



SOUND EFFECT DEVICES

BY: JAKE ASMUS, JOSEPH BROWN, DANIEL PETERJOHN, AND
JIANGNING XIONG

DEC1712

THE PROBLEM

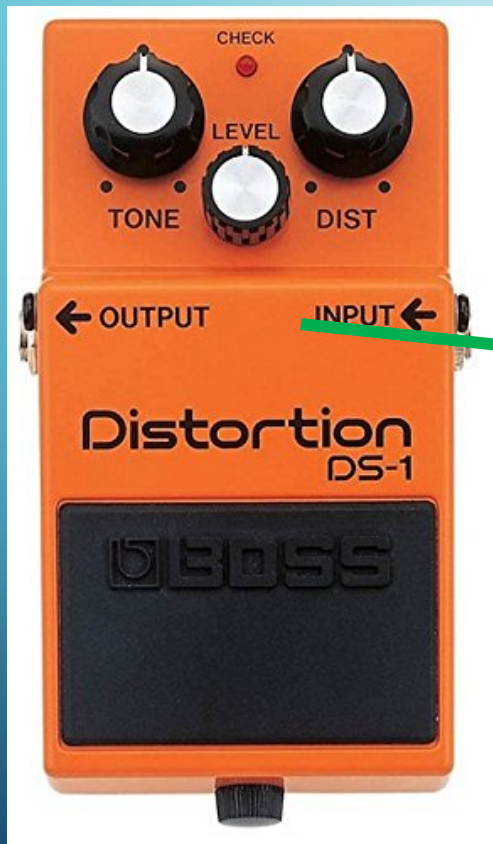
- Our clients were looking for a sound effect device with multiple effects and/or a different way to interact with musicians live.
- Our team decided to tackle both problems and allow as much flexibility as possible for the musician.

WHAT IS A PEDAL?

- To the right is an example of a typical guitar pedal.



WHAT IS A PEDAL BOARD?



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ROYAL BLOOD AUDIO SAMPLE

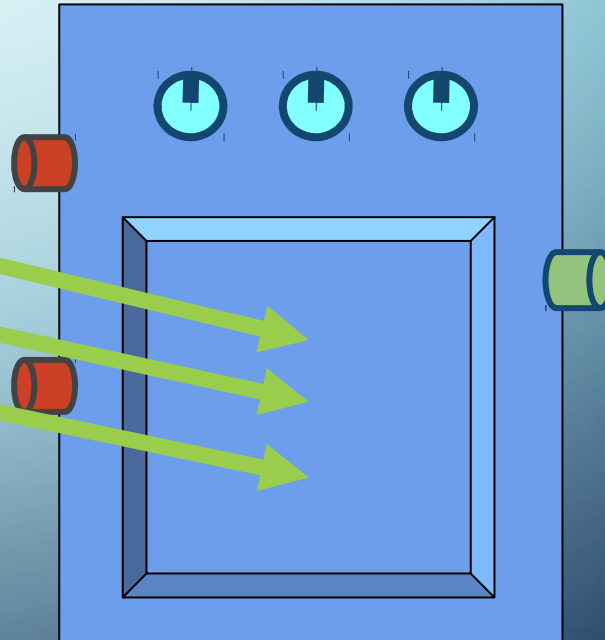
☐ Two Person Band with multiple sound effect pedals

☐ MP3



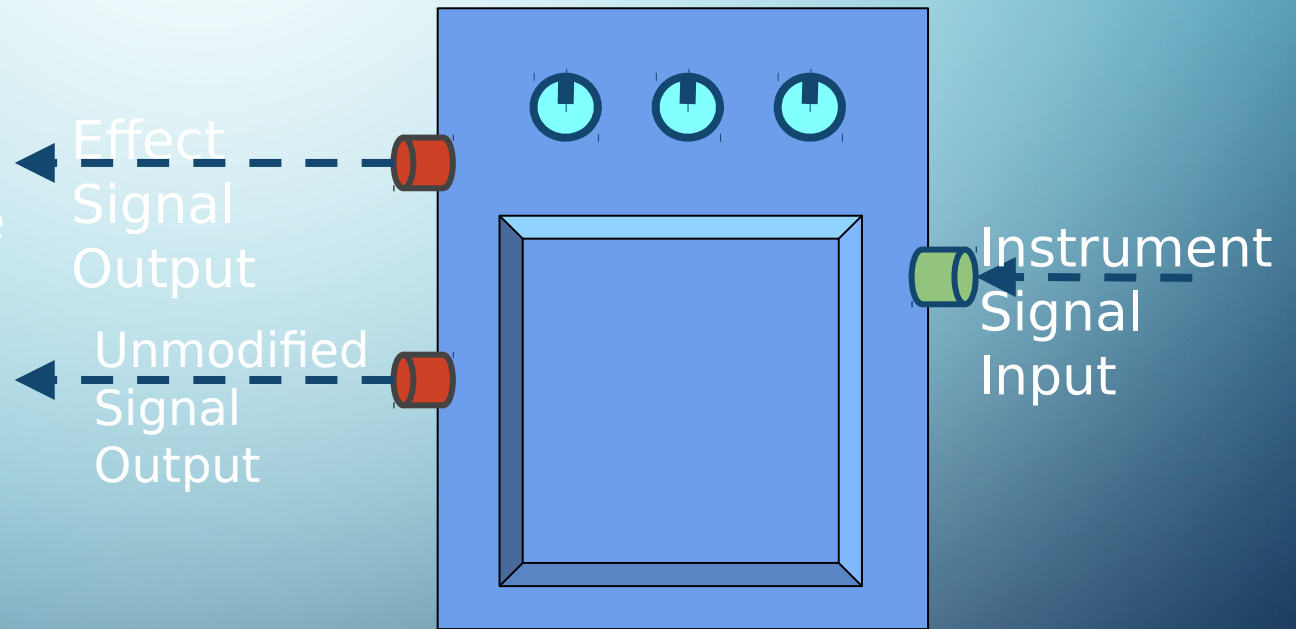
THE SOLUTION

- Integrate many different pedals into one pedal



THE SOLUTION

- For Multiple Effects in One Location:
 - Multiple Effects from one input to two outputs



Example audio setup



Amplifiers



Other Effect Pedal

Our Effect Pedal



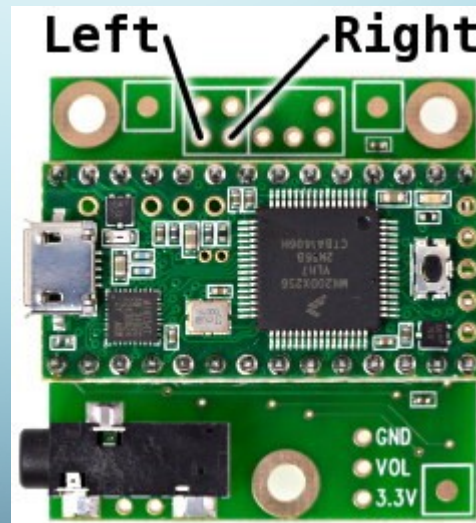
Instrument

PEDAL DESIGN

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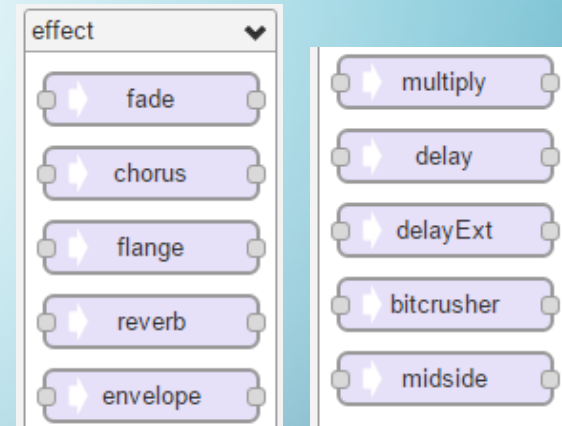
AUDIO IN/OUT

