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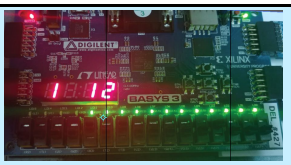
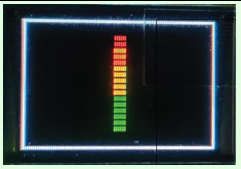
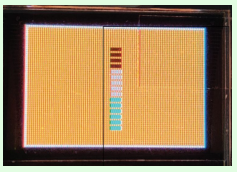
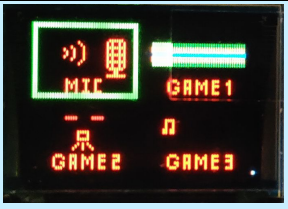
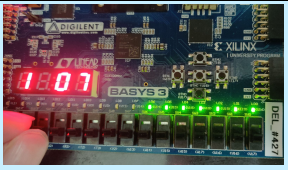
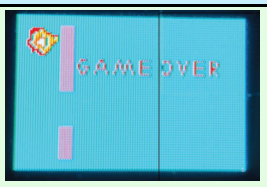
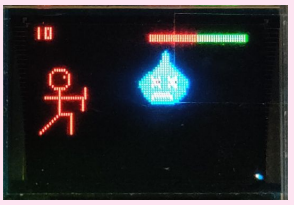
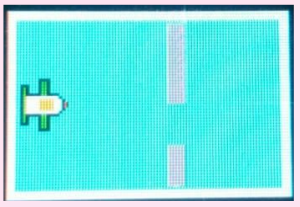
Recommended microphone level (2 O'Clock)

Feature	Feature Marks For	Input Devices	Feature Description	Images/Photos
Real-time audio volume indicator	Zhan Hao	SW0, SW8	Uses the LEDs to display the volume levels measured from the microphone. The 2 digit number on the 2 rightmost 7 segment displays corresponds to the number of LEDS lit up. Leftmost number is an additional feature. **SW0**: Activates the LEDs if 0 and disables the LEDs if 1. **SW8**: Toggles between 12-bit mic_in signal on 12 LEDSl if 1 and Volume Signal/Frequency signal on all LEDs if 0.	
Graphical visualisations and configurations (OLED in the microphone mode)	Xing Rong	SW1, SW2, SW3, SW5, SW6, SW7, SW15, PBU, PBC	Visualises the max amplitude of the sound detected on the mic at a certain time interval. **SW1**: Border is shown on the OLED if 0, hidden if 1. **SW2**: Volume bar is shown if 0, hidden if 1. **SW3**: Border is one pixel thick if 0, three pixels thick if 1. **SW5**, **SW6**: There are three colour themes. Colour theme is default if 2'b00, second colour theme if 2'b01, third colour theme if 2'b10 or 2'b11. **SW7**: Freezes the volume bar if 1, unfrozen if 0. **SW15**: Hides everything on the OLED display if 1, unhide if 0. **PBU**: When pressed, exits the microphone mode and enters the menu mode. **PBC**: When in the microphone mode, the OLED screen will black out for a split second if PBC is pressed.	 
Menu	Zhan Hao	PBC, PBU, PBD, PBL, PBR	4 panel animated menu to select applications to be used. Panel names are MIC, GAME1, GAME2 and GAME3. Selected item is highlighted in green. **PBU**, **PBD**, **PBL** and **PBR** are used to navigate between applications, and **PBC** is used to enter the application. To exit back to the menu, press PBU within each application. This menu is to make navigation more user-friendly, with visuals indicating what each application does.	
Sound frequency detector	Xing Rong	SW4	The bar on the OLED represents the frequency of the sound captured on the mic: level zero if freq < 100Hz, level one if 100Hz <= freq < 200Hz, ... , level sixteen if freq >= 1600Hz. The OLED shows a scale of 400, 800, 1200 and 1600 Hz to let the user know the frequency of the sound captured on the mic. **SW4**: Volume bar on OLED represents max amplitude of sound measured if 0, sound frequency measured if 1.	
Refresh speed Multiplexer	Zhan Hao	SW9, S10, SW11	**SW9, SW10, SW11**: Multiplexer to select the speed at which the LED and OLED bars are refreshed. SW11 has highest priority, while SW9 has lowest. Default speed is slowest at 5Hz, which is also the speed of SW11. This can be seen on the extreme left of the 7 segment display. SW10 is for a higher refresh rate 400Hz and SW9 is for 20khz. A higher speed is more responsive and is suitable for measuring changes in sound level, while a slower speed is suitable for detecting peaks as the max volume is displayed longer.	
"GAME OVER" and "CONGRATU-LATIONS" texts	Xing Rong	-	Two modules are created to allow the texts "GAME OVER" and "CONGRATULATIONS" to be displayed on the screen. These modules are used in the games to show the state of the game. The modules can be used to display the texts anywhere on the screen by setting the top left pixel of the text image to the desired pixel. (eg setting the starting x and y coordinates to 0 will make the text appear flushed to the top left of the OLED screen) This also allows the text to be able to move through the screen which is implemented in the games.	 
Game 1: Kamehameha	Team	PBC, PBU	This is a game where you have to shout very loudly to charge up your attack. (Preferably, shout "KAME..HAME..HAAA" like in DBZ) Every 5 seconds (seen on the counter on top left), the figure will fire a Kamehameha wave of different intensity depending on how loud you have sustained the high volume. The goal is to defeat the evil slime jumping towards you, whose health bar is represented with the green bar on top. Shouting for longer periods produces a stronger Kamehameha wave	

