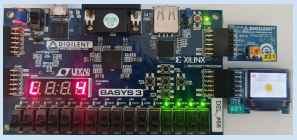
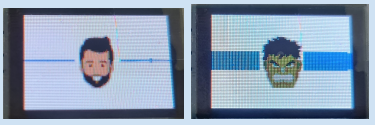
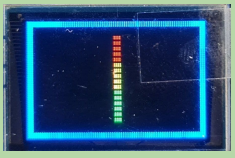
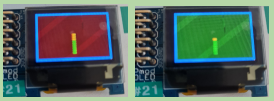
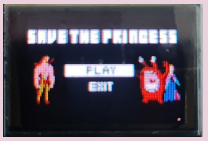
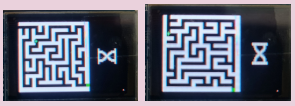
EE2026 FPGA Design Project Report

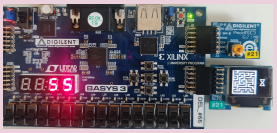
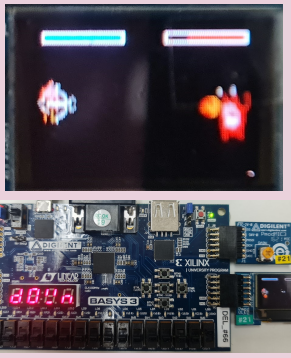
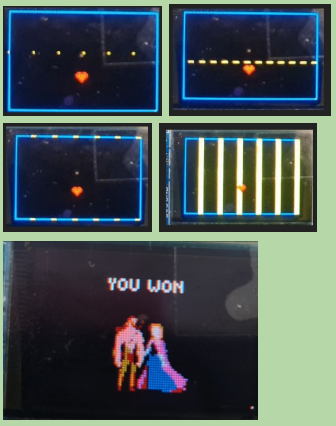
Team members:
Student A (Real-Time Volume Indicator): Nguyen Van Binh - Matric No. A0219795L
Student B (Graphical Visualisations and configurations): Nigel Ng - Matric No. A0217408H

Lab session: Monday P.M.

User Guide

Feature	Feature Marks For	Input Devices	Feature Description	Photos/ Images
Interactive Menu / Game Finite State Machine	Binh	btnU btnD btnC SW15	btnU: move the selecting box up btnD: move the selecting box down btnC: choose the mode to go to SW15 is 1: return to the main menu at any time	
Real-Time Audio Indicator	Binh	SW0 Pmod mic	SW0 is 0: 7 segment display and LEDs changing according to the peak value from mic_in SW0 is 1: 7 segment display and LEDs changing according to the sampled mic_in value	
Sound Wave Sampling (Bar mode / Disco mode)	Binh	SW1 Pmod mic	SW1 is 1: OLED shows the “disco ball” according to mic_in value, the color of the ball changes randomly SW1 is 1: OLED shows the sampling mic_in values as vertical bars, the color of the bars changes randomly	
“We have the Hulk”	Binh	SW2 Pmod mic	SW2 is 1: Toggle this mode If the peak value from mic_in (which is shown as a sound wave) is big enough, the man becomes Hulk.	
Graphical Visualisations and configurations	Nigel	SW[0] SW[1] SW[2] Pmod mic	Turn on / off border Turn on / off thicker border Turn on volume bar Reads in peak values and maps it out on a 16-bits scale, displayed on a colourful bar	
“What’s your favourite colour?”	Nigel	SW[14:11] SW[10:7] SW[6:4]	Set red values Set green values Set blue values	
Save The Princess	Team	**<u>Storyline</u>** Princess Chua is kidnapped by the Red “bitstream” monster and friends. You, as Prince Alio, will come to the rescue. Solve the maze, defeat the monster holding the gates and survive the final boss to save the Princess.		
The A-Maze-ing Challenge	Team	btnC, btnU, btnD, btnR, btnL	**Mission**: Solve the maze within <u>60 seconds</u>. If the player touches the wall, the maze will be transposed[1], and the player has to re-orientate their character. The time left is shown on the 7 segment display Press btnU, btnD, btnR, btnL to go up, down, left, and right, respectively	

[1] For every row in the maze, for every column, the rows and columns are swapped

			Press btnC to reset the game, including countdowns and original position of player	
"I'm lost" - Solve the maze automatically	Nigel	SW1	Given that the player is already on the best path possible[2], simply activate SW1 to solve the maze automatically.	
The White Arrow (shooting game)	Team	btnC btnU btnD Pmod mic	Press btnC to shoot Move up/down to avoid the fire balls. Press btnU to change the moving direction to "up" Press btnD to change the moving direction to "down" Use your voice to control the character and the moving direction is shown on the 7 segment display.	
"Hawkeye" - AI mode of the shooting game	Binh	SW1	SW1 is on: The player becomes so smart that he can kill the monster and dodge the fireballs without your instruction	
"Dodge that" Final boss fight	Nigel	btnC btnU btnD btnL btnR	**Context**: you, Prince Alio has bravely traversed an impossible maze, then beat the monster holding the gate - now all that's left is the final boss - and they conveniently have plenty of lasers to shoot at you **Objective**: survive the waves of random laser beams for 60 seconds. (There would be 2 flashes warning you the direction of attack.[3]) btnC - hard reset Movement keys for up, down, left, right respectively	

Feedback:

Binh:

1. Fun module and fun project.
2. There should be more time for the project.

Nigel:

1. Would be cooler with 2 OLED displays since we have to pass the OLED around constantly to test our own modules
2. Could have given us more bitstreams to work with, since the resources we have for a single bitstream are severely limited for any more useful work (we could have included more fun things in, given more LUT)
3. A VGA display would make our games look more fantastic and graphical, rather than a tiny and flimsy OLED
4. Overall, enjoyed the process of game-design and implementation of our ideas

[2] For this game, we take it that if you're going to cheat, go all out :)
[3] Either horizontal, or vertical lasers