- Teensy Microcontroller + Audio Adapter
- Very clean output
 - 16 Bit, 44.1 kHz sample rate (CD quality) Audio
- Easy to use



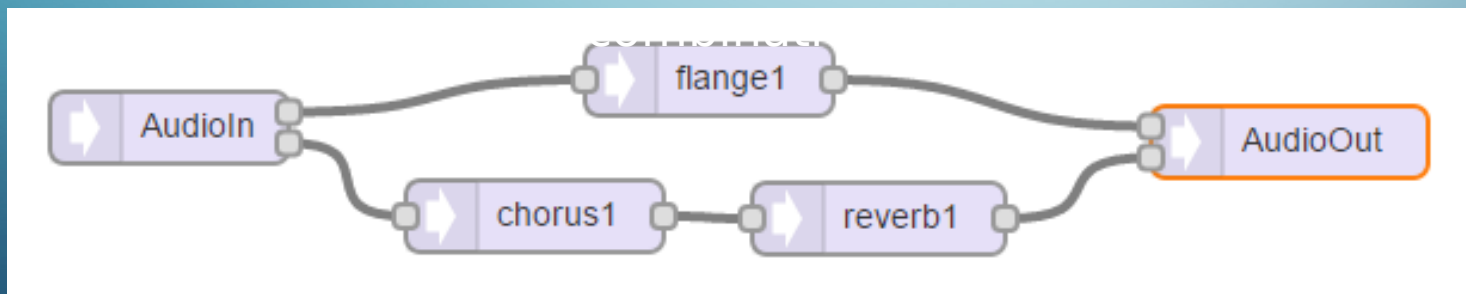
TEENSY AUDIO LIBRARY

- Various existing effects
- Simple to design new effect combinations

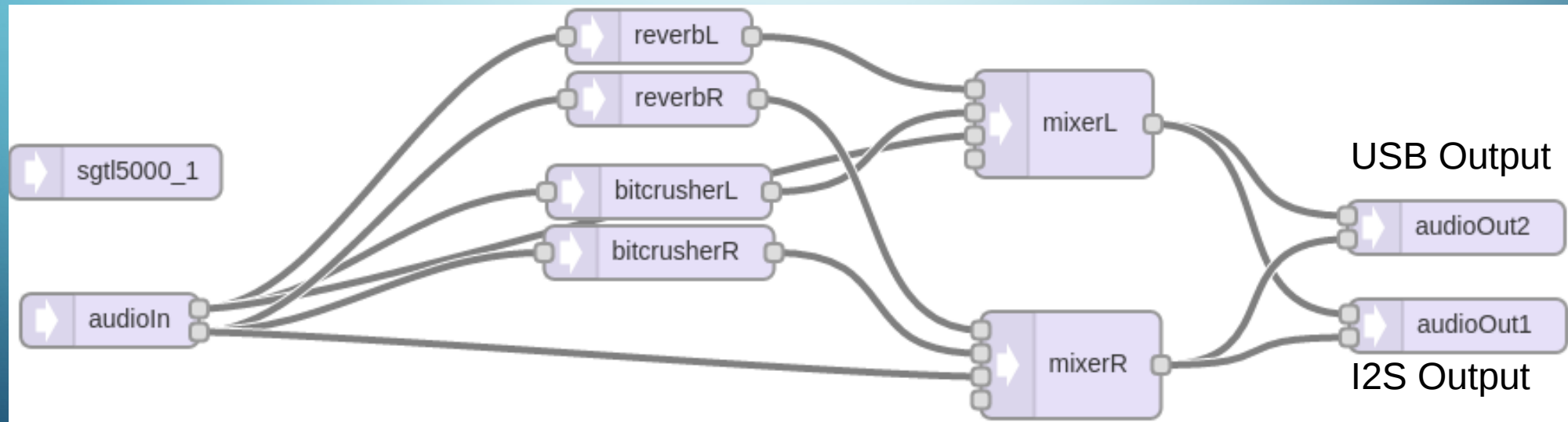


Various existing effects

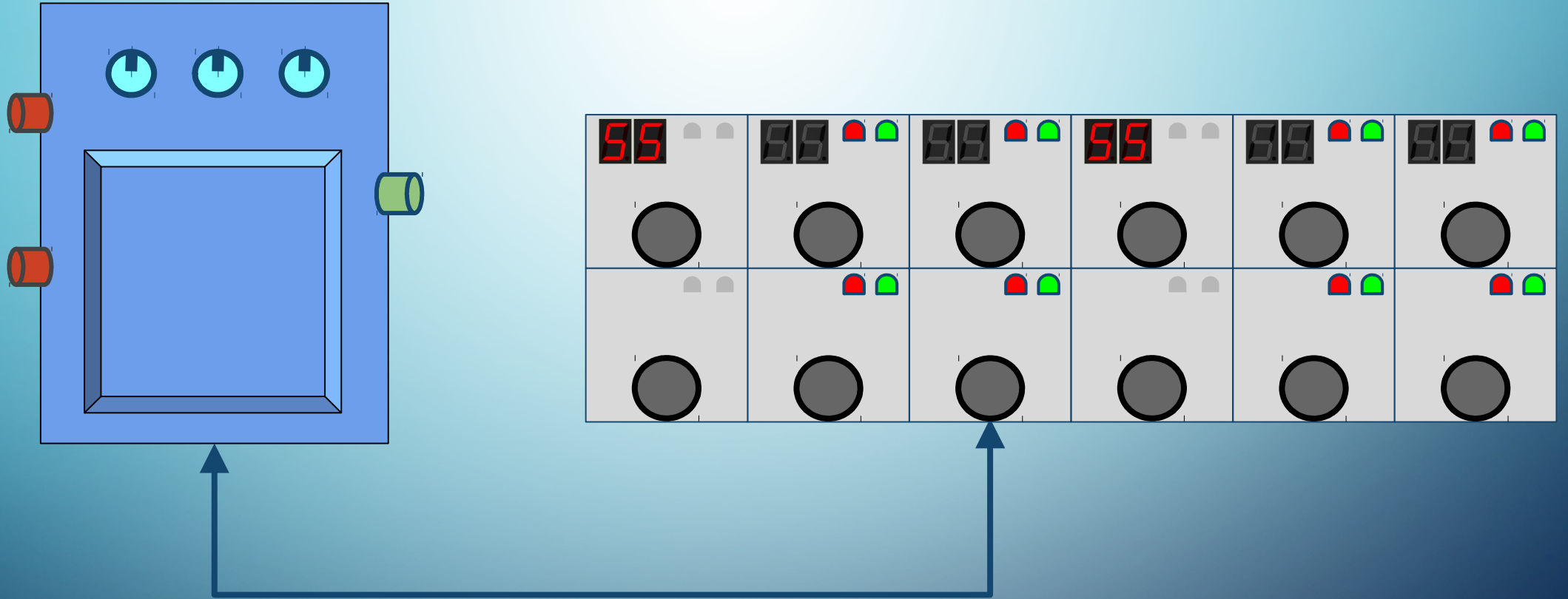
Example of audio effect



UNIQUE PEDAL EFFECTS



Mat Communication



MAT INTERFACE DESIGN

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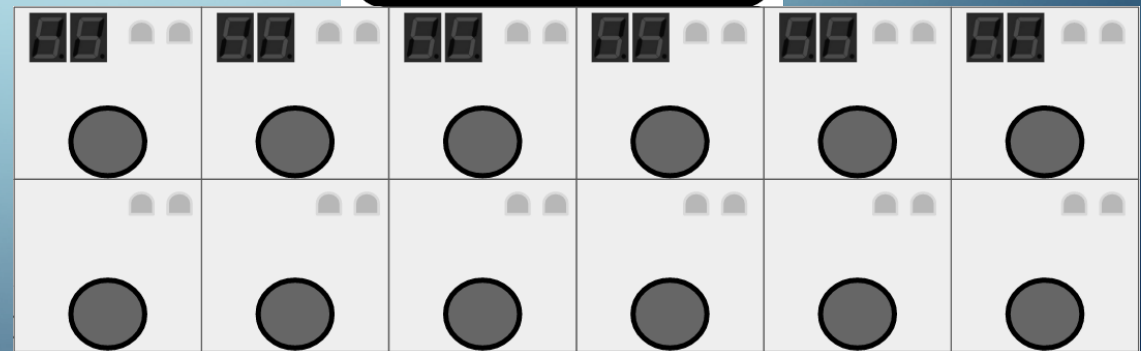
14

THE SOLUTION (CONT.)

