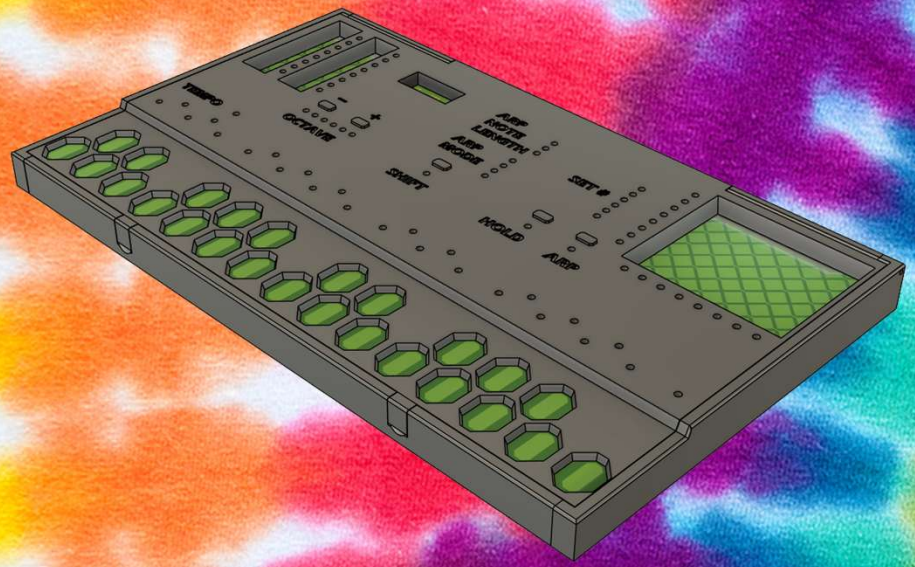
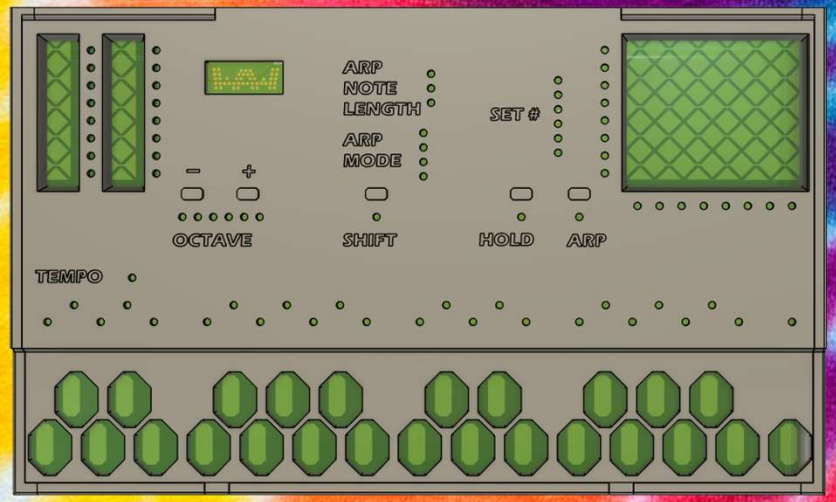




WAW

MTP – 25K

(MIDI Touch Piano ———————— 25 Keys)

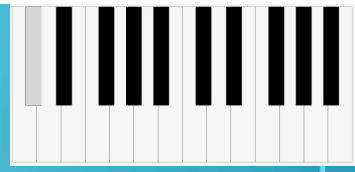
MEET THE TEAM:

WES MARSEN

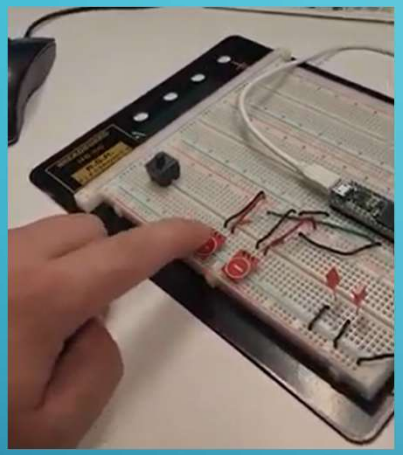
ANDREW GOERTZEN

WALKER BRADLEY

WHY MIDI?

