EE2026 Project Report S1-22 (Friday - PM)

Done by:
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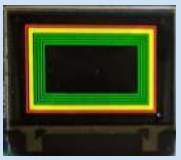
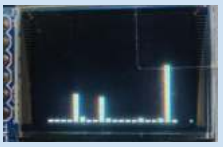
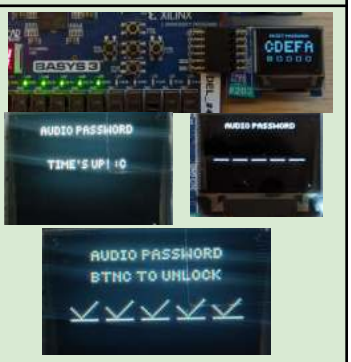
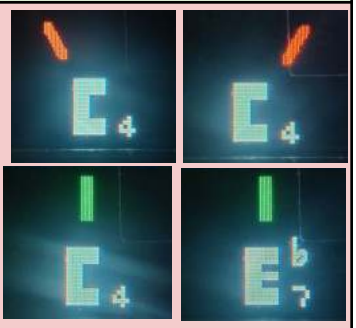
Feature Name	Feature Description	Images
Student A: Prince OTA & AVI 2A	As specified by Project Manual. ● Set SW[0] to display ● Press Btn_U to display next border / reset ● Led[14] will light up and no Btn_U presses will do anything until the led[14] is off after 3 seconds	
Student B: Yan Ming OTB & AVI 2B	As specified by Project Manual. ● Set SW[1] to display ● Press Btn_D to display next rectangle / reset ● Led[12] will light up and no Btn_D presses will do anything until the led[12] is off after 5 seconds	
TEAM: Audio Volume Indicator 3	As specified by Project Manual. ● Displayed by default on OLED display the volume level ● Displayed led[0] to [4] the volume level ● Displayed 7-seg 0-5 the volume level	
Student A: Prince Waveform Visualizer	Displays audio waveform on the oled screen that is detected by the mic. 7-seg displays the rate at which it is sampling, 1-20 in khz. ● Use Btn_L and Btn_R to change the sampling rate (hold down Btn_L/Btn_R to select faster) ● Use Btn_C to pause/start the waveform visualization ● Use Btn_U and Btn_D to change the visualization mode (colored, colored modulus, white, white modulus) ● Set SW[0] to enable capture mode, when capture mode is on, the next sound that crosses a threshold volume will be captured on the screen for you to inspect the results.	
Student A: Prince Audio Spectrogram analyzer	Displays audio spectrograph for frequencies detected by the mic. Uses an 1024 point FFT sampled at 20khz for effective measurement of 0-10khz frequencies. 7-seg displays the total bandwidth of frequencies that are being displayed on the oled. ● Use Btn_L and Btn_R to change the effective range of frequencies being displayed on the oled. Higher range has less resolution of hz. ● Use Btn_C to pause/start the spectrograph for you to inspect the results.	 

Student B: Yan Ming Feature Selection Menu	Interface to select the different features. Shows the current selected feature and displays an animation of a particular feature when hovered over. • Set SW[2] to toggle the menu • Use Btn_L and Btn_R to hover over features (green square) • Use Btn_C to select feature (red square)	
Student B: Yan Ming Audio Frequency-based Password System and Lock Screen	Set a password based on 5 musical notes, LD5 to LD9 lights up each time a note is selected to indicate progress. Once confirmed, a lock screen appears. • Set SW[10] while in feature selection menu to open reset password menu • Use Btn_L and Btn_R to choose 1 of 5 musical notes • Use Btn_C to confirm each selected note and one final time to set lock screen • Once all correct notes played, use Btn_C to unlock device	
Student B: Yan Ming Digital Hands-free Stopwatch	Digital stopwatch with hands-free and button-based start / stop and reset function. Watch counts up to 59 minutes, 59 seconds and 99 centiseconds and stays at that value until user reset. • Use Btn_L and Btn_R to select start/stop and reset • Use Btn_C to confirm selected option • Use loud noise (finger snap / clap) to trigger hands-free start / stop of stopwatch	
TEAM: Tuner	Tuner using a 440hz tuning standard implemented using 1024 point FFT sampled at 5khz. Displays the current detected musical note ranging from C2 to Eb7, including whether the musical note is sharp or flat. This is done by creating a range of values for each musical note along the 512 usable points from the sampled FFT and showing the musical note that fits the musical note being played. • Use SW[15] to activate tuner and display its menu • Display shows the current detected musical note	
TEAM: Metronome	Metronome using piezo buzzer that allows hands-free changing of bpm using claps. It is also fully configurable, able to adapt to any time-signature, with its total beats, BPM and subdivision options (bpm displayed on 7-seg) • Use SW[14] to activate metronome and display its menu • Toggle SW[13] to start / stop the metronome display and buzzer • Use Btn_L and Btn_R to change BPM/Tot.beats/Subdivision (can hold down to select faster) • Use Btn_U and Btn_D to navigate the menu to change the other configurations • If in “TAP” part of menu, user can either tap Btn_C or clap to the rhythm with a minimum of 8 beats to get an accurate BPM	 

References: https://github.com/ZipCPU/dblclockfft https://zipcpu.com/dsp/2018/10/02/fft.html