redditgifts

Reddit Secret Santa 2020

Custom Circuit Board Gift User Guide

Dec 21, 2020

Produced by @MakeItHackin

This document serves as a User Guide for the Reddit Secret Santa 2020 custom circuit board.

All files available on Github:

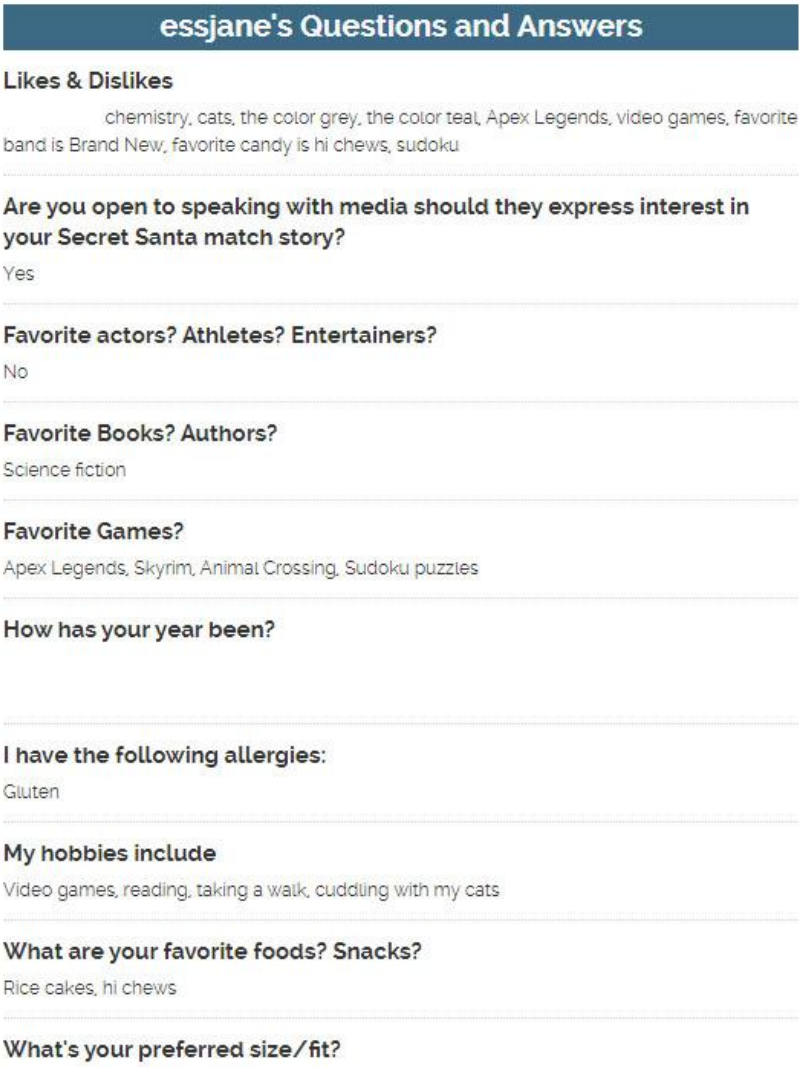
https://github.com/MakeItHackin/SecretSanta2020

Walk-though of Gift:

https://youtu.be/uKTaNg_Iy-Q

BACKGROUND

I was randomly matched with Reddit user “essjane.” The following is a screenshot of her questions and answers for the gift exchange.



essjane's Questions and Answers

Likes & Dislikes

chemistry, cats, the color grey, the color teal, Apex Legends, video games, favorite band is Brand New, favorite candy is hi chews, sudoku

Are you open to speaking with media should they express interest in your Secret Santa match story?

Yes

Favorite actors? Athletes? Entertainers?

No

Favorite Books? Authors?

Science fiction

Favorite Games?

Apex Legends, Skyrim, Animal Crossing, Sudoku puzzles

How has your year been?