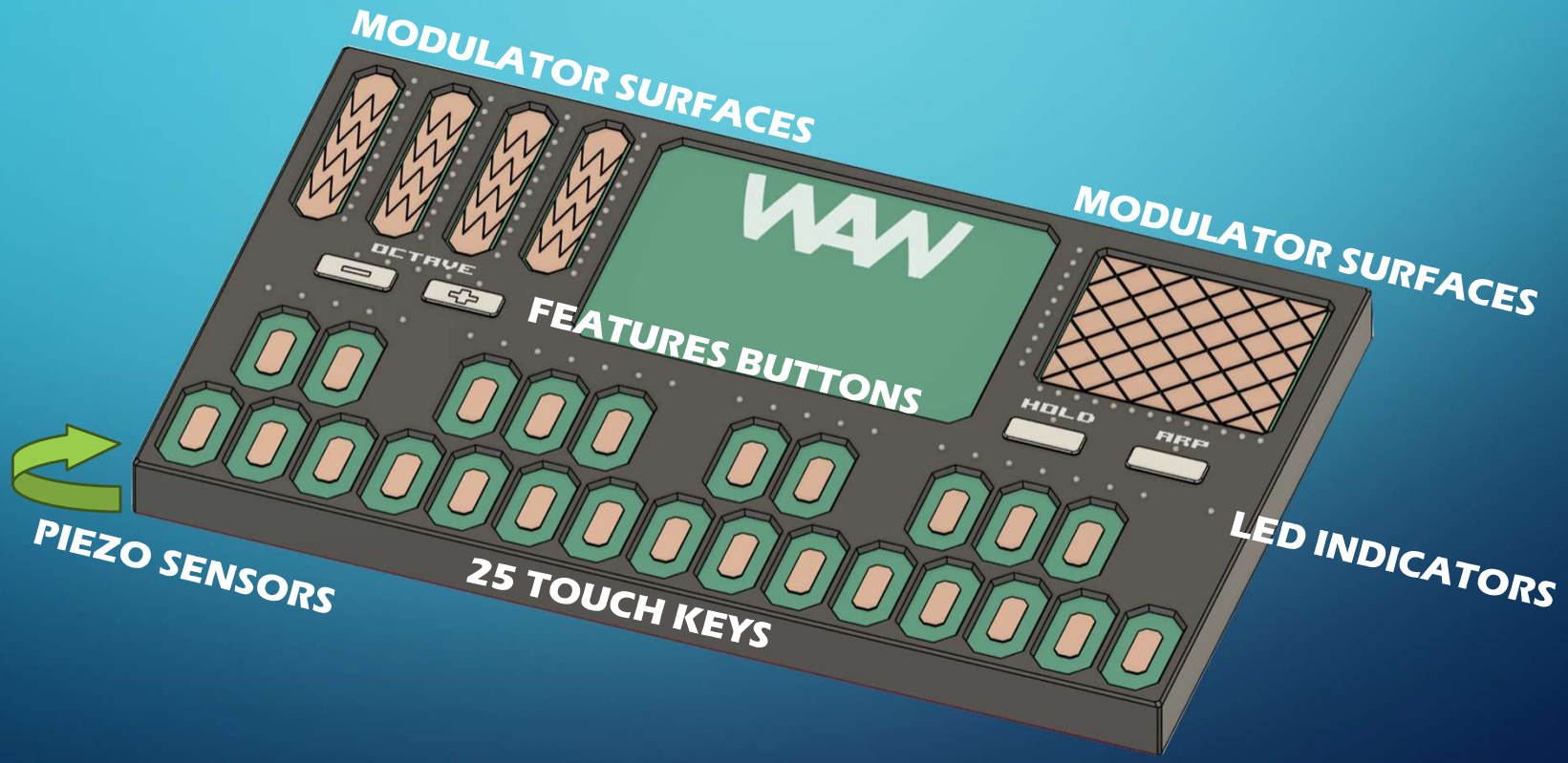


HOW MIDI?

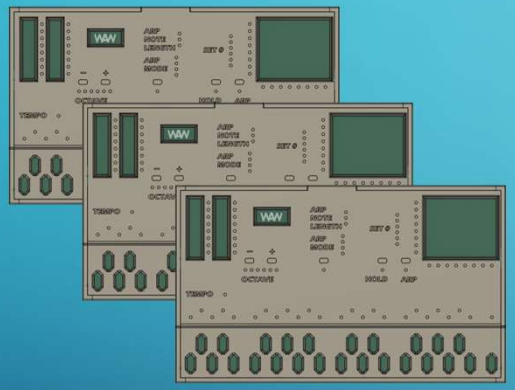


1101111
10101100

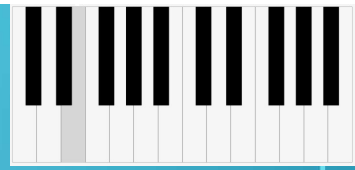
THE GOAL:


MODULATOR SURFACES
MODULATOR SURFACES
OCTAVE
FEATURES BUTTONS
HOLD
ARP
PIEZO SENSORS
25 TOUCH KEYS
LED INDICATORS

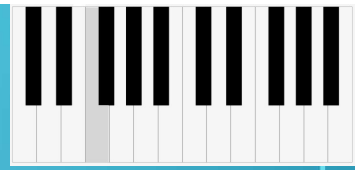
BUDGET



TIMELINE

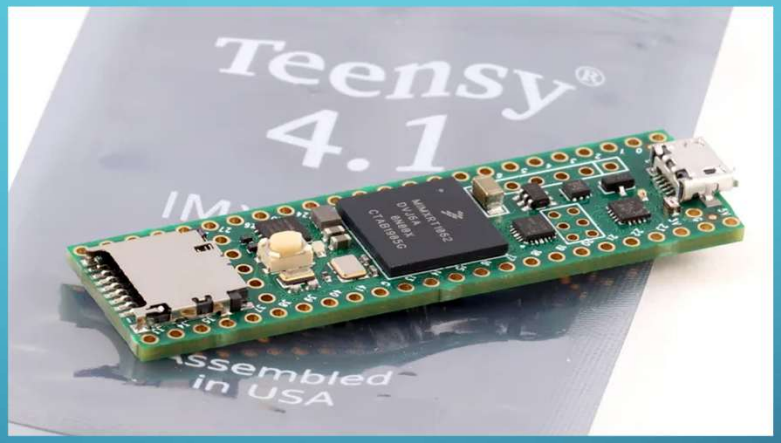


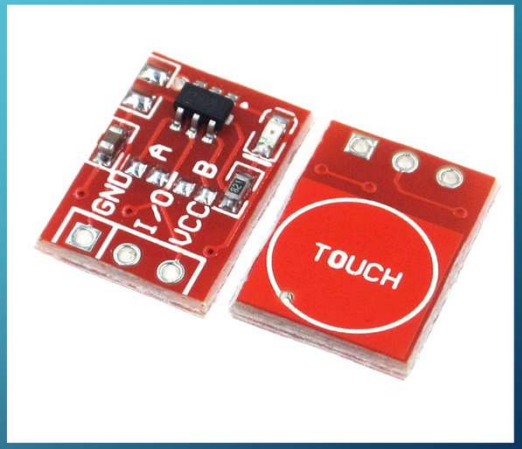
- Project Inception (Week 1)
- Breadboard Proof of Concept (Weeks 1 - 3)
- Order Test PCB (Week 5)
- Larger Breadboard & Test PCB Testing (Weeks 8 - 10)
- Final PCB Design (Weeks 8 – 11)
- Pull Out Our Hair Debugging (Weeks 11-14)
- Make It To The Symposium (Week 15)