- ❑ Unique User Interface:
 - ❑ The mat that can do it all
 - ❑ Quicker, easier, and more accurate adjustments in a live setting



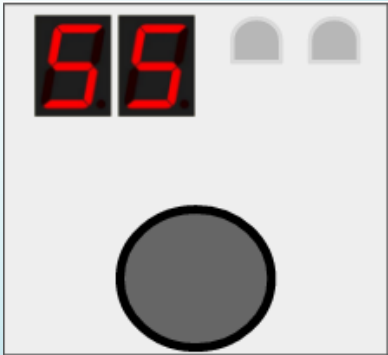
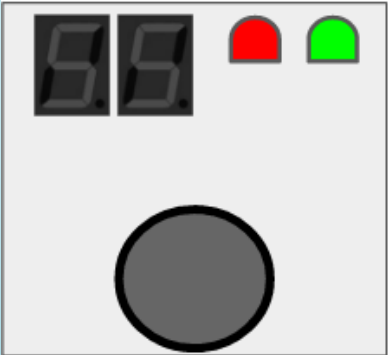
LCD Screen Displaying all pedals programmed in mat and highlights the current layout



MAT TERMINOLOGY

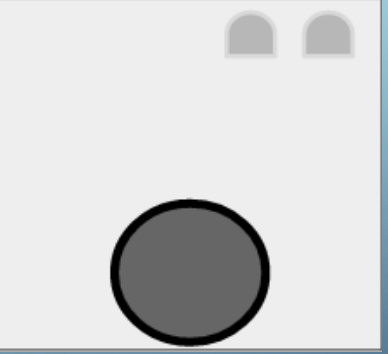
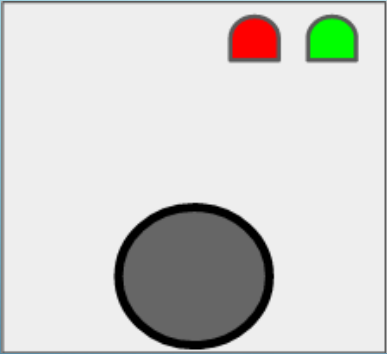
Column 0

Column 1



CELLS 1

CELLS 3

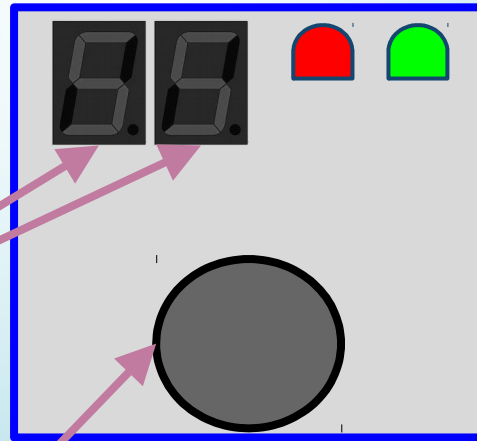


CELLS 0

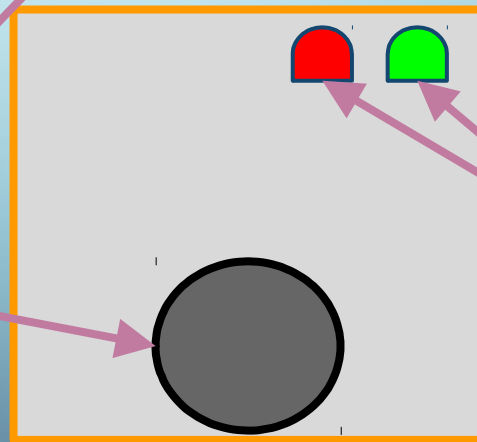
CELLS 2

COLUMN TOGGLE MODE

Number display
turn off (Unused)



Buttons are
assigned to
separate
functionalities

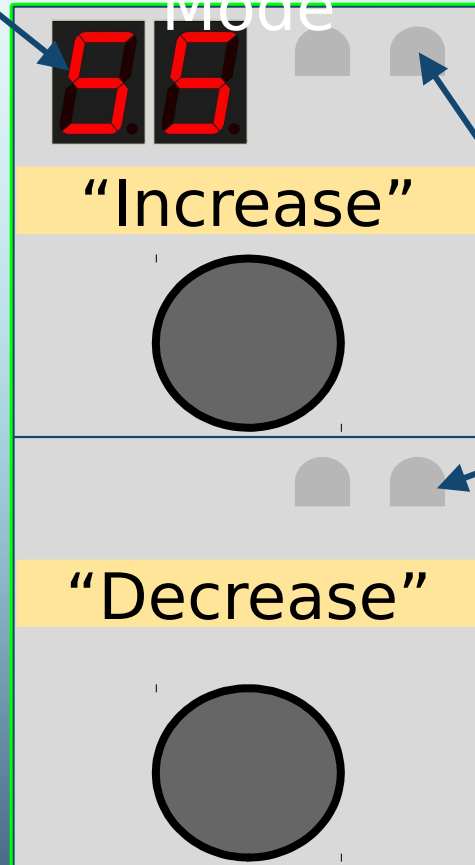


State
Indicator

COLUMN KNOB MODE

Number display turned on

Column Knob Mode



Column of buttons is "Linked"

LEDs turn off (Unused)

COLUMN KNOB MODE: WHY?

Using **Hand**



The **WHY?**

Using **Foot**

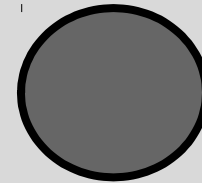
+1 or +2 if held

Column
n is
"Linked"

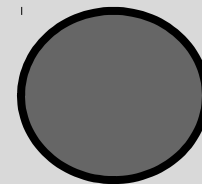
-1 or -2 if held

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Increase



Decrease

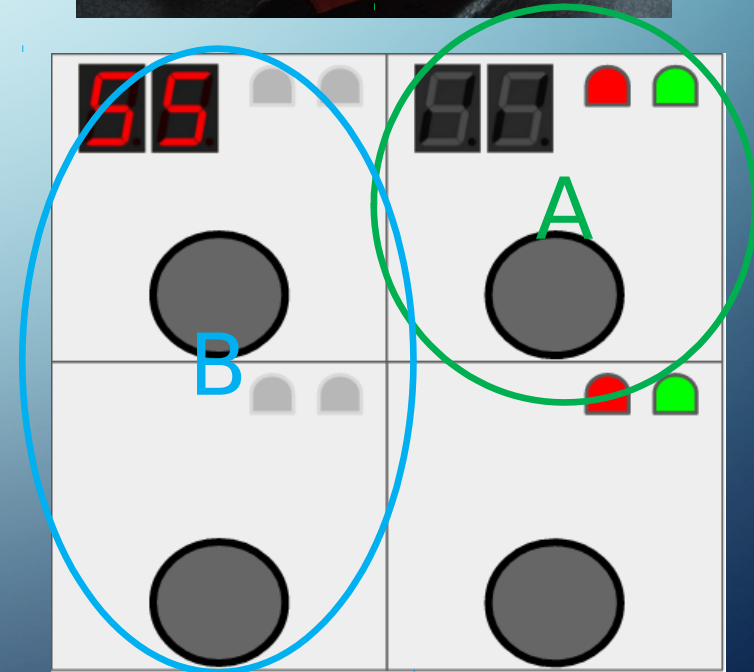


DEC 17 '12 "Octave Knob"

