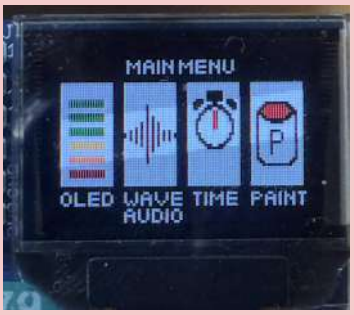
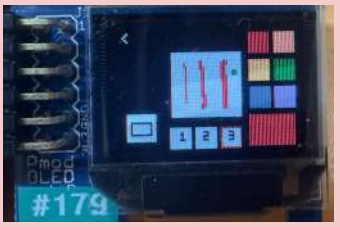
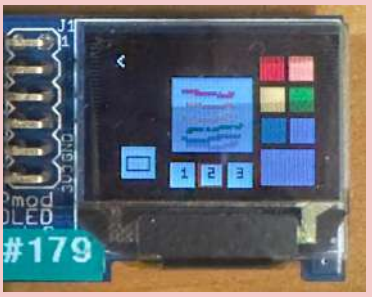
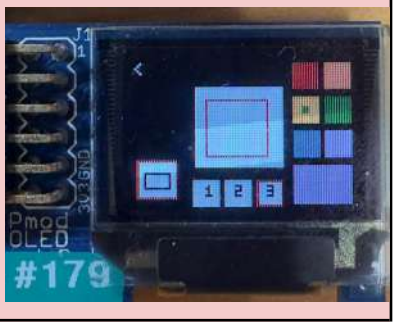
EE2026 Design Project

Team Members:
Student A (Audio Wave Visualiser): Irving Alexander de Boer
Student B (Interactive Stopwatch): Poh Wei Pin

Feature Name	Feature Description	Images / Photos
Audio Visualiser/ Menu	Audio input from any source is displayed on the OLED display at various sampling frequencies observable to the human eye. A menu can be brought up by **left clicking the mouse**.	
Waveform Colour Change	Waveform colour to be displayed in two modes, **colour and greyscale** as selected in the menu using the **left mouse button**. The colours of the waveform represent the amplitude of the wave with green being the lowest, yellow being medium and red being highest	
Frequency Change / Freeze	Displays the wave at various frequencies (**96 Hz, 192 Hz and 384 Hz**), toggled through the menu using **the left mouse button** Freeze mode will freeze the waveform at that instant. Colour can still be toggled on and off.	
Stopwatch Timer	Stop watch timer with OLED display, include start, stop, lap feature. Able to count up to 9 minutes 59 seconds 9 milliseconds (M:SS:MS display on 7-seg) Start/Stop button changes according to current mode upon left mouse click Not Running -> Green Start Button Running -> Red Pause Button A mic mode icon at the top right corner to activate between whistle and manual mouse click mode	 
Stopwatch Lapping function	When the timer is running, you can lap the timer. Left mouse click on the “LAP” button to lap the current time. Display up to past 3 laps with a green arrow showing the most recent lap. Beyond 3 laps, display resets back to the top. **To enable mic/whistle mode**, click onto the red icon at the top right corner which will turn green upon successful toggle	
Stopwatch Whistle Function	**<u>Whistle/Mic Mode</u>** **<u>Whistle Start Mode</u>** 1 Short Whistle -> Start/Pause according to current status **<u>Whistle Lap Mode</u>** 1 Short Whistle -> Lap current stopwatch time. Green arrow will show the most recent lap **1 Long Whistle (>0.5 second) -> Change Mode (Toggle)** **You can see current mode based on the LED as well as banner at the bottom of the timing banner** To disable this mode, click the icon at the top right corner using the mouse (Turns back to red)	

		
Main Menu	A main menu to navigate (including back navigation) between the various features and subtasks. The menu is interacted with using a mouse and selecting the specified sub tasks Shows animation for each component upon selection as part of improved user experience When OT tasks are selected, menu box OLED will turn orange to indicate activation of mode. SW[2:0] is used to determine which task is active. SW[0]: OTA SW[1]: OTB SW[2]: OT Team	
Drawing Canvas	A blank canvas which can be drawn on using the mouse and the left click. Left Click - Draw Right Click - Erase Box at the bottom right corner shows the current selected color from the palette	
Canvas Brush Tool	A brush tool which changes the size of the brush used to draw on the canvas. Brush tool 1, 2 and 3 determine the radius of the brush. 1 Pixel Width 2 Pixel Width 3 Pixel Width	
Canvas Colour Palette	The colour palette consists of 6 colours. Each colour is selected by clicking on it with the left mouse button. Correspondingly, the cursor colour will change in accordance to the colour palette selection.	
Canvas Rectangle Tool	The Rectangle Tool draws a perfect rectangle on the canvas (limited to 1 due to Canvas size) Drawn by left clicking on the canvas and then dragging the cursor. A second left click will fix the rectangle. To activate the cursor, one must first left click on the rectangle tool in the bottom left. Similarly, clicking on the button when activated will deactivate it and return to drawing mode.	

Feedback:

Irving

- Earlier labs can touch on certain Vivado features e.g. ROM Block, BRAM as it would help for the project
- The latest version of Vivado claims to be 1.5x faster in compiling, would be nice if we can utilise such increased compilation speed.

Wei Pin

- Lost of sanity and sleep doing this.

- As mentioned above as well, would be great if EE2026 wiki can provide a bit more guidance on trickier topics such as FFT and etc.
- Fun and satisfying if and only if you manage to compile without bugs and errors.

References

https://github.com/johnmurrayvi/vhdl-projects/blob/master/VGA-PS2_Cursor/mouse_controller.vhd
https://github.com/johnmurrayvi/vhdl-projects/blob/master/VGA-PS2_Cursor/ps2interface.vhd