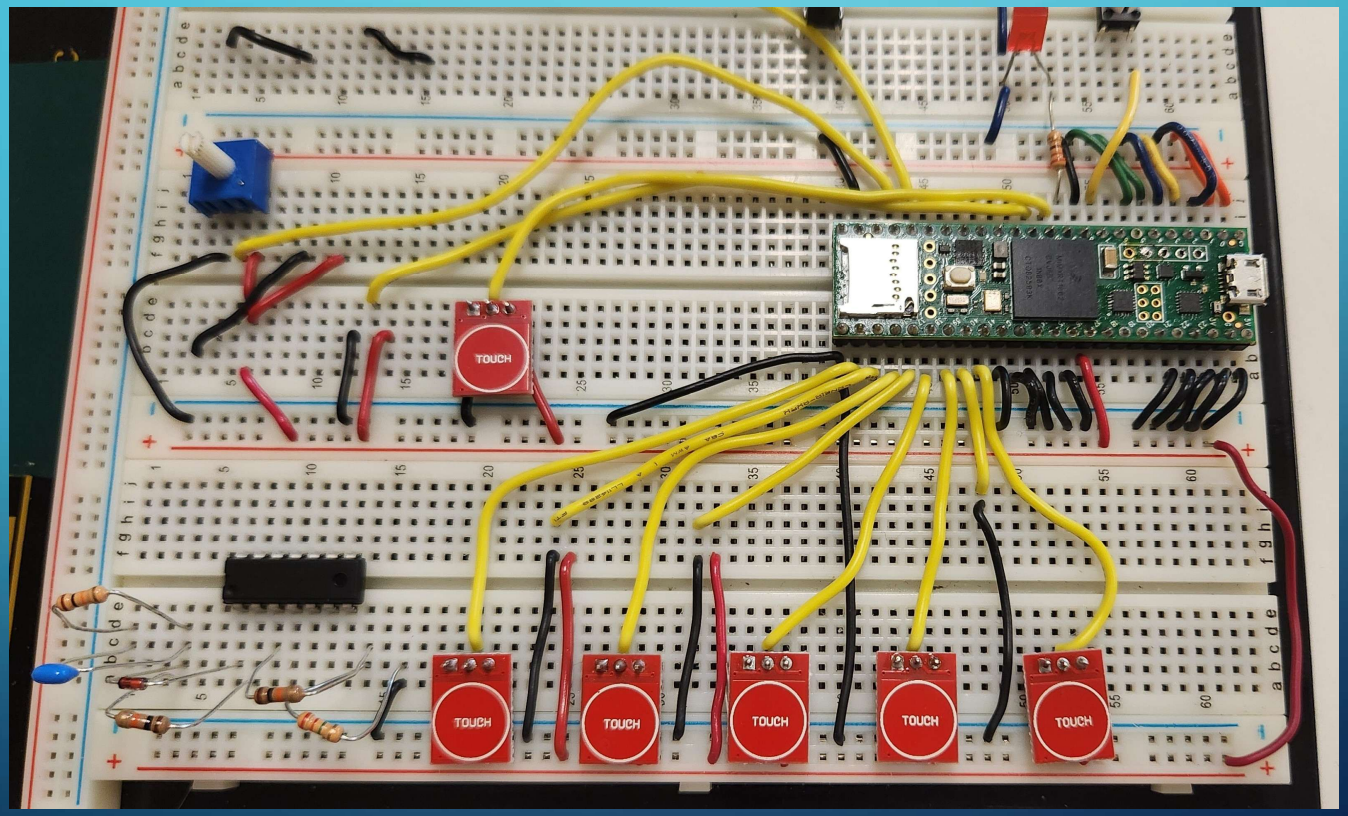
BEGINNINGS

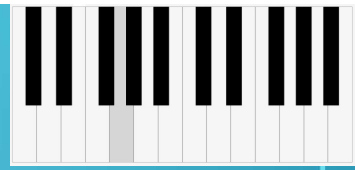
A MIDI CONTROLLER





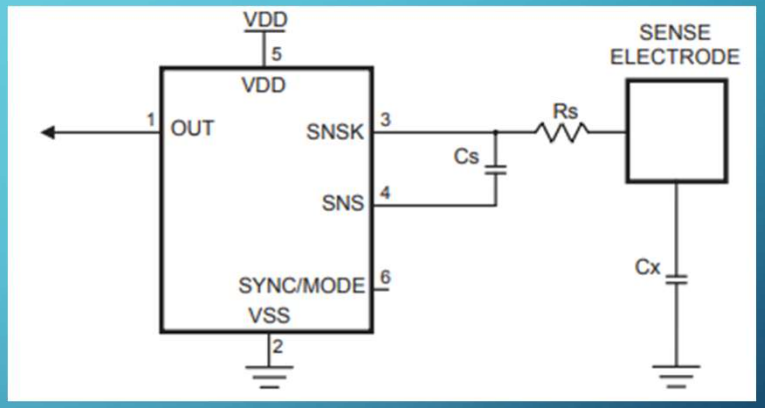
FIRST MIDI SIGNALS





HOW TOUCH KEYS

Electrodes



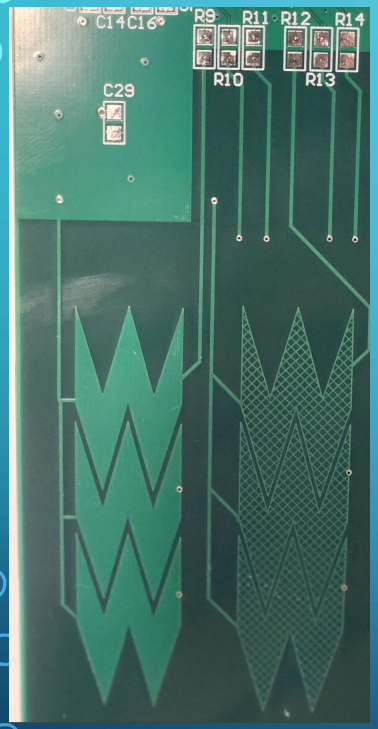
AT42QT1010

AT42QT1010 sensor chip

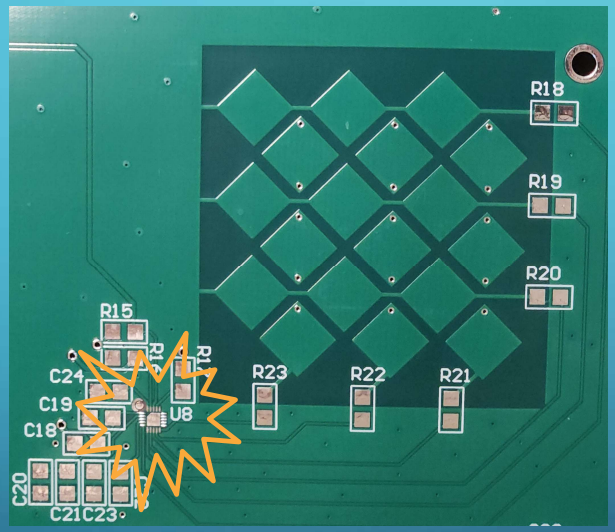
Creates electrostatic field at electrode