MAT DESIGN

HARDWARE

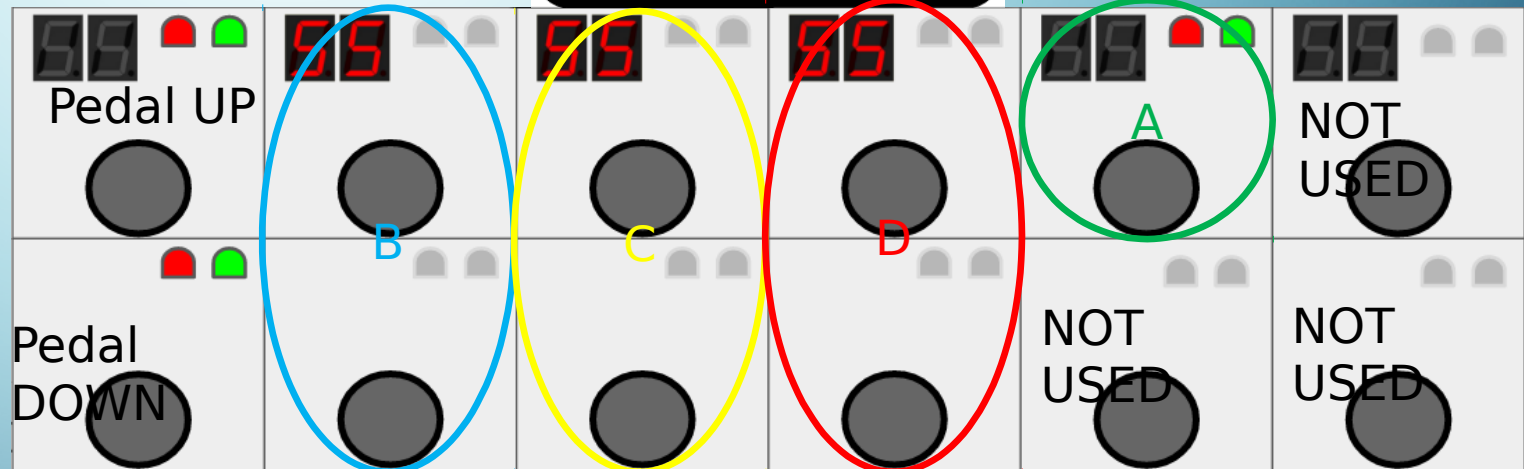
- Green and Red LEDs
 - For toggle features on pedals (A)
- Seven-Segment Displays
 - For knob features on pedals (B)



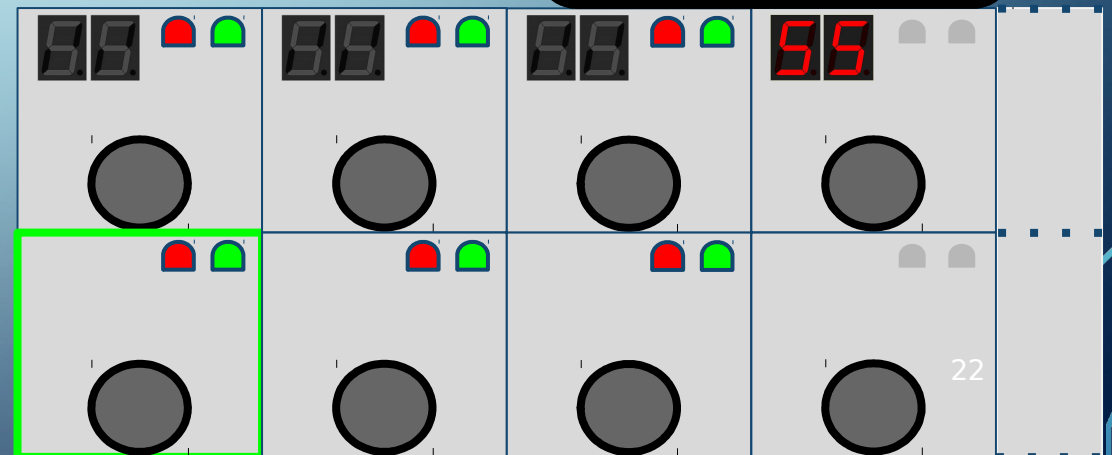
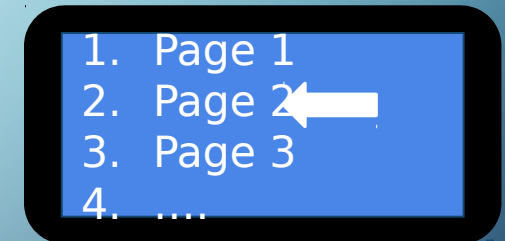
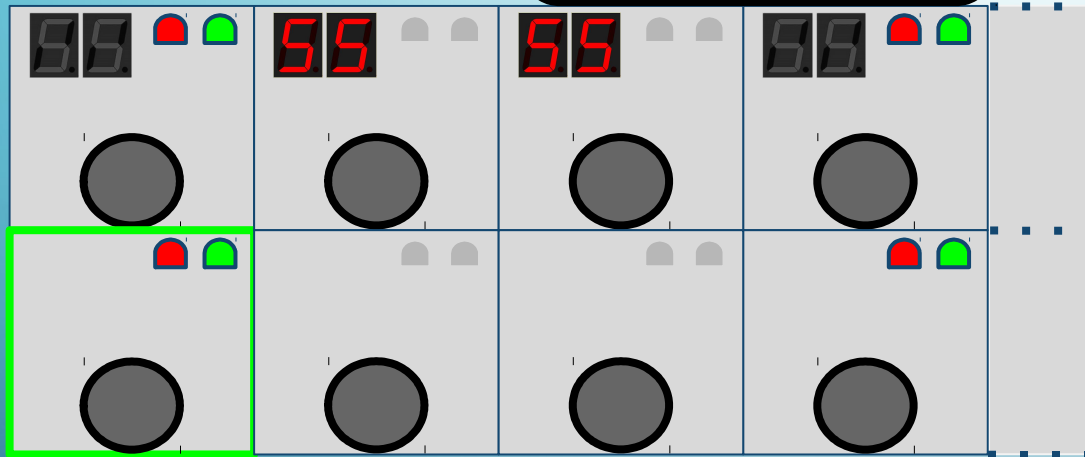
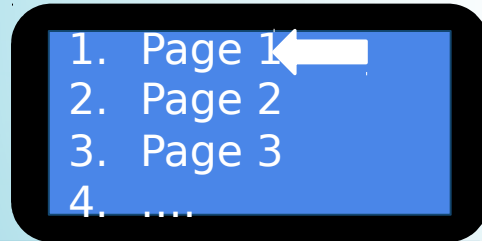
AN EXAMPLE



• (Other Pedal)
• Phase Box ←
• (Other Pedal)