I have the following allergies:

Gluten

My hobbies include

Video games, reading, taking a walk, cuddling with my cats

What are your favorite foods? Snacks?

Rice cakes, hi chews

What's your preferred size/fit?

I only realized the morning of December 7, 2020 that Reddit Secret Santa sign-ups were ending. I went ahead and quickly signed up, and was able to make the cut-off before sign-ups closed in the afternoon. Matching on Reddit Secret Santa 2020 occured on December 7, 2020. Gifts are required to ship by December 21, 2020. I’ve created printed circuit boards (PCB) for projects before, so I wanted to make a custom PCB for essjane in a theme of her interests.

Since ordering PCBs from China usually has a 10 day turn-around from when I place the order to when I receive the item, I didn't have too much time to develop a new circuit. Luckily, I developed a similar circuit board for the Hudson Alpha Tech Challenge in February 2020. I used most of the same components and remixed that project into the Reddit Secret Santa gift.
I decided to make a cat from the outline of the circuit board. I also wanted to try something new and make the eyes of the cat translucent and shine a light behind them. I have seen this done on other circuit boards before and it is acheived by removing copper on both sides and removing the solder mask as well.

I added the remaining of essjane's interests on the silk screen layer of the circuit board. I started off with a poem, which reminded me of Christmas time and included some of essjane's interests...

Teal and grey colors and whiskers on kittens,
The chemistry between Apex heros and villains,
Hi-Chew, Brand New, and Sudoku playing,
These are a few of my favorite things.

Designs included on silk screen: Hi-Chew, Brand New, Apex Legends, Baby Yoda, sudoku puzzle (with Pi reference, and chemical symbols.

BUILD OF MATERIALS

Part	Value	Package	Description	QTY 1 BOARD
A,B,C,D, RESET	5_1_SPST	5.2mm Button	FLAT BUTTON	5
ON_OFF	3PINSWITCHMINI	3PINMINI	MINI SWITCH	1
C1,2	10uF	C0805	CAPACITOR, American symbol	2
LED1-9		SML0805	LED	9
NEO1-10	NEOPIXEL5050	NEOPIXEL5050		10
OLED	DISPLAY-OLED-128X32	DISPLAY-OLED-128X32	128x32 Dot Matrix OLED Module with I2C - SSD1306 chip	1
PH1	A1060_11	T0-46-A10XX	Sensor Robust Light Sensing Applications	1
R1,11	470	R0805	RESISTOR, American symbol	2
R2	10k	R0805	RESISTOR, American symbol	1
R 3,4,5,6,7,8,9,10, 12,15	330	R0805	RESISTOR, American symbol	10
R16,17	100k	R0805	RESISTOR, American symbol	2
SP1	SPEAKER/AL60P	AL60P	SPEAKER Source: BuerklinAdded PS12	1
U$1	ARDUINO NANO V3.0	ARDUINO-NANO-3.0	Arduino Nano 3.0 and compatible devices	1
U$2	REAL TIME CLOCK - DS3231	RTC-DS3231-AT24C32	RTC Module with Battery and EEPROM based on DS3231	1
U$4	BATTERY-LI-MH1221018650_SMD	BATTERY_18650_SMD	Lithium-Ion MH12210 Rechargeable Battery	1
U$6	BATTERY CHARGER	BAT_CHARGE_LOW_FP	Lithium Battery 5V Charger with protection circuit	1
U$7	DC POWER BOOST MODULE	DC-DC-STEP-UP-LOW_FP	DC/DC Step-Up Regulator based on MT3608 chip	1
	18650 Battery Holder			1
	3D printed Base			1
	Mini Screws			2
	Mini Washers			4
	Mini Nuts			2

USING THE CAT

How to turn the unit on/off:

There is one switch on the front of the board, to the left of the display. When the switch is in the LEFT position, the unit is OFF. When the switch is in the RIGHT position, the unit is ON. There is an exception. If the Arduino Nano is powered by a supply other than the on-board battery, then the unit will turn on. For example, if a person is programming the board through micro usb on the Arduino, the unit will power on despite the power switch.

