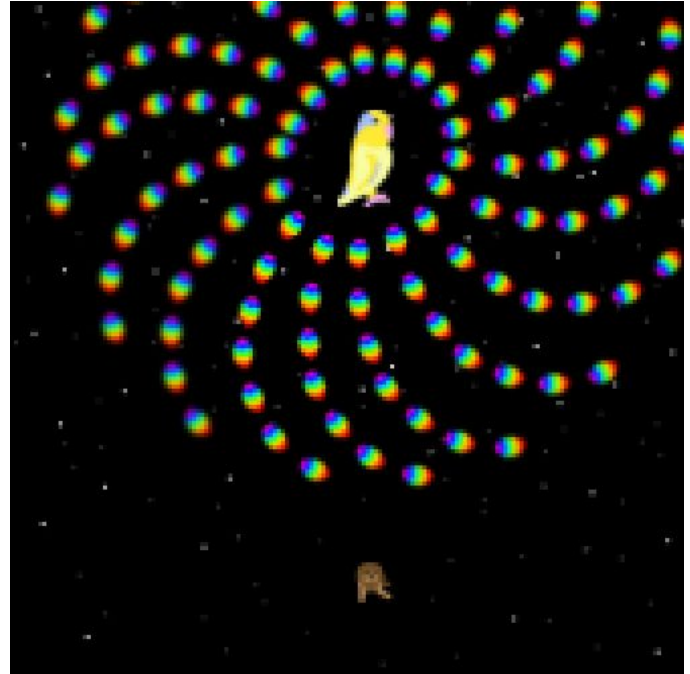


Bullet Hell Game: Bad Bird!

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Design

- Gameplay
- Control
- Graphics
- Results



Design Vision drawn in Photoshop

Hardware - Verilator

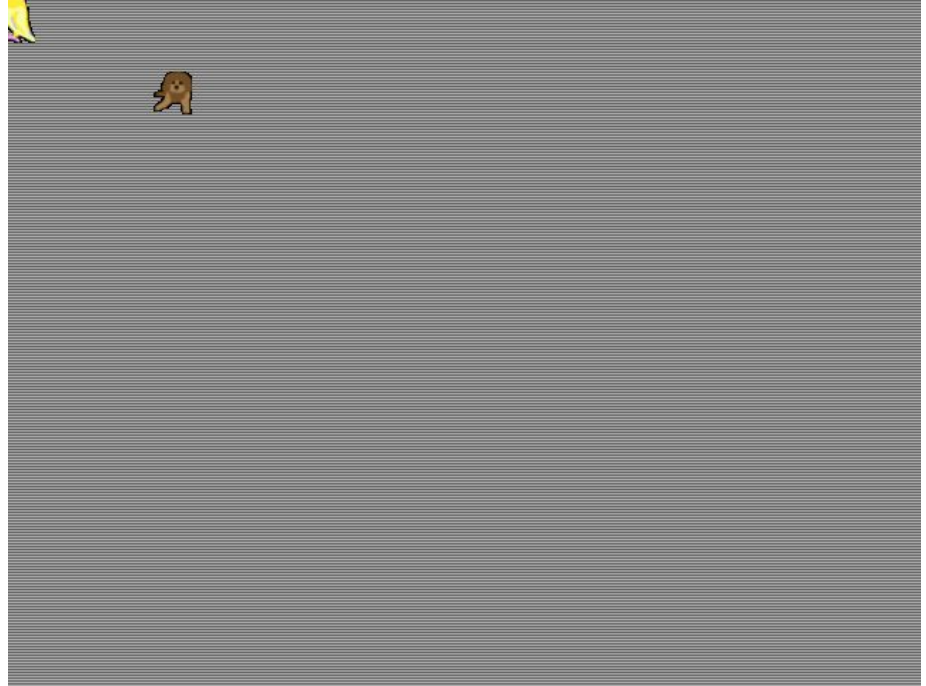
Connect to VGA module.

Feed data to module like Avalon bus.

Get VGA output signals over time.

Draw a frame base on output signals.

Preview the design before run Quartus.



A preview frame on early stage

Hardware - Sprites

Maximum size 30px * 40px

Convert images to a SV module.

- Input: image number, line number.
- Output: 30px RGB line pattern.

Use built in RAM/ROM and Memory Initialization File.

- Work well on FPGA, but MIF not working on Verilator.

Hardware - VGA Display

2 RGB line buffer.

Modify the next line, when display the current line.

Clear the buffer after each line is displayed.

From Avalon bus:

- A list of sprite number.
- A list of sprite vertical position.
- A list of sprite horizontal position.
- Boss health.

Hardware - VGA Display

Modify line buffer:

- Loop over the list, for each element:

 - Request the line pattern of the sprite.









 - Skip to next element if it does not appear in this line.

