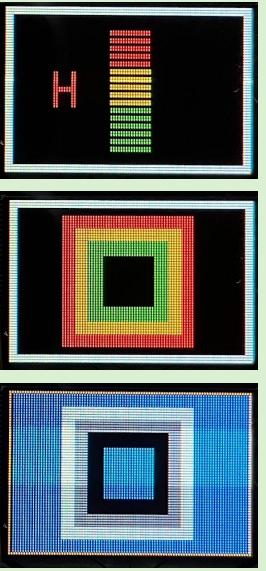
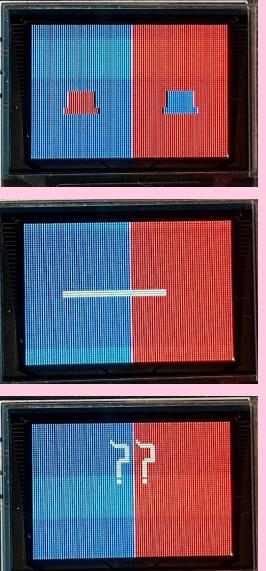
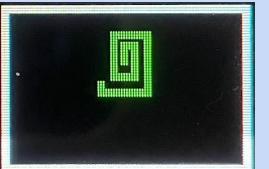


Feature	Feature Marks For	Input Devices	Feature Description	Images/Photos
Real-time audio volume indicator	Jianning	SW0, SW1	<b>SW0:</b> If SW0 is 0, mic_in is shown on 12 LEDs. If SW0 is 1, peak intensity is shown on 16 LEDs.  <b>SW1:</b> 7-segment display indicates volume using decimal digits from 0 to 15. If SW1 is 1, it also shows the alphabets 'L', 'M', 'H'.	
Graphical visualisations and configurations	Vikas	SW10, SW11, SW12, SW13, SW14, SW15, PBL, PBR	<b>SW15, SW14:</b> No border if 2'b0X, 1 pixel thick border if 2'b10, 3 pixel thick border if 2'b11  <b>SW13:</b> If SW13 is 0, normal colour scheme is shown. If it is 1, contemporary colour scheme is shown.  <b>SW12:</b> If SW12 is 0, the volume bar is hidden. If it is 1, the volume bar is activated.  <b>SW11:</b> If SW11 is 0, regular volume bar is selected. If it is 1, then an alternate rectangular volume bar is selected.  <b>SW10:</b> If SW10 is 0, no volume text is shown. If it is 1, then volume text (L/M/H) is shown. Only activated if the volume bar is also activated.  <b>PBL:</b> If normal volume bar is activated, then volume bar shifts left  <b>PBR:</b> If normal volume bar is activated, then volume bar shifts right	
Menu GUI	Team	PBU, PBD, PBR, SW[7]	<b>PBU, PBD:</b> Used for navigating up and down the menu screen  <b>PBR:</b> When pressed, starts the game/feature currently selected  <b>SW[7]:</b> When <b>SW7</b> is ON and <b>PBU</b> is pressed, you will return to the Menu Screen	
Bishi Bashi 2-Player Game	Team	PBL, PBR, PBC, btnL, btnR, SW[15:13] SW[2:0]	Bishi Bashi is an arcade-style player-vs-player game. It comprises the following minigames: Tug-of-war, Countdown, Whack-a-mole and Slap.  After selecting Bishi Bashi from the Menu, you will be brought to the Press to Continue screen where both players have to hold down their respective buttons <b>btnL</b> and <b>btnR</b> to start the next minigame.  Each round will consist of a random minigame and the first player to win three rounds is the overall winner!  <b>Tug-of-War:</b> A button-mashing game where both players mash their respective buttons <b>PBL</b> and <b>PBR</b> to get the rope over to their side. The game ends after 10 seconds.  <b>Countdown:</b> A random number between 11 and 15 is generated and the countdown is shown for 4 seconds. After which, the count is replaced with question marks and the player who presses their respective <b>PBL</b> or <b>PBR</b> closest to 0 seconds wins. Only one press is recorded.  <b>Whack-a-mole:</b> Whack the mole(s) first with the corresponding set of	

			<p>switches <b>SW[15:13]</b> and <b>SW[2:0]</b> to gain a point. If you whack the wrong hole(s), your opponent gets a point. The first to 5 points wins the round!</p> <p><b>Slap:</b> Attacker presses his respective <b>PBL</b> or <b>PBR</b> to slap the opponent. If the defender does not dodge in time, the attacker gets a point and continues attacking. If the defender dodges in time, he becomes the attacker. Dodging 3 times when the attacker is not attacking gives the attacker a free point. First to 5 points win!</p>	
Snake and Sketch	Jianning	SW15, SW14, PBU, PBD, PBL, PBR, PBC, mic_in	<p><b>Snake:</b> Use the direction buttons <b>PBU</b>, <b>PBD</b>, <b>PBL</b> and <b>PBR</b> to change the direction of the snake. Eat the apple to grow in size. Game over when snake hits the border or its own body.</p> <p><b>Auto:</b> Turn <b>ON SW15</b> to engage Auto Gear to control the speed of the snake with the volume of your voice (<b>mic_in</b>). There are 16 levels of speed for smooth acceleration and deceleration.</p> <p><b>Sketch:</b> Turn <b>ON SW14</b> to enter Sketch mode to draw cool shapes and pictures by controlling snake.</p> <p><b>Pause:</b> Pause the game at any time with <b>PBC</b></p>	 
2026 + 22	Jianning	PBU, PBD, PBL, PBR, PBC, mic_in	<p><b>2048:</b> Use the direction buttons <b>PBU</b>, <b>PBD</b>, <b>PBL</b> and <b>PBR</b> to shift and merge tiles to form powers of 2. Earn points by merging tiles with the same value. The score is displayed on the 7-segment display. The game is over when there are no valid moves left.</p> <p><b>Undo:</b> Scream in frustration(<b>mic_in</b>) to undo the last bad move you made. The score on the 7-segment display also reverts to the score of the last move.</p> <p><b>Restart:</b> Press <b>PBC</b> to restart to the original state with 2 randomly generated 2s.</p>	 
Tap Tap	Vikas	PBU, PBD, PBR, PBC, btnU, btnL, btnD, mic_in	<p><b>Tap Tap Menu</b>  <b>PBU, PBD:</b> Used for navigating up and down the menu screen.</p> <p><b>PBC:</b> When pressed, start Tap Tap at the level specified. From top to bottom represents an increase in speed, corresponding to that level's verilog coding speed :)</p> <p><b>Gameplay</b>  <b>btnU, btnL, btnD:</b> Press the buttons when the balls are inside the respective rings to increase your score. If you press the wrong button (there is no ball inside that ring), your score decreases, to a minimum of 0. Score is shown on the 7-segment display.</p> <p><b>PBC/mic_in:</b> While playing, you can press PBC to pause/unpause the game. You can also raise your voice (mic_in) to pause the game.</p> <p><b>PBR:</b> While paused, press PBR to go to the game over screen.</p> <p><b>Gameover Screen</b>  <b>PBC:</b> Press PBC to return to Tap Tap menu</p>	 

#### Feedback:

We had to cut some features from our project as we exceeded the number of available LUTs on the basys board. Perhaps Project Lab 3 could have introduced to us more ways of optimising our code or utilise other resources like BRAM and FFs.

#### References:

<http://blog.gadgetfactory.net/2016/04/snake-game-created-with-the-minimum-fpga-resources/>

CS1010X Mission 10.1 and 10.2 (2048 Game and AI solver)