Conductive Material (finger) disrupts field

MODULATORS

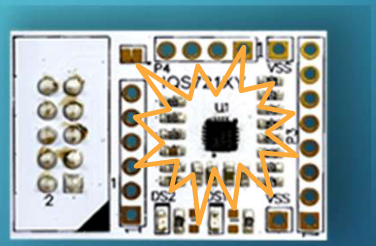


Sliders

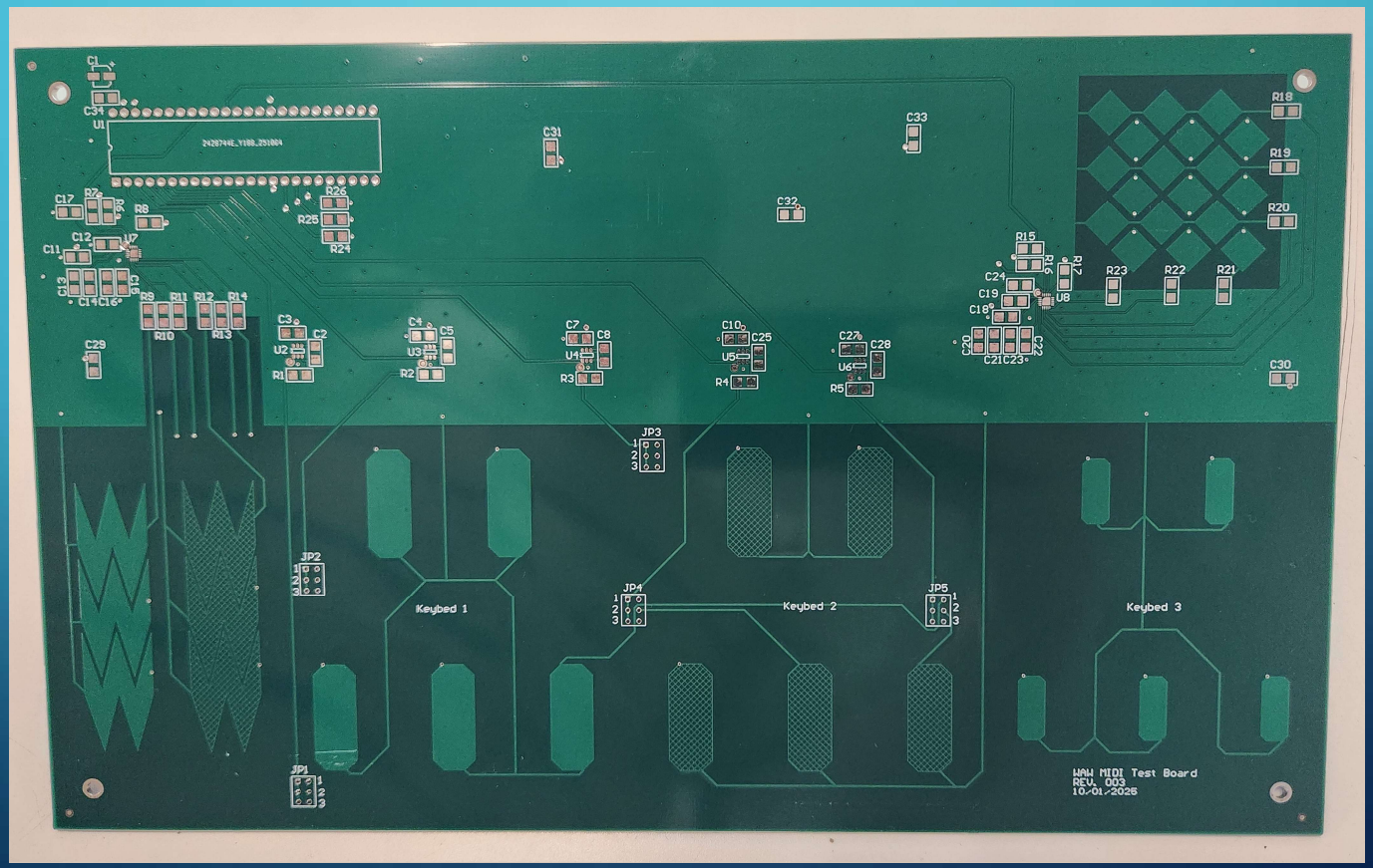


XY Trackpad

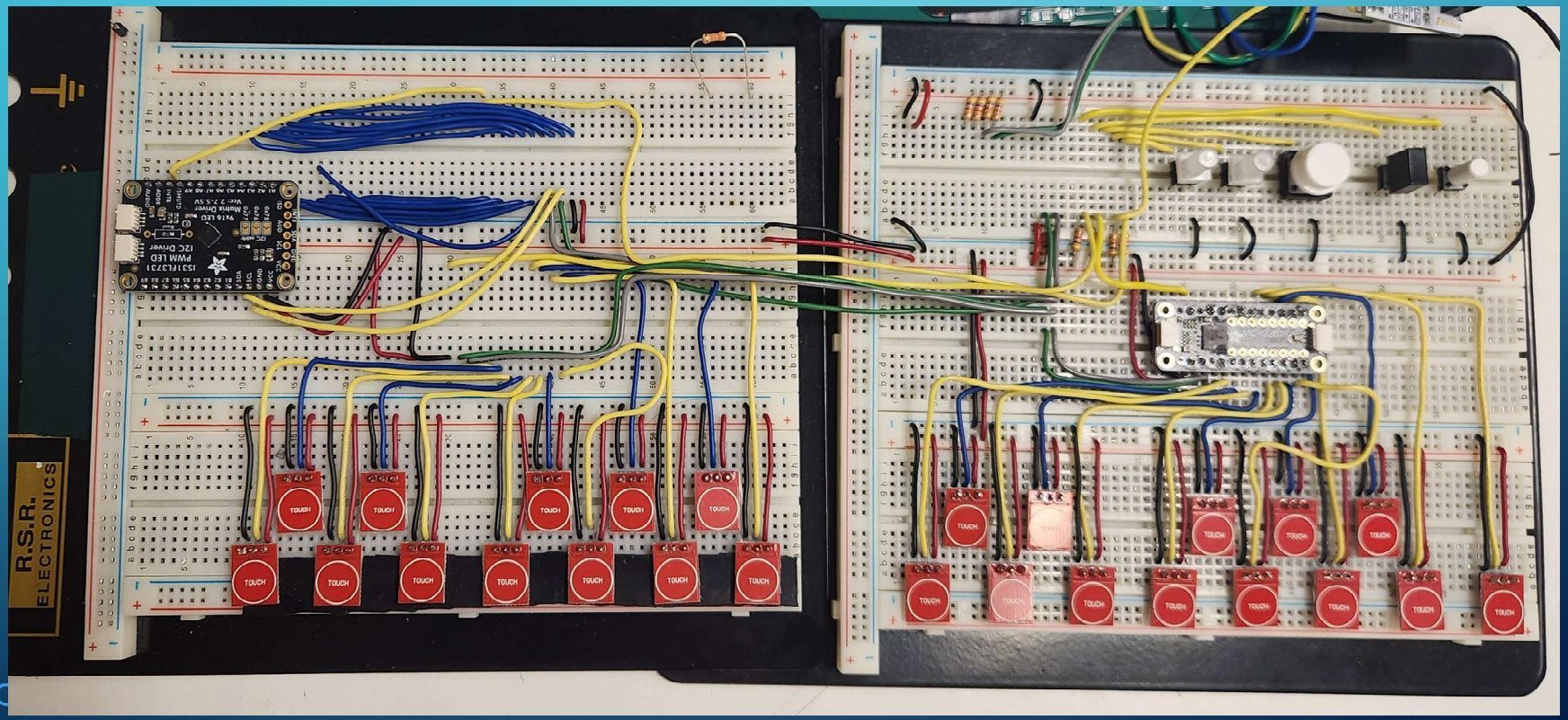
IQS7211AEV01 Kit



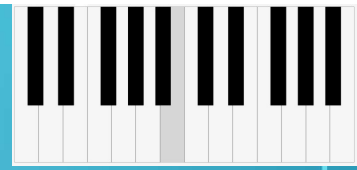
TEST PCB


Keybed 1
Keybed 2
Keybed 3
WAW MIDI Test Board
REV. 003
10-01-2025

EXPANDING MORE?!



