab-work if still any;

otherwise, oral presentation of one’s PPT-proposal for every individual class member will be arranged.

2014-12-04

CD: project specifications released

code samples for major IO components released

major IO components technical briefing

IJK: routine lab-work