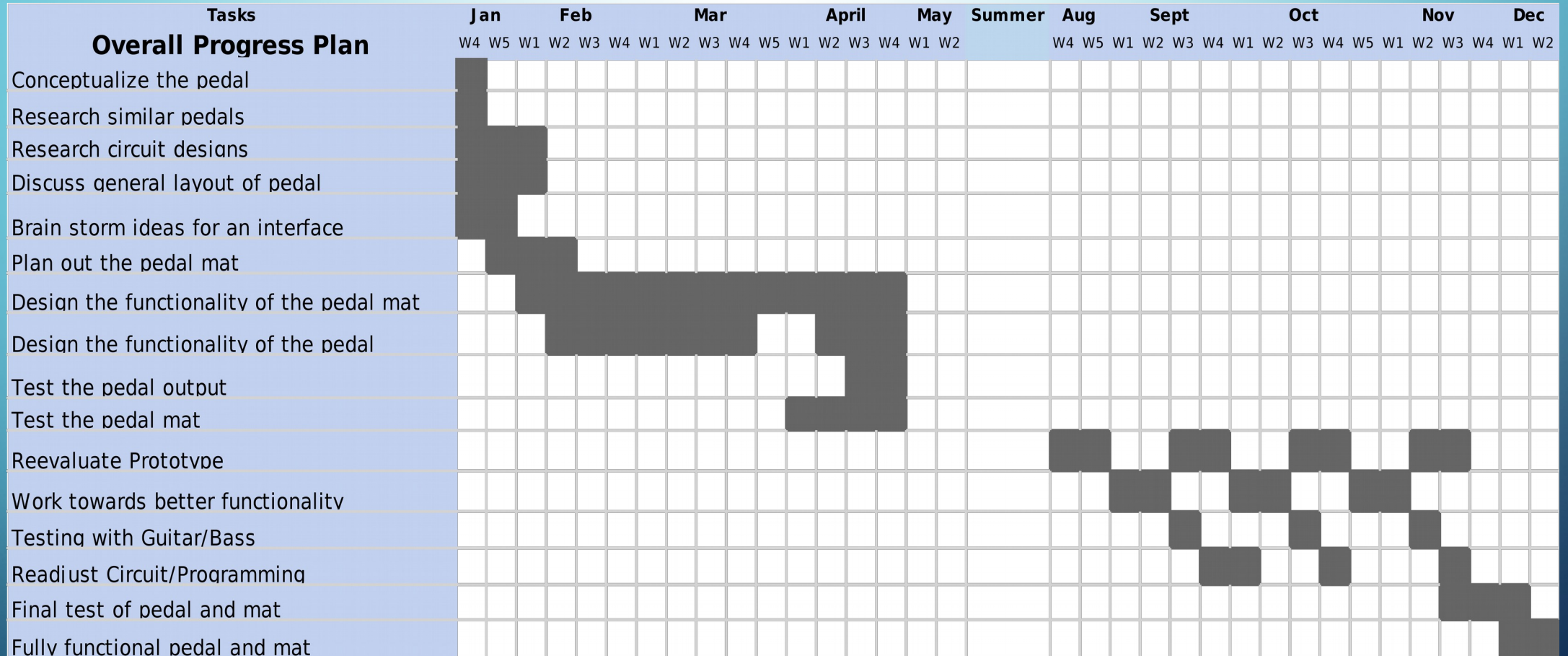
PAGING THROUGH PEDALS



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OVERALL PROJECT TIMELINE



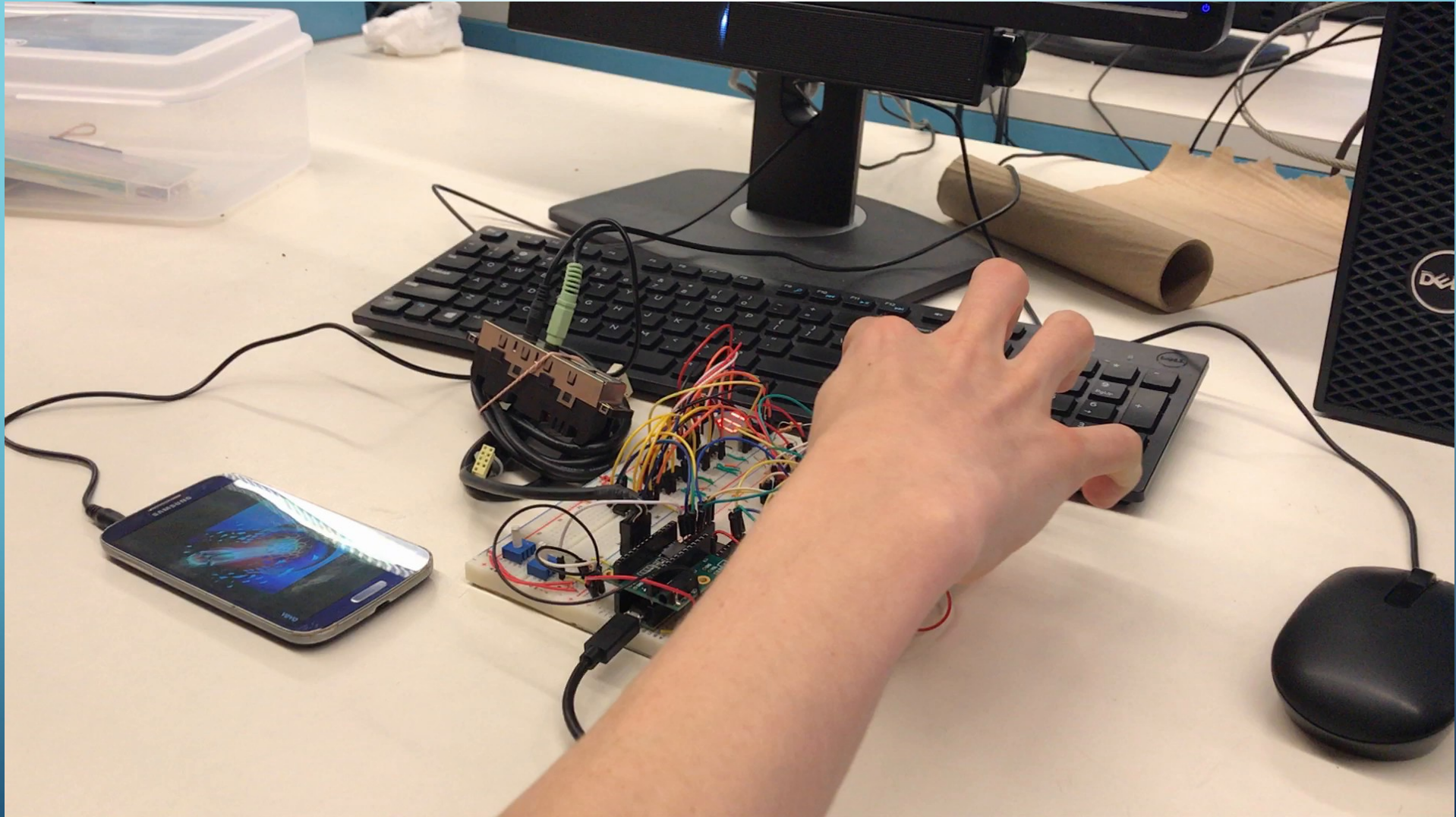
1ST SEMESTER PROGRESS

Tasks	Jan		Feb			Mar					April			May			
	W4	W5	W1	W2	W3	W4	W1	W2	W3	W4	W5	W1	W2	W3	W4	W1	W2
Overall Progress Plan																	
Conceptualize the pedal	█																
Research similar pedals	█																
Research circuit designs	█	█	█														
Discuss general layout of pedal	█	█	█														
Brain storm ideas for an interface	█		█														
Plan out the pedal mat	█	█	█	█													
Design the functionality of the pedal mat	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█		
Design the functionality of the pedal												█	█				
Test the pedal output													█	█			
Test the pedal mat													█	█	█		