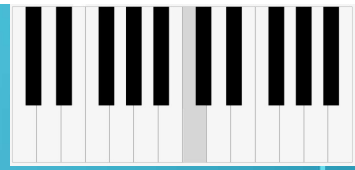
GPIO EXPANDERS



25 TOUCH KEY PINS

MCP23017

2 I2C PINS



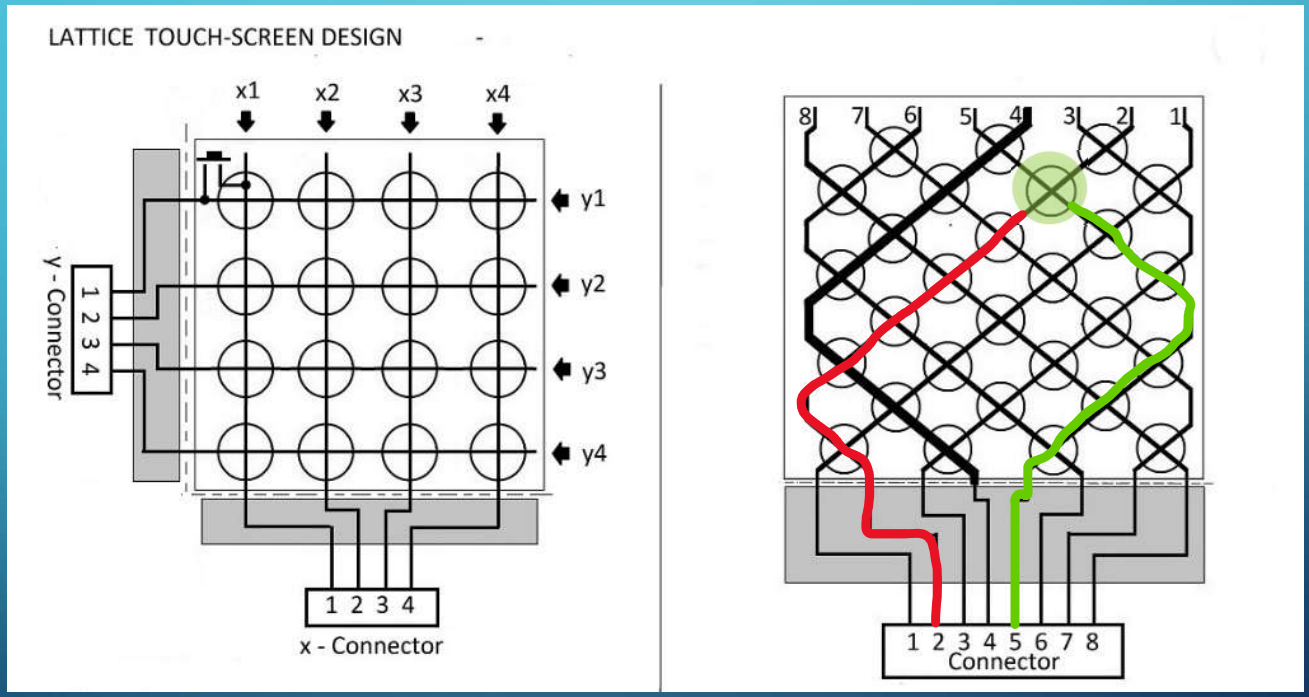
LED INDICATORS

RUN LEDS IN SERIES? ✗ TOO MUCH POWER, NOT ENOUGH CONTROL

MATRIX? ✗ NOT ENOUGH PINS

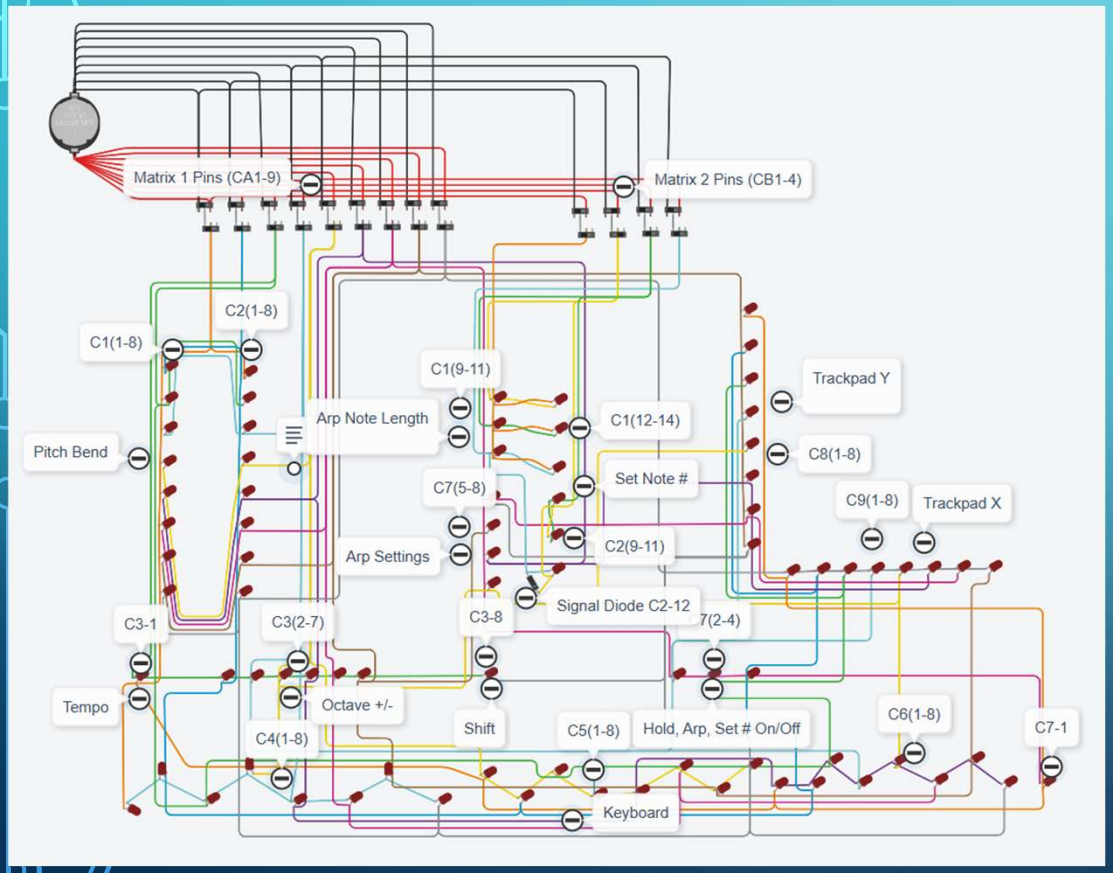
CHARLIEPLEXING? ✓ ENOUGH PINS, LOW POWER, TALKS ON I2C

