Team 8
ECE 411
12/5/2024

SynthBuddy Test Plan

Part 1

Unit Test

- Test power supply to verify it provides both -9V, 9V, and 4.5V (probe (VGND, V9, V4.5, pin 5 of U2 for -9V or negative leg of C22)
- Test 5V regulator circuit to ensure 5V output to OLED (probe OLED1 pin 2)
- Test buttons to verify a signal is sent to ESP32 (check serial output)
- Test ESP32 to verify a data signal is sent to OLED display (probe at pin header)
- Test ESP32 to verify PWM Signal is sent to Fuzz (probe TP GENOUT1)
- Test to see signal goes from Fuzz to Chorus (probe TP FUZ-CHO1)
- Test to see signal goes from chorus to Tremolo (probe TP CHO-TRE1)
- Test to see signal goes from Tremolo to amplifier (probe TP LINEOUT1)
- Test to see signal goes from amplifier to output speaker (probe TP SPK+/SPK-)
- Test output signal after amplifier to see if the amplitude is in an acceptable range

Verification Test

- Input buttons select a predesignated signal frequency
- PWM synth signal dry
    - Does the output signal produce sound
    - Is the pitch the note specified
    - Does the frequency change when input changes
    - Is the dry signal a sin wave clear of any distortion or other artefacts
- Signal with Fuzz
    - Does the signal route through the fuzz effect and produce output
    - Does the bypass potentiometer completely cut off the effect without adding distortion
    - Does setting the potentiometer to different values produce unique sounds

- Signal with Chorus
    - Does the signal route through the chorus effect and produce output
    - Is the chorus able to be bypassed with bypass switch
    - Does the chorus need additional hardware added to the test point to produce output
- Signal with Tremolo (“Tre-Mellow” ™)
    - Does the signal route through the tremolo effect and produce output
    - Does the bypass potentiometer completely cut off the effect
    - Is the rate potentiometer able to affect the rate of cut off of the signal with the tremolo
- Signal with all effects
- Text is written out to the OLED display
- Buttons activate different frequency output from the ESP32 function generator

Validation Tests

- Speaker outputs an amplified sound
- Effect Potentiometers/buttons impact the sound/quality of sound generated.
- OLED displays selected signal frequency based on selected input button
- Selecting an input button generates a sound from the speaker.

Test Case

Test Author: Team 8				
	Test Case Name:	PWM Signal Generation Test	**Test ID #:**	1
	Description:	*Checks the response of the esp32 to the input buttons as well as testing the output of the signal for integrity and proper tuning*	**Type:**	□ white box ☑ black box □ _____
Tester Information				
	Name of Tester:	Team 8 The Voltage Vanguard	**Date:**	12/04/24
	HW/SW Version:	Synth Buddy r1.6	**Time:**	12:00 pm
	Setup:	*The circuit should be powered attached to a wall outlet, the output should be attached to a speaker and monitored by an oscilloscope, a guitar tuner app can be placed near the speaker to determine the note being played, buttons connected to the GPIO pins will float freely for now,*		

STEP	**Action**	**Expected Result**	**PASS**	**FAIL**	**N/A**	**Comments**
1	Connect synth buddy to power	Relevant LEDs, OLED, and microcontroller are all powered on	X			All components receiving power, and acting as intended, rate and waveform LED show as planned
2	Connect synth buddy to speaker	No connection issues, dry signal able to be heard.	X			Amp works well, input through aux outputs with no issues
3	Connect synth buddy to oscilloscope	Sine wave output from dry signal	X			Scope reads almost exactly the same as input sine wave from ipad
4	Press each input button	Guitar tuner app will indicate correct frequency (note) being pressed	X			All notes exactly where intended, some minor tweaks needed to be made, presumably an issue with the original PWM library
5						
	Overall test result:					Amp and ESP32 work flawlessly

Matrix Test (for varying parameters)

Test Author: Team 8				
	Test Case Name:	Tremolo Integration Test	**Test ID #:**	2
	Description:	Checks that the tremolo effect causes a varying scale of change on the generated PWM signal based on the tuning of the potentiometer.	**Type:**	☑ white box □ black box □ _____
Tester Information				
	Name of Tester:	Team 8	**Date:**	12/04/2024
	HW/SW Version:	Synth Buddy r1.6	**Time:**	12:00 pm
	Setup:	With the generated PWM signal turned on, the tremolo effect will be tested with the rate potentiometer starting at 0% (off) as a bypass, slowly incrementing to 100%. The tremolo effect will be tested at each point of input testing.		

TEST	**INPUTS**	**EXPECTED OUTPUTS**	**PASS**	**FAIL**	**N/A**	**Comments**
1	Rate Potentiometer turned/set to 0.	Output should be plain and steady sine wave, signal is unaffected	X			Some minor artifacts from the effect remain but the signal is mostly dry
2	Rate Potentiometer turned/set to 20%.	The tremolo effect will be subtly applied to the signal as it should oscillate at ±20% of its original amplitude.	X			A very slow pulsing signal achieved, as intended

3	Rate Potentiometer turned/set to 40%	The tremolo effect will be more noticeable as the signal should oscillate at ±40% of its original amplitude.	X			Seemed to accelerate rather quickly at this point compared to the 20% but still working well
4	Rate Potentiometer turned/set to 60%	The tremolo effect will cause noticeable volume changes as the signal should oscillate at ±60% of its original amplitude.	X			Picked up some more speed, led still in sync, sound is clear
5	Rate Potentiometer turned/set to 80%	The tremolo effect causes the sound to wildly vary with moments of high highs and near silence as the signal should oscillate at ±80% of its original amplitude	X			Quick stutter, almost unnoticeable at this speed but affects the sound in an interesting way
6	Rate Potentiometer turned/set to 100%	Tremolo rate should be at its fastest setting, the signal should oscillate at ±100% of its original amplitude	?			This one is a bit unclear as it oscillates so quickly that it almost sounds like distortion but seems to be working as intended
	Overall test result:		X			Very few issues after assembly, most aspects worked on initial effort, some minor tweaks were needed on a few values