 - For each pixel in line pattern:

 - Copy to line buffer if the pixel is not 24'h000000.

Able to display 128 sprites in a frame.

Able to display at least 30 sprites in a line. (maybe more)

Objects	Graphics	Size (pixel)	Number	Total Size (bit)
Boss		40 * 25	3	72000
Player		30 * 30	3	64800
Bullet 1		25 * 25	4	60000
Bullet 2		25 * 25	4	60000
Bullet 3		14 * 13	1	4368
Player's Health		15 * 15	3	16200
Result	 	60 * 50	2	144000
Total				469368

Resolved: Result Image Too Large



lose1.png



lose2.png



lose3.png



lose4.png



lose5.png



lose6.png



lose7.png



lose8.png



lose9.png



lose10.png



lose11.png



lose12.png



lose13.png



lose14.png



win1.png



win2.png



win3.png



win4.png



win5.png



win6.png



win7.png



win8.png



win9.png



win10.png



win11.png



win12.png



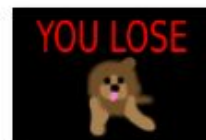
win13.png



win14.png



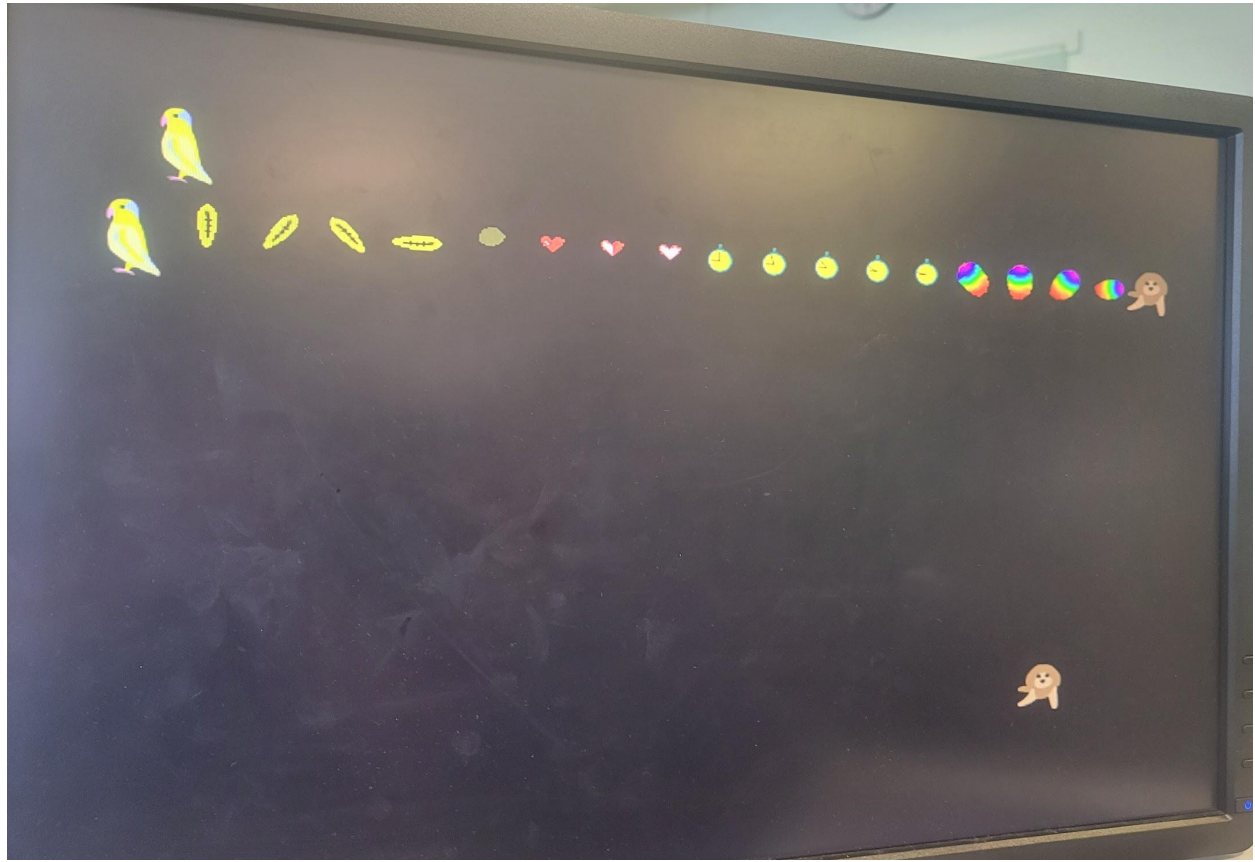
win15.png

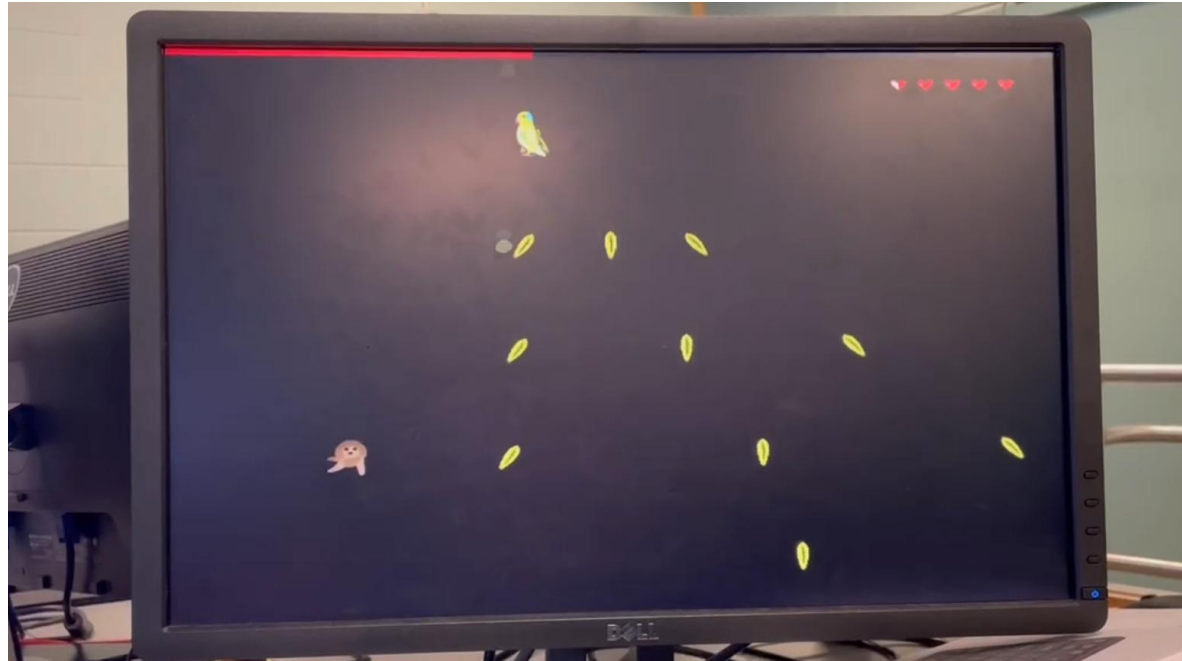


youlose.png

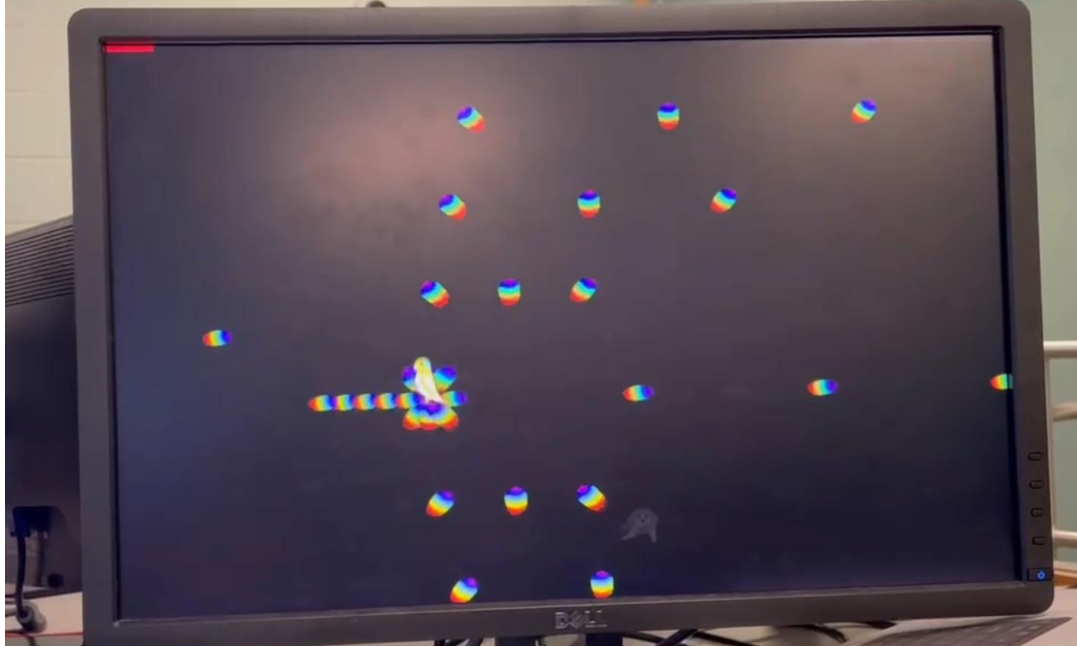
Algorithm

- Keyboard Control and Thread (Lab2, libusb)
- Modified Device Driver (Lab3)
- Player's Move and Attack
- Boss's Move and Attack
- Result Calculation