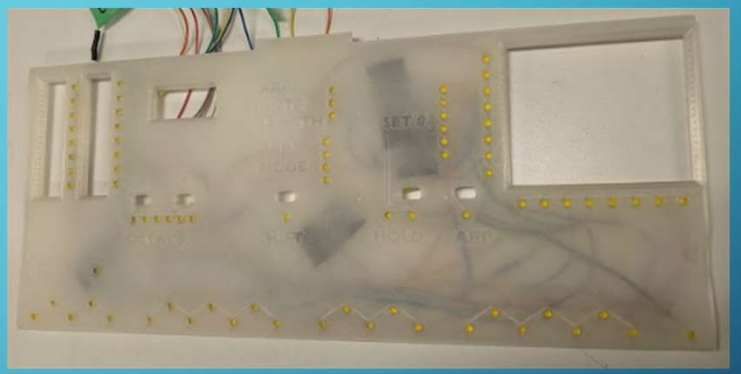
CHARLIEPLEXING



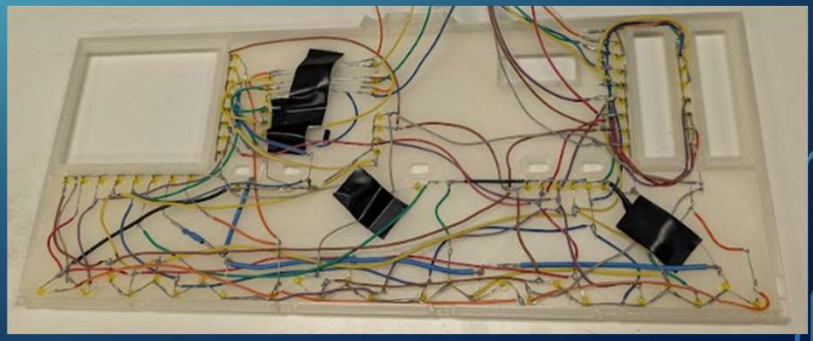
16 VS 28

OUR CHARLIEPLEXING

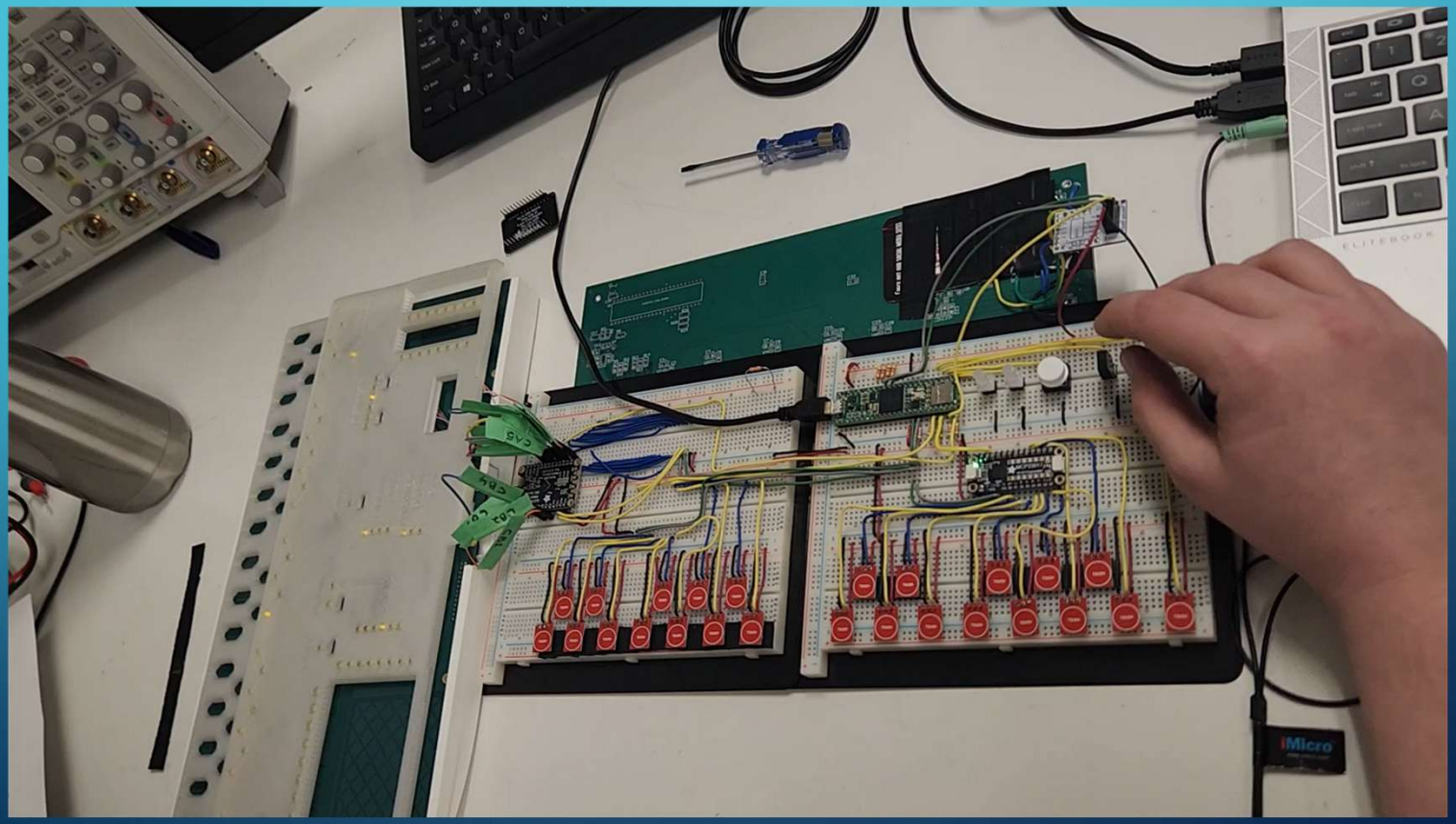




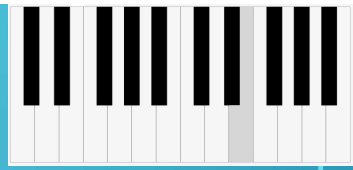
Physical Layout



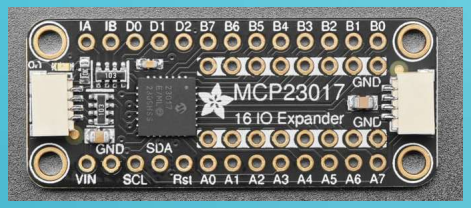
WORKING LED ARRAY! HURRAY!