Programming the Arduino Nano board:

Insert Data Micro USB cable into board and into computer. Arduino software (IDE) is available here:
https://www.arduino.cc/en/software
It is compatible with Windows, Mac, and Linux.
Download the files from the Github link and use the Arduino IDE to upload to the board. A user will need to install libraries for the OLED screen, NeoPixels, and Real Time Clock. A user can get help with this process by searching YouTube.

Charging the Battery:

Insert cable into battery charging unit. Charging time will depend on size of battery and if unit is currently powered on. When charging, the red light on the charging board indicates battery is currently charging. A solid blue light indicates battery is done charging.

Using the buttons:

Primarily, the buttons function in the following way:
Button “A” (top left button): Scroll up
Button “B” (bottom left button):: Scroll down
Button “C” (top right button):: Select
Button “D” (bottom left button):: Select/Final Select/Exit

Version 9 of the software boots Circuit board with:

Cat Eyes ON and YELLOW
Apex Legends theme plays
Default menu is clock only (not with temperature and date)

MENUS AND FEATURES

Use A and B buttons to scroll through the menu. Use buttons C and D to access the features.

Cat Eyes

Press C to enter submenu. Once the color names appear, use buttons A and B to scroll through available colors or to turn off the eye LEDs. After desired color or state is acheived, press D to exit menu.

Reddit Logo

This menu only displays the Reddit Logo. Pressing C or D does nothing.

Demo Mode

Press C to enter Demonstration mode. Once Demo Mode is activated, the unit will stop responding to A,B,C, and D buttons. To exit Demo Mode, press the RESET button. Demo Mode will go through all of the components and demonstrate how they work.

Battery

Press C to view the battery voltage. Fully charged is around 4.2 volts. Minimum voltage needed is around 3.6 volts. The voltage will be displayed for about 5 seconds and then return to the main menu.

LEDs

Press C to activate bottom LEDs. They will repeat a flashing sequence. To exit, press the D button.

Play Songs

Press C to play Apex Legends theme song.

Collar

Press C to enter submenu. Once the color names appear, use buttons A and B to scroll through available colors or to turn off the eye LEDs. After desired color or state is acheived, press D to exit.

Lite Sense

Press C to view the light sensor value. Fully bright is around 1023. Complete darkness is 0 (zero). Try putting the light sensor near a bright light or darkness to see value change. Press C to exit.

View Temp

Press C to view the temperature from the Real Time Clock module. Temperature will be displayed in fahrenheit and celsius. Press C to exit.

Set Clock

Press C to change the date or time. Once in submenu, use A and B buttons to increment and decrement numbers and use D button to go to the next screen. Submenu order: Hour, Minute, Seconds, Year, Month, Date. Note: Current configuration is 24 hour time (no AM or PM). Pressing D after date, will finish setting the clock.

Clock

Press C to view Date/Time/Temperature. Time is displayed in 24 hour time (no AM or PM). Press C to exit.