			which deals more damage. The slime will react to the wave that you have fired with a hurt animation. The timer represents the time taken for the slime to reach you. Once it reaches zero, and the slime has arrived, you lose the game, and get a game over screen. To monitor your power level, you can look at the LEDs being lit up. The more LEDs are being lit, the higher your power level, and the more damage you will do. Bringing the health bar to complete red will defeat the slime and bring you to the congratulations screen. **PBU**: Exits the game and enters the menu mode when pressed. **PBC**: Resets the game, restarting the slime position, timer and charge animations. Entering the game from the menu automatically resets the game.	 
Game 2: Windblow	Team	PBC, PBU	This is a game whereby you have to prevent the slime from falling on your pink flowers, by blowing into the microphone. Blowing for some time will cause the elements on the screen to react accordingly. The slime is carried up, and the flowers wll sway gently. The slime does not like being blown and will display a hurt animation. The timer on the top left will countdown from 20. The goal is to keep the slime away from the flowers for these 20 seconds. Doing so will bring you to the congratulations screen. However, if in this time period the slime falls onto your flowers, it is game over and the game over screen is displayed. **PBU**: Exits the game and enters the menu mode when pressed. **PBC**: Resets the game, restarting the slime position, timer and the flowers. Entering the game from the menu automatically resets the game.	 
Game 3: Pitch perfect	Team	PBU, SW1, SW3, SW5, SW6	This is a game in which the player has to produce sounds of different frequencies (through his/her voice or by other means) to play the game. The game starts immediately when the game mode is switched from the menu mode. There will be a plane on the screen which changes its position when different frequencies of sound are detected at the mic. There will be barriers on the OLED screen which moves from left to right. The barriers have a gap that is big enough for the plane to pass through if the plane is flying at the right position. The objective of the game is to guide the plane past all the obstacles (barriers). If the plane collides with the barriers (incorrect range of frequencies of sound is detected at the mic)), it will explode and a “GAME OVER” text will drop down from the top to the middle of the OLED screen. If the plane manages to get past all barriers, the player wins and a “CONGRATULATIONS” text will cycle continuously through the screen from right to left. The plane will also cycle continuously through the screen from left to right and its vertical position on the screen can still be controlled by changing the frequency of the sound which is detected at the mic. Exiting and entering the game will reset the game. The game also shows the same border that is present on the OLED in the microphone mode. **PBU**: Exits the game and enters the menu mode when pressed. **SW1**: Border is shown on the OLED if 0, hidden if 1. **SW3**: Border is one pixel thick if 0, three pixels thick if 1. **SW5**, **SW6**: Switches the colour of the borders depending on the colour theme. Colour theme is default if 2’b00, second colour theme if 2’b01, third colour theme if 2’b10 or 2’b11.	   

No other open source codes are used in this project besides the “Audio_Capture” and “Oled_Display” modules which are provided.

Feedback:

We liked brainstorming ideas for our simple games, how to incorporate elements of the Basys Board with the OLED display and microphone to create unique games. We also liked figuring how the OLED display worked, although to be honest, writing code for the OLED was quite tedious. It was also harder to coordinate with only one microphone and OLED display. Perhaps in the future, 2 sets of OLED and microphone can be loaned out so both members can work at the same time without having to meetup.