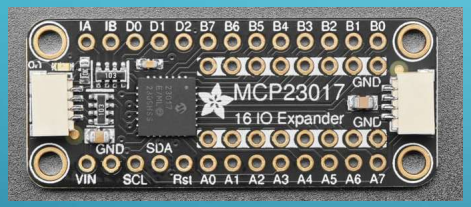
INTER-INTEGRATED CIRCUITS (I2C)



25 TOUCH KEYS

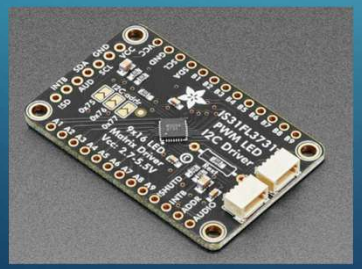


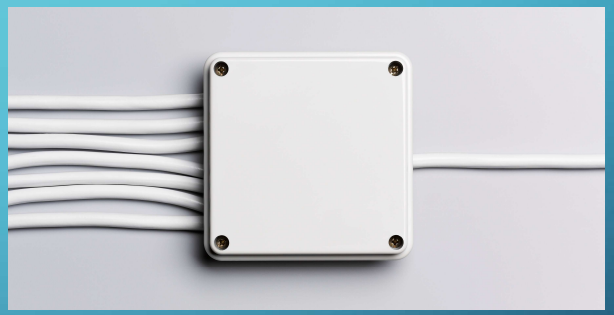
MCP23017



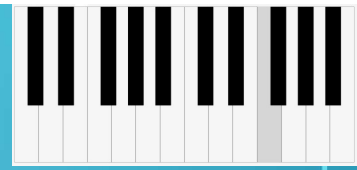
IS31FL3731

81 LEDS





2 I2C PINS



WE MADE IT!

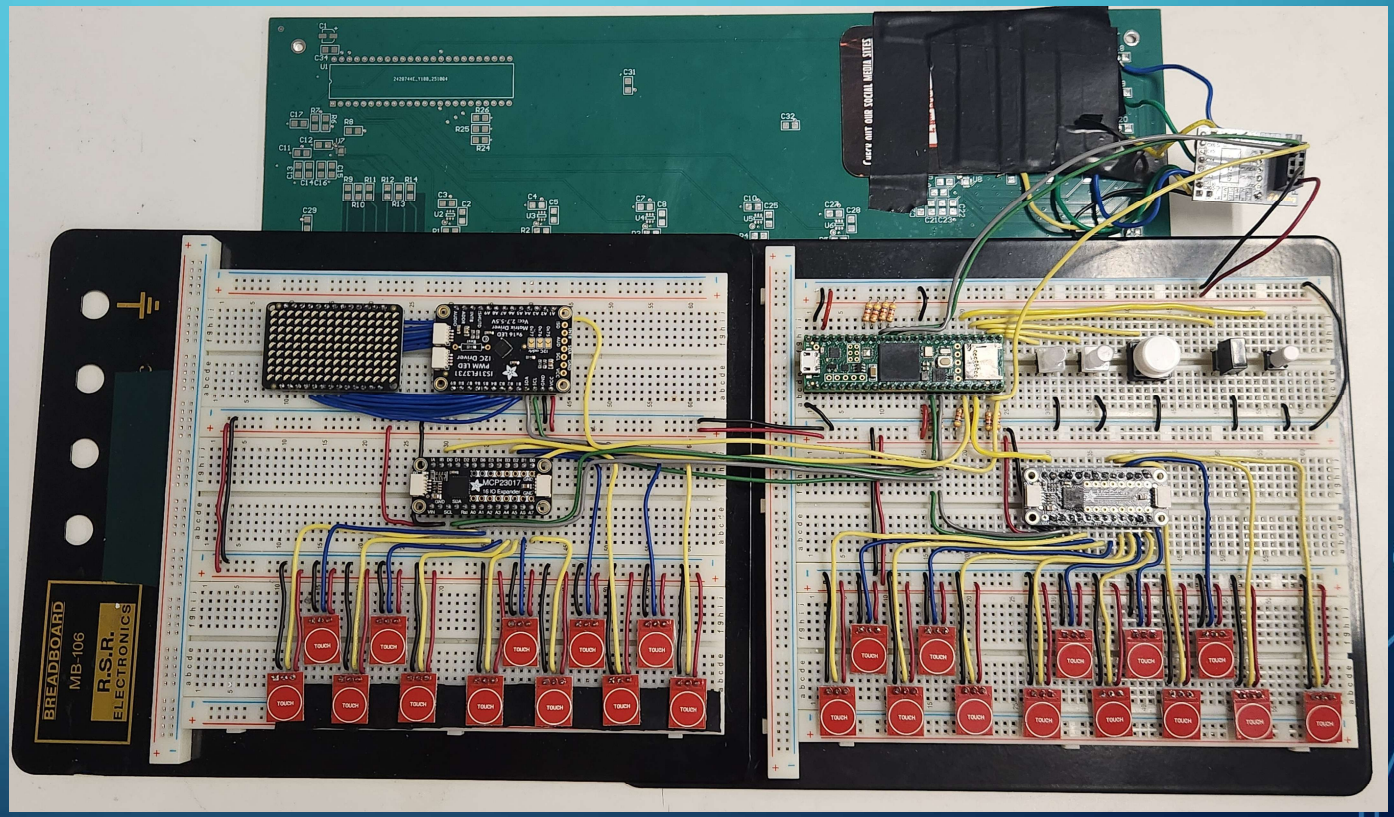
TOUCH KEYS? ✓

XY TRACKPAD? ✓

LED ARRAY? ✓

PLAY MODES? ✓

PIEZOS? ✓



WE MADE IT?