COMPONENT LAYOUT AND DIAGRAM

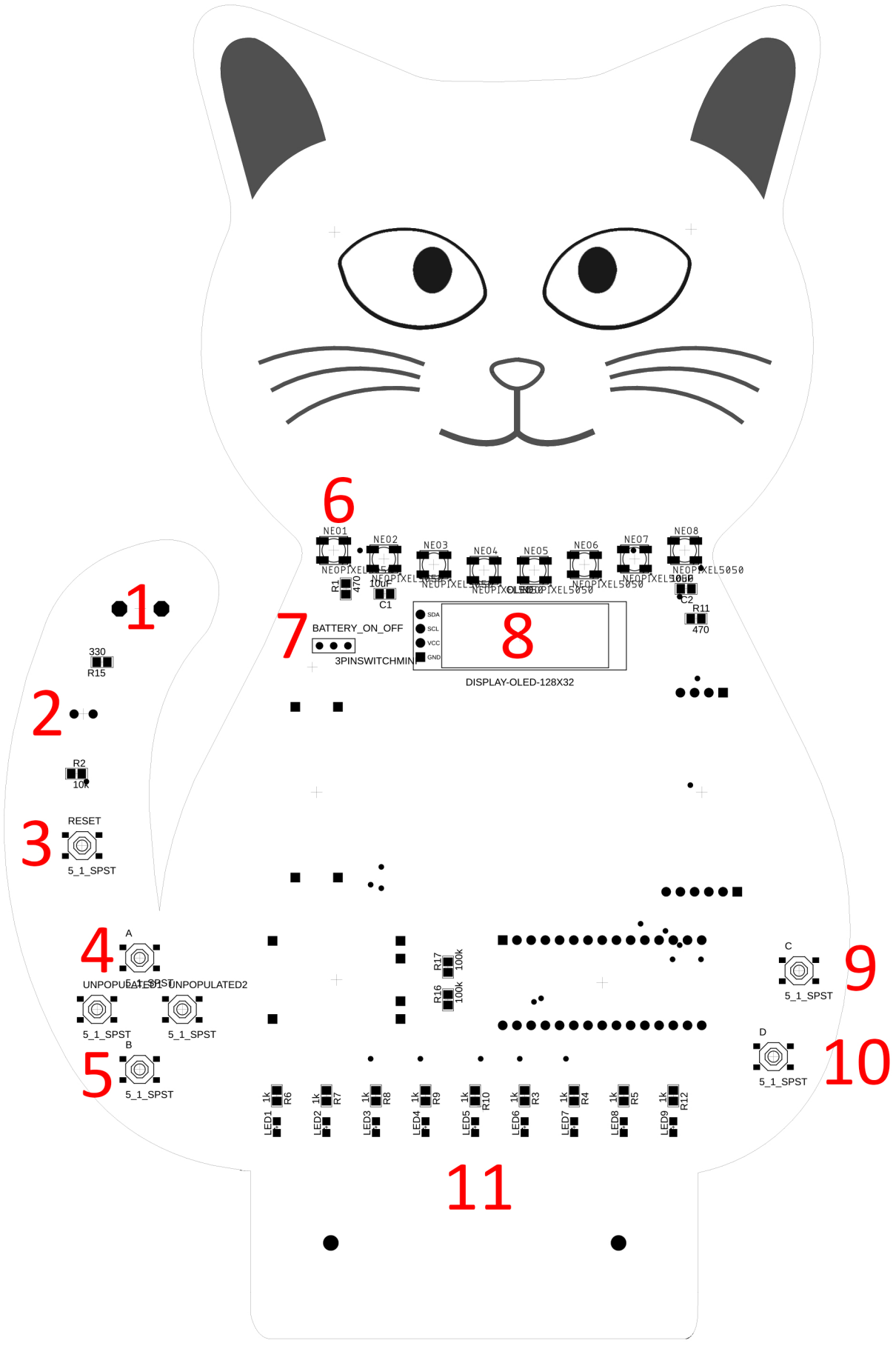
LEGEND

Front:

1: 12mm Passive Piezo Buzzer
2: Light Sensor
3: RESET Button
4: Button A
5: Button B
6: Neopixel 1st strip (8 neopixels)
7: Power Switch
8: 128x32 OLED display
9: Button C
10: Button D
11: LEDs (blue 0805 size)

Back:

12: DS3231 Real Time Clock
13: DC-DC Power boost converter
14: Arduino Nano v3.0 (with micro usb port)
15: Battery charging circuit
16: Battery holder and 18650 Battery (with 'button')
17: Neopixel 2nd strip (2 neopixels). Used for Cat eyes.


