



Introduction

Think you know yourself? It knows you better.