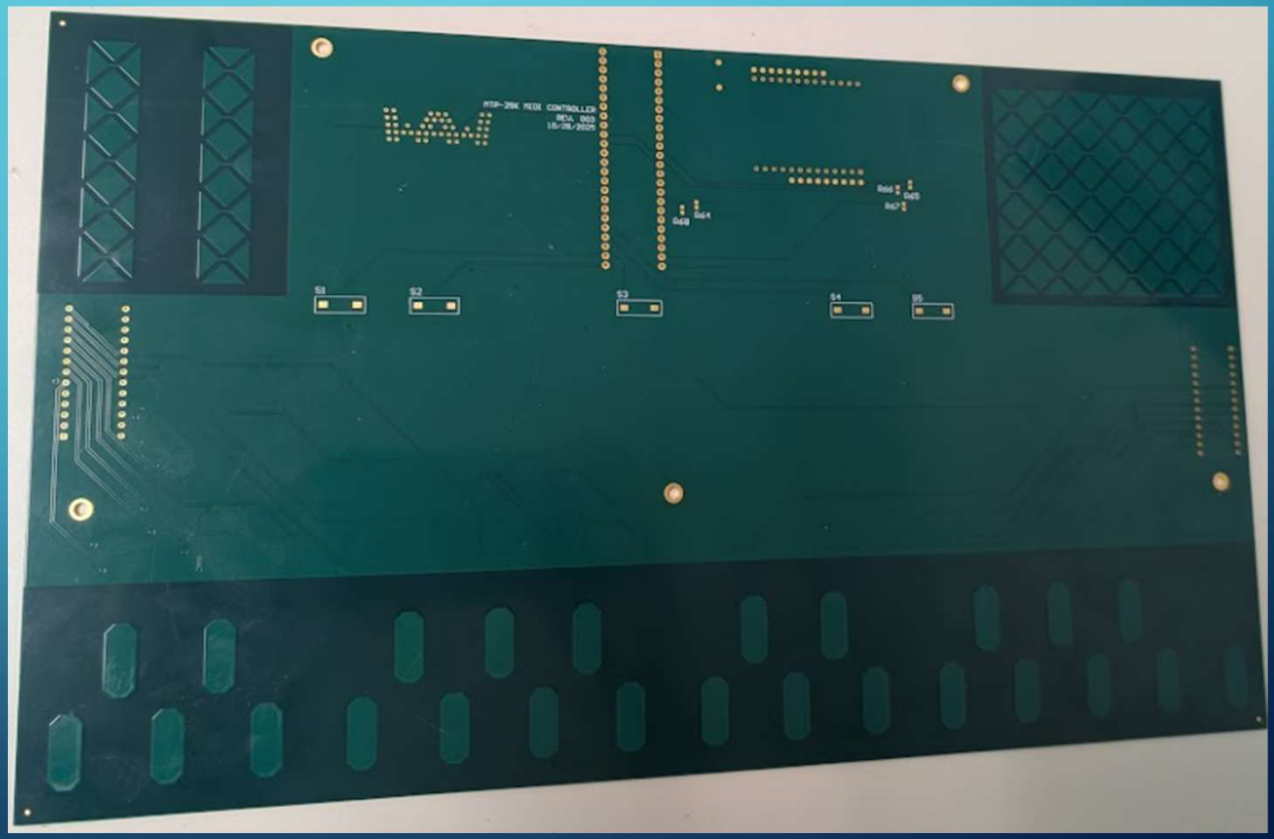
TOUCH KEYS? ✗

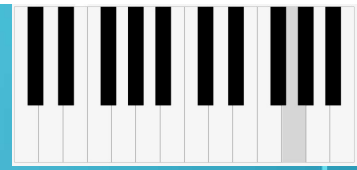
XY TRACKPAD? ✗

LED ARRAY? ✓

PLAY MODES? ✗

PIEZOS? ✗





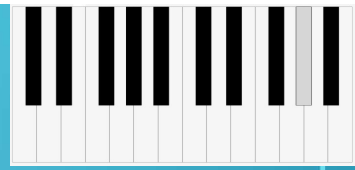
THERE'S HOPE!

PCB REWORK

\+ CODE MODIFICATIONS

KEYS AND PLAY MODES WORK!

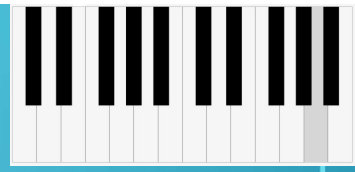
XY TRACKPAD ON THE WAY!



...AND MORE CHALLENGES

SLIDER CONTROLLER NEEDS REWORK

PIEZO PEAK DETECTION NEED A REDESIGN



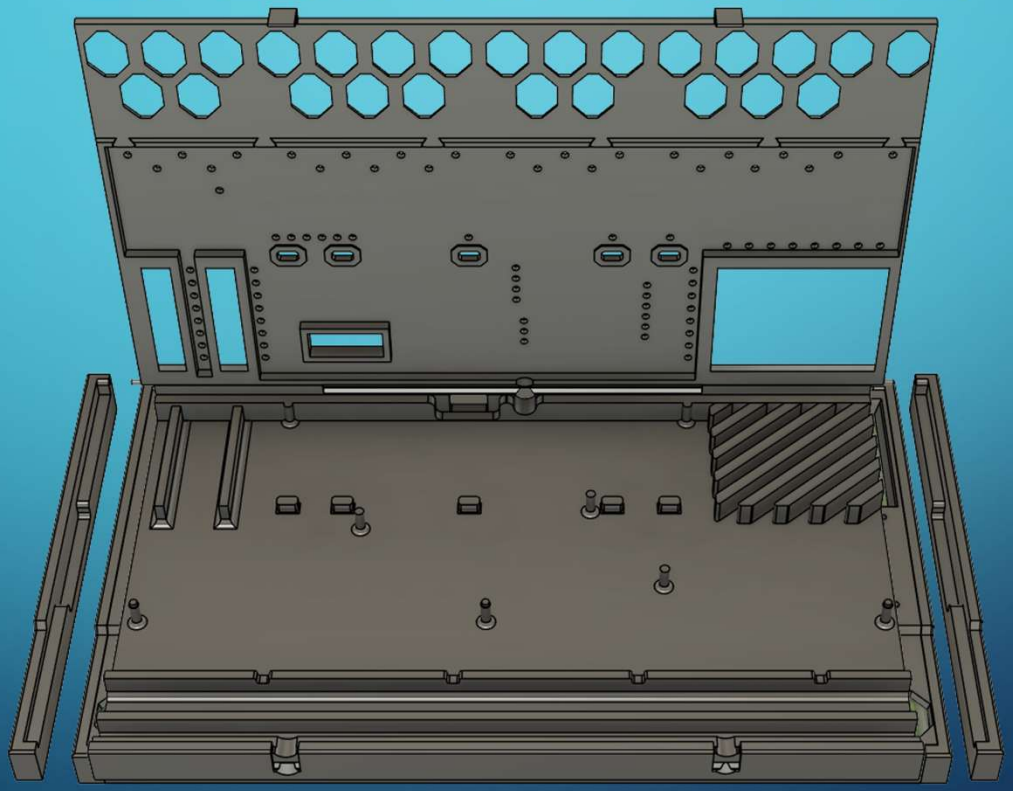
PCB PLANS

MULTIPLE PCBs
Vs
ONE BIG PCB

BETTER PIEZO CIRCUIT

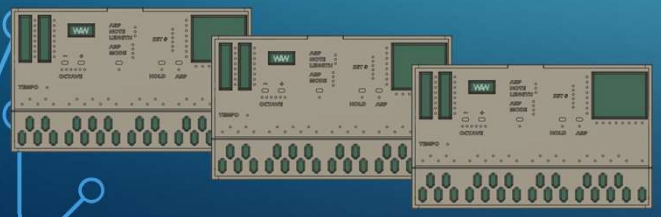
DESIGN FOR EXPANDABILITY

ENCLOSURE



BUDGET

Parts before semester	Subtotal	$104.67
Order #1	Subtotal	$78.92
Order #2	Subtotal	$26.20
Order #3	Subtotal	$45.07
Order #4	Subtotal	$1.10
Order #5	Subtotal	$5.11
Order #6	Subtotal	$55.86
Order #7	Subtotal	$85.25
Order #8	Subtotal	$100.60
Order #9	Subtotal	$17.04
Order #10	Subtotal	$192.32
Grand Total		$712.14



CONCLUSION

QUESTIONS?