1
2
3
4
5
6
7
8
9
10
11
NEO1
NEO2
NEO3
NEO4
NEO5
NEO6
NEO7
NEO8
NEOPIXEL5050
R1
470
C1
10UF
C2
R11
470
BATTERY_ON_OFF
3PINSWITCHMIN
SDA
SCL
VCC
GND
DISPLAY-OLED-128X32
330
R15
R2
10K
RESET
5_1_SPST
A
B
C
D
UNPOPULATED1
UNPOPULATED2
R17
100k
R16
100k
1k
R6
R7
R8
R9
R10
R3
R4
R5
R12
LED1
LED2
LED3
LED4
LED5
LED6
LED7
LED8
LED9

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17

NEO9
NEOPIXEL5050
NEO10
NEOPIXEL5050

HI-CHEW

3 1 4

BRAND NEW

FOR DESCRIPTION AND ASSEMBLY INSTRUCTIONS:
https://github.com/MakeItHackin/SecretSanta2020
THIS PROJECT IS HACKABLE. DO SOMETHING FUN WITH IT !!!
DESIGNED BY: ANDREW DENIO @MakeItHackin

NEOPIXEL WS2812 5050 LEDS

128 X 32 OLED DISPLAY

SP1
PIEZO BUZZER
SPEAKER/AL60P

A1060_11
LIGHT SENSOR
PH1

SCL SDA VCC GND

REAL TIME CLOCK DS3231
U$2

12

i'm addicted to science

REAL TIME CLOCK - DS3231

32K SQW SCL SDA VCC GND

IN
OUT
U$7

13

DC POWER BOOST MODULE

ARDUINO NANO v3.0

14

USB
RESET

BATTERY CHARGER

OUT- IN-
B-
B+
OUT+ IN+

15

USB

ARDUINO NANO V3.0
U$4

3.7v 18650 BATTERY

BATTERY HOLDER FOR 18650

POS

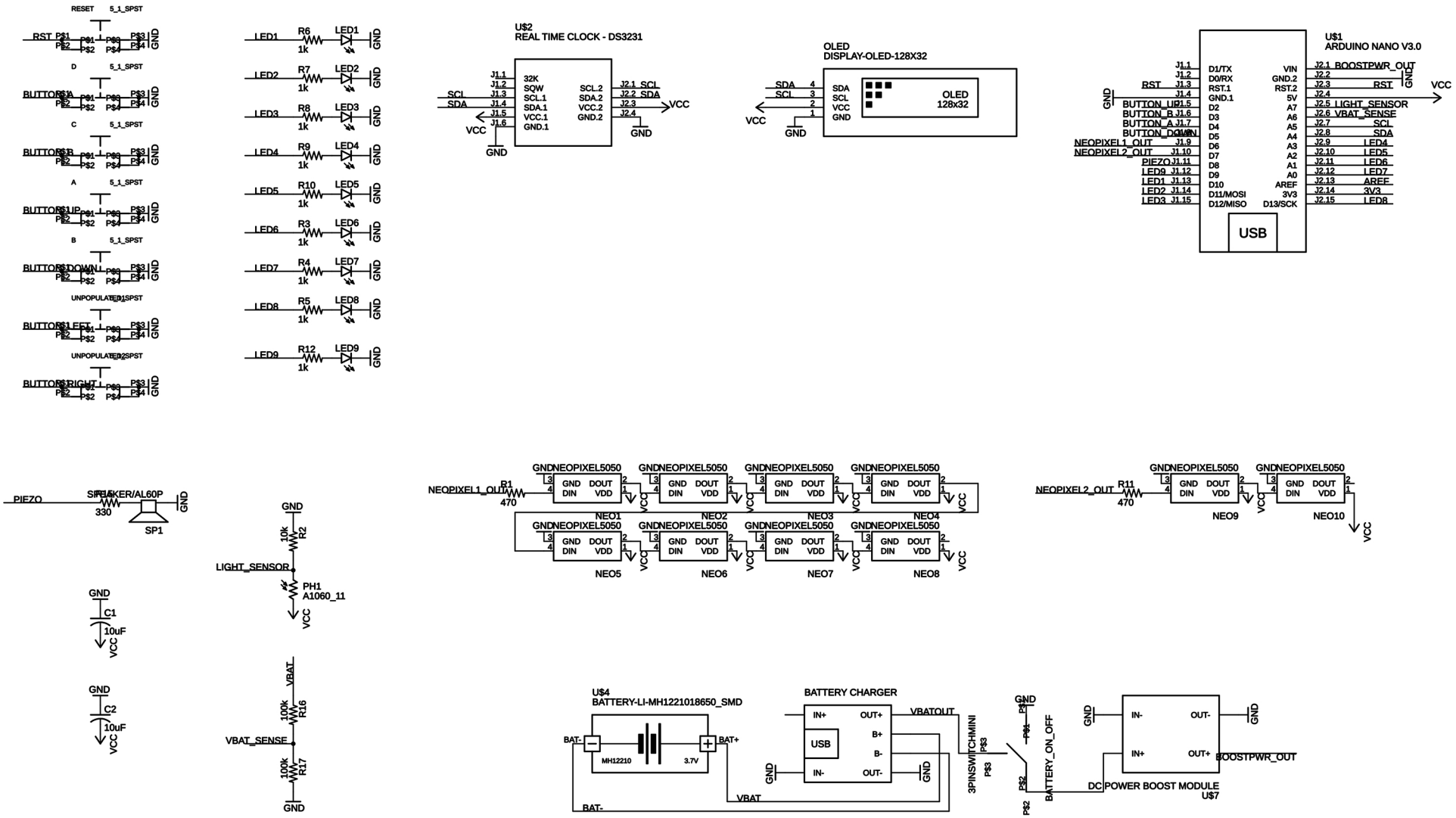
16

3.7V

NEG

BATTERY-LI-MH1221018650_SMD

DESIGNED FOR THE REDDIT GIFT 2020 SECRET SANTA EXCHANGE
DECEMBER 8, 2020 – MY FIRST REDDIT GIFT EXCHANGE



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ARDUINO NANO PIN ASSIGNMENT