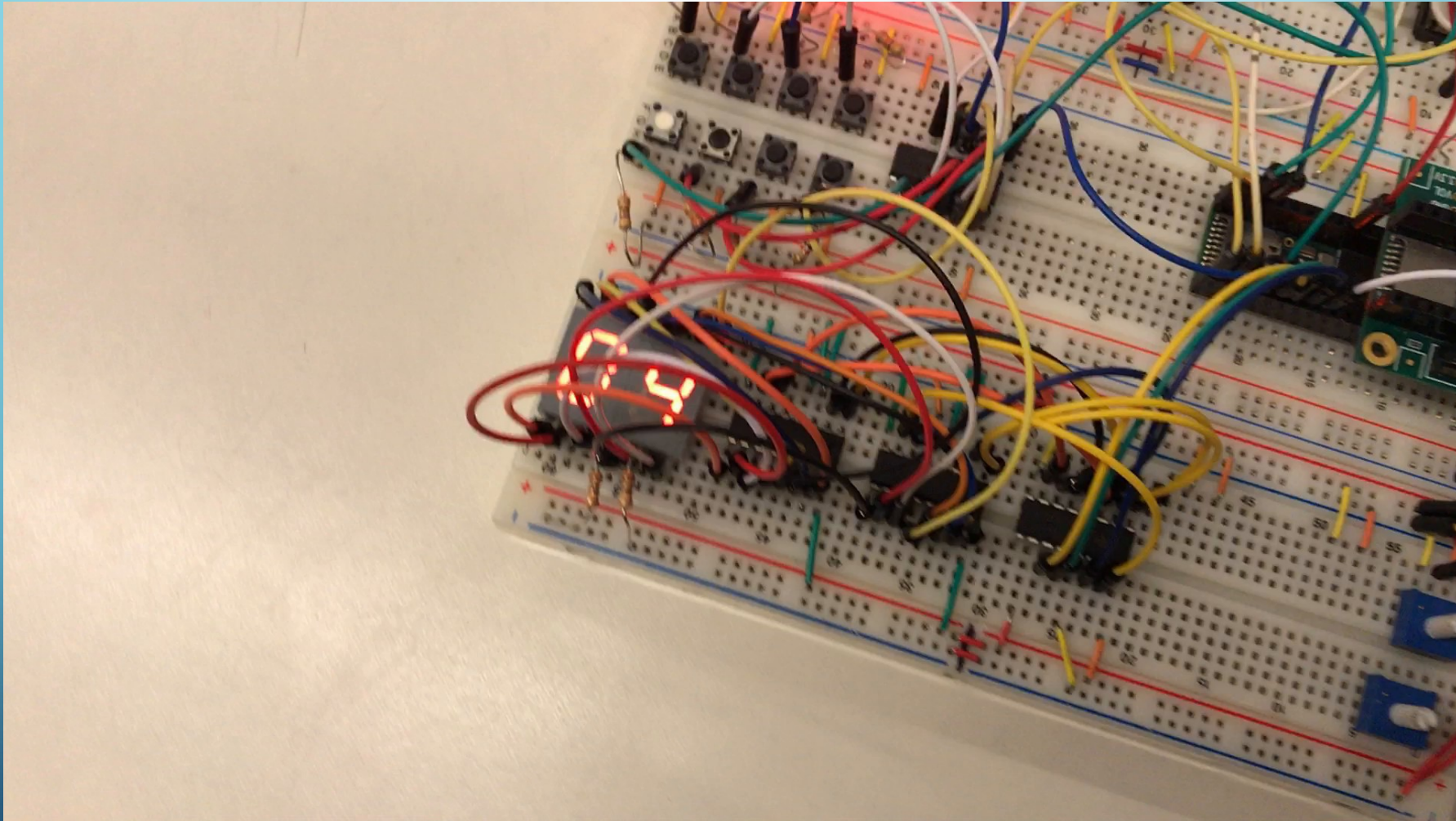
2ND SEMESTER PROGRESS

Tasks	Aug		Sept			Oct					Nov				Dec		
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Overall Progress Plan																	
Reevaluate Prototype	█				█				█				█				
Work towards better functionality			█				█			█							
Testing with Guitar/Bass					█				█				█				
Readjust Circuit/Programming						█			█					█			
Final test of pedal and mat													█		█		
Fully functional pedal and mat															█		█

CURRENT PROJECT STATUS



CURRENT PROJECT STATUS (CONT.)



RESOURCES/COST

RESEARCH AND DEVELOPMENT

- Budget: \$500
- R&D Current Cost: \$162
- Estimated cost of the pedal: \$80
- Estimated cost of the mat: \$200

SELLING PRICE

- Estimated Market Pricing:
 - \$200 for the pedal
 - \$500 for the mat

CONCLUSION

- Problems:
 - Multiple effects into one pedal
 - Complicated user interface (pedal board)
- Solutions:
 - One pedal with different effects
 - Interface that allows adjustments by foot

QUESTIONS?



SOUND EFFECT DEVICES

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THE PROBLEM

- Our clients were looking for a sound effect device with multiple effects and/or a different way to interact with musicians live.
- Our team decided to tackle both problems and allow as much flexibility as possible for the musician.

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WHAT IS A PEDAL?

- To the right is an example of a typical guitar pedal.

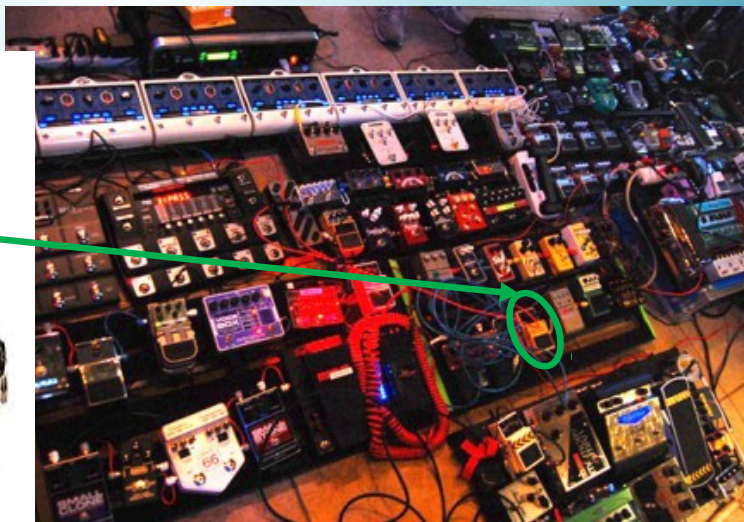


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Input signal comes in from the right
Output signal goes out the left
Knobs on the pedal for sound effect
adjustments
Some kind of toggle button

WHAT IS A PEDAL BOARD?