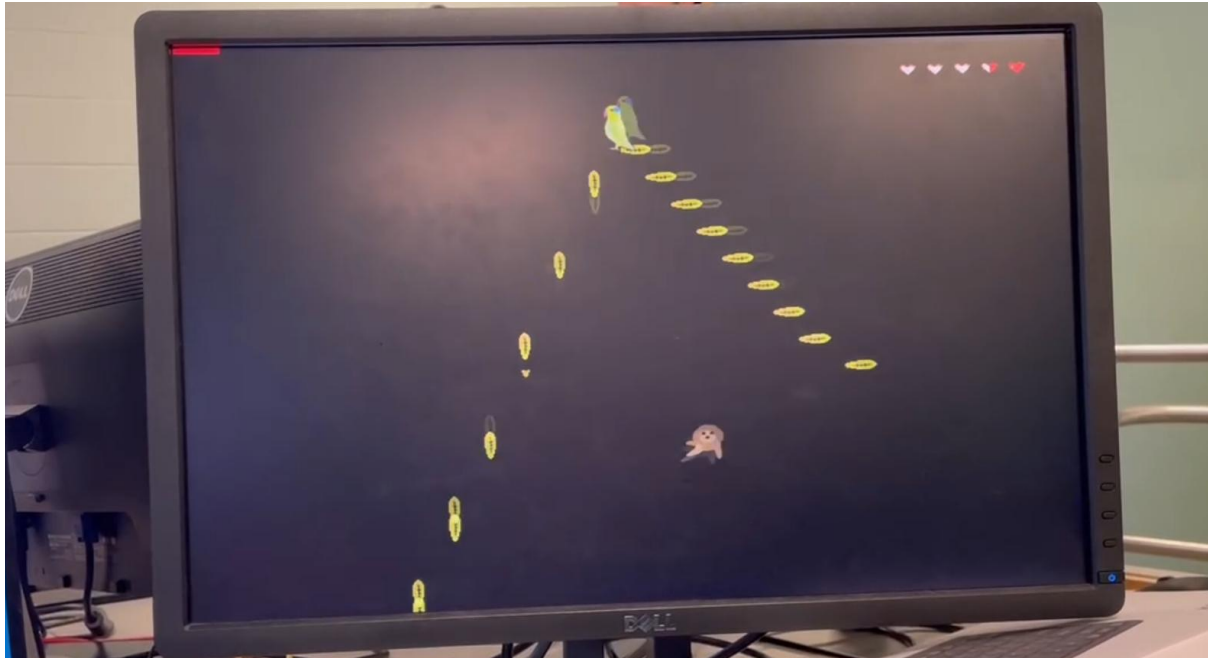




Boss's attack and move pattern no.1



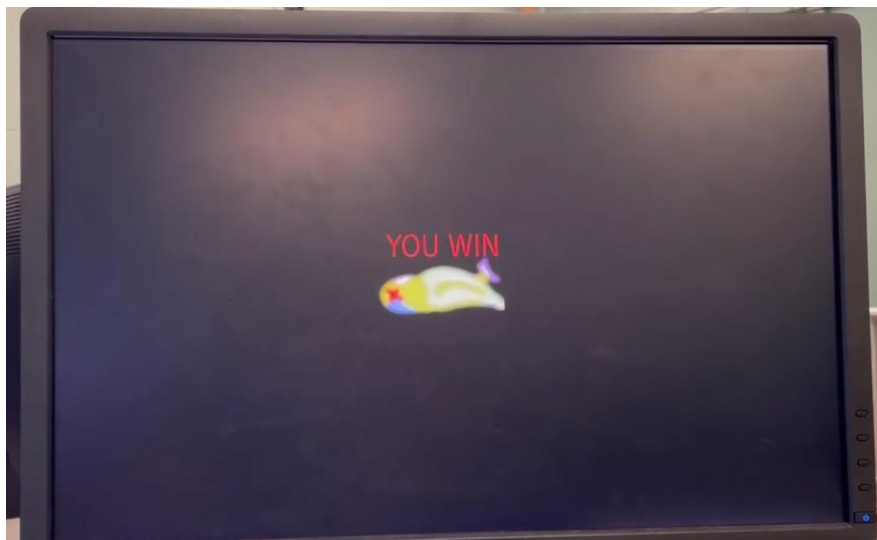
Boss's attack and move pattern no.2



Boss's attack and move pattern no.3



Boss's attack and move pattern no.4



Results

Demo