D1/TX - NOT CONNECTED - DO NOT USE BECAUSE OF USB COMMUNICATION
D0/RX - NOT CONNECTED - DO NOT USE BECAUSE OF USB COMMUNICATION
RST - RESET BUTTON
GND - CONNECTED TO GROUND PLANE
D2 - BUTTON A
D3 - BUTTON C
D4 - BUTTON D
D5 - BUTTON B
D6 - NEOPIXEL STRAND 1 OUT
D7 - NEOPIXEL STRAND 2 OUT
D8 - PIEZO BUZZER
D9 - LED #9
D10 - LED #1
D11/MOSI - LED #2
D12/MISO - LED #3

VIN - CONNECTED TO OUTPUT FROM BOOST CONVERTER
GND - CONNECTED TO GROUND PLANE
RST - WIRED TO PCB RESET BUTTON
5V - CONNECTED TO 5V BUS
A7 - LIGHT SENSOR / (cannot be used as digital pin)
A6 - battery voltage sensor/divider / (cannot be used as digital pin)
A5 - i2c (SCL)
A4 - i2c (SDA)
A3 - LED #4
A2 - LED #5
A1 - LED #6
A0 - LED #7
AREF - NOT CONNECTED
3V3 - NOT CONNECTED
D13/SCK - LED #8

FUTURE WORK

Include “Pong” game as one of the menu items.

Populate LEFT and RIGHT buttons. I will need to remove 2 LEDs in order to do this.

Figure out what is going wrong with the OLED library. May need to use a different library.

Add multiple songs to PLAY SONGS menu.

Add ability to select which fuctions are displayed in Demo Mode.

Add ability to store data from user... like a set of configurations, or custom text menu.

RTC layout is reversed. Reverse it so I don’t have to spend an hour desoldering the headers.

Remove duplicate neopixel functions.