ROYAL BLOOD AUDIO SAMPLE

Two Person Band with multiple sound effect pedals

MP3

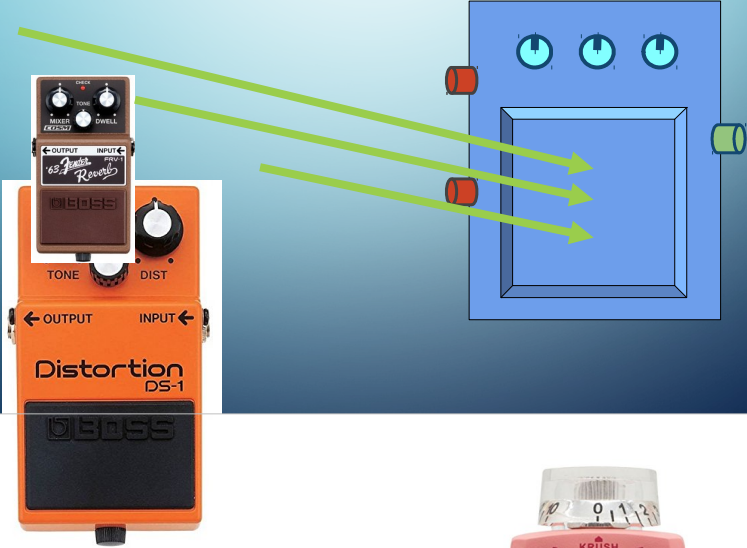


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THE SOLUTION

- Integrate many different pedals into one pedal



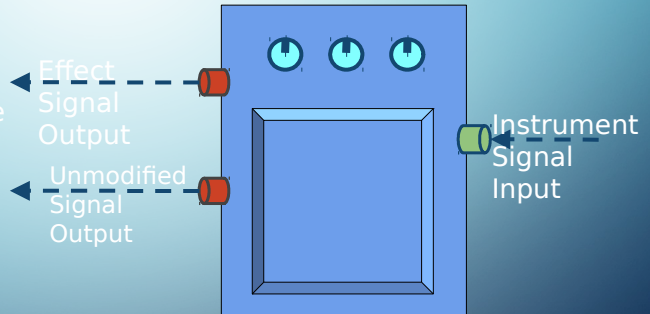
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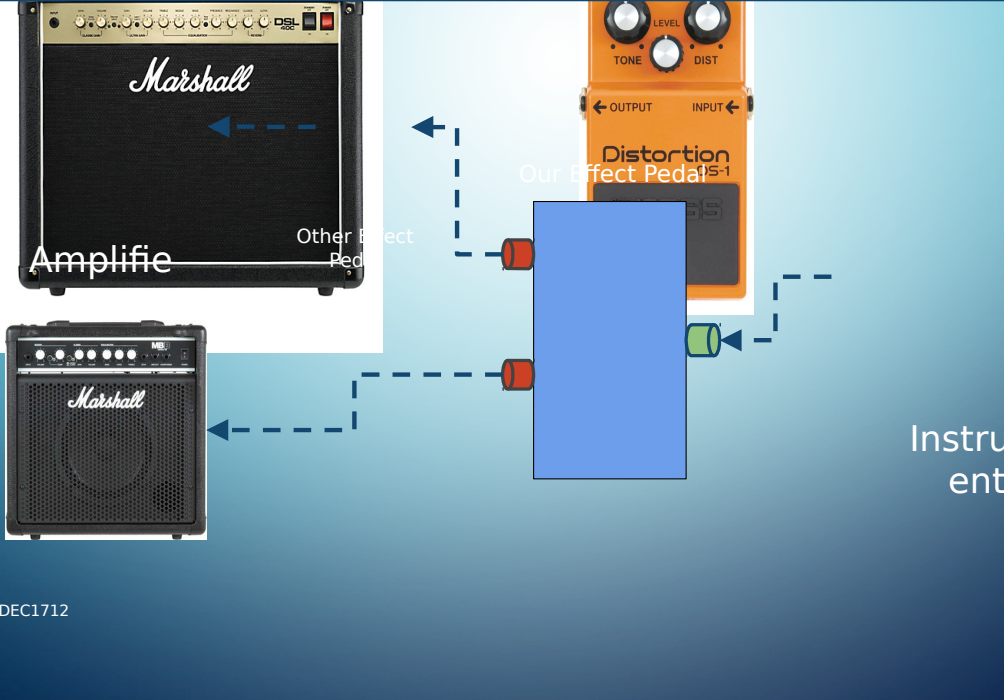


THE SOLUTION

- ❑ For Multiple Effects in One Location:
 - ❑ Multiple Effects from one input to two outputs



Example audio setup



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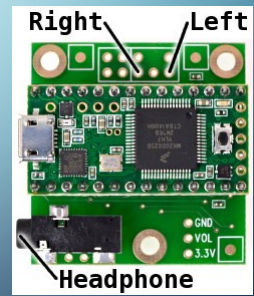
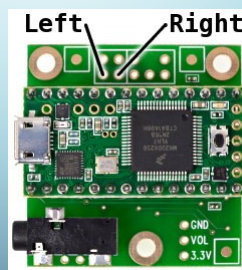
PEDAL DESIGN

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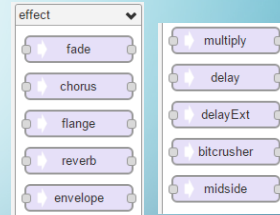
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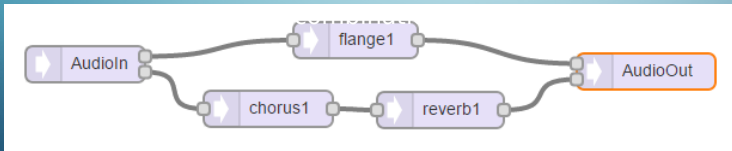
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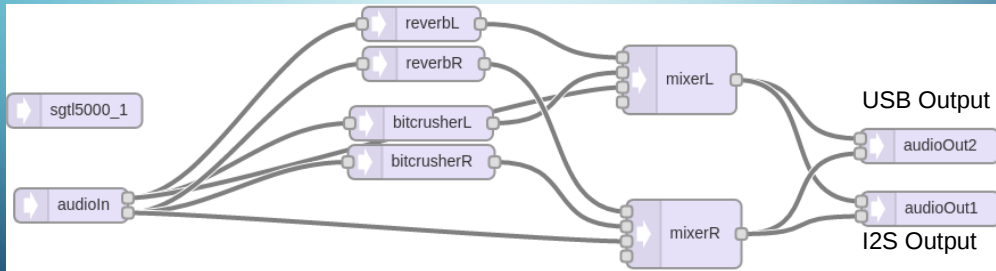


Various existing effects

Example of audio effect



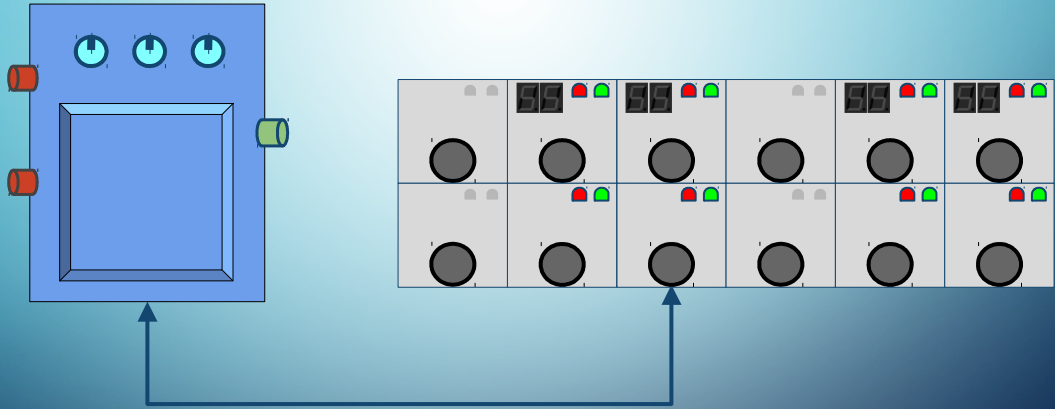
UNIQUE PEDAL EFFECTS



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Mat Communication



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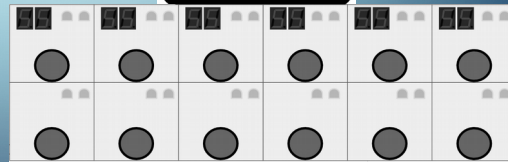
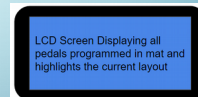
MAT INTERFACE DESIGN

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THE SOLUTION (CONT.)

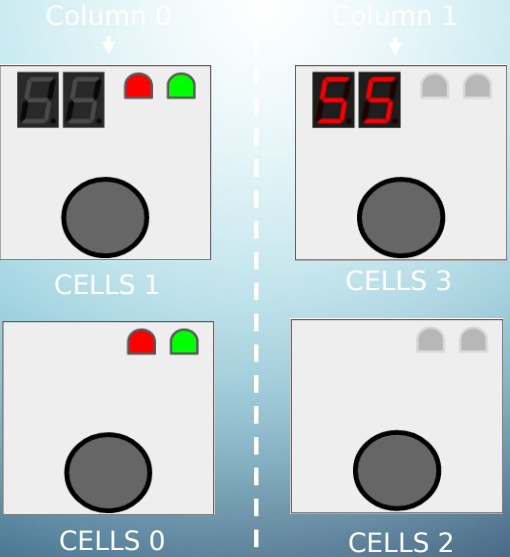
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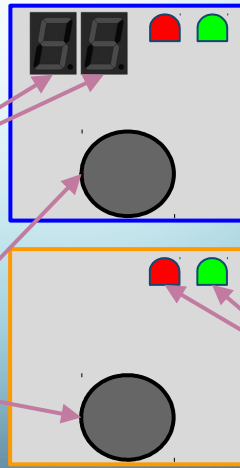


COLUMN TOGGLE MODE

Number display
turn off (Unused)

Buttons are
assigned to
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functionalities

State
Indicator



COLUMN KNOB MODE

Number display turned on

Column Knob Mode

"Increase"

"Decrease"

LEDs turn off (Unused)



Column of buttons is "Linked"

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COLUMN KNOB MODE: WHY?

Using **Hand**

The **WHY?**

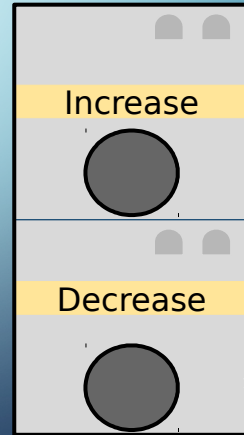
Using **Foot**

+1 or +2 if held

Column

d

held



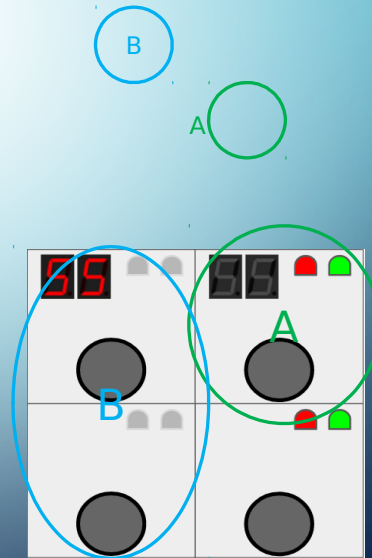
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MAT DESIGN

HARDWARE

- Green and Red LEDs
 - For toggle features on pedals (A)
- Seven-Segment Displays
 - For knob features on pedals (B)

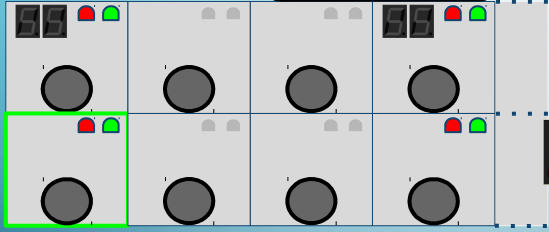


AN EXAMPLE



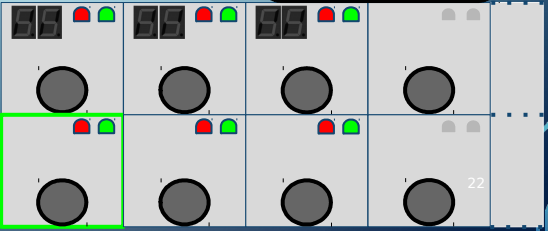
PAGING THROUGH PEDALS

- 1. Page 1 ←
- 2. Page 2
- 3. Page 3
- 4.



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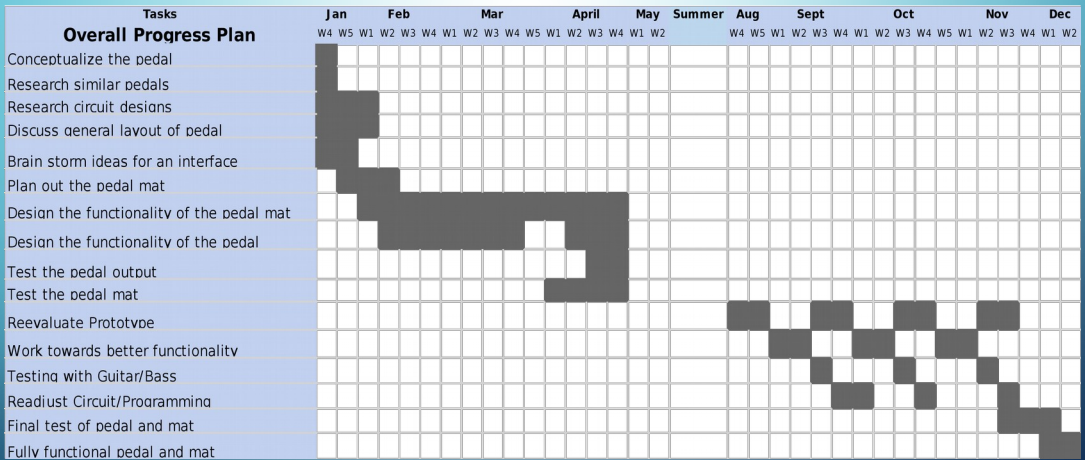
- 1. Page 1
- 2. Page 2 ←
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Press "Page" button

OVERALL PROJECT TIMELINE



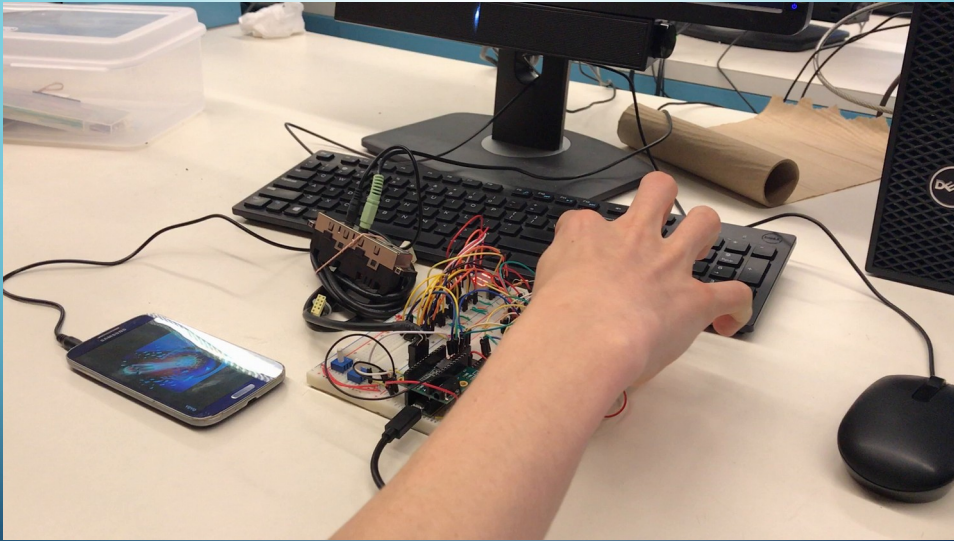
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Brain storm ideas for an interface				█													
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Design the functionality of the pedal mat				█	█	█	█	█	█	█	█	█	█	█	█	█	█
Design the functionality of the pedal																	
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Work towards better functionality			█	█			█	█			█	█		█			
Testing with Guitar/Bass					█				█					█			
Readjust Circuit/Programming						█	█			█					█	█	
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Fully functional pedal and mat																█	█

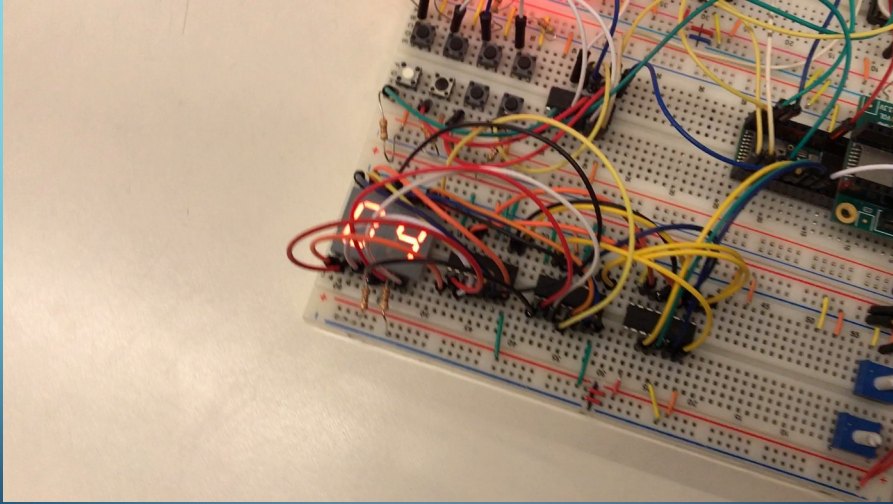
CURRENT PROJECT STATUS



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CURRENT PROJECT STATUS (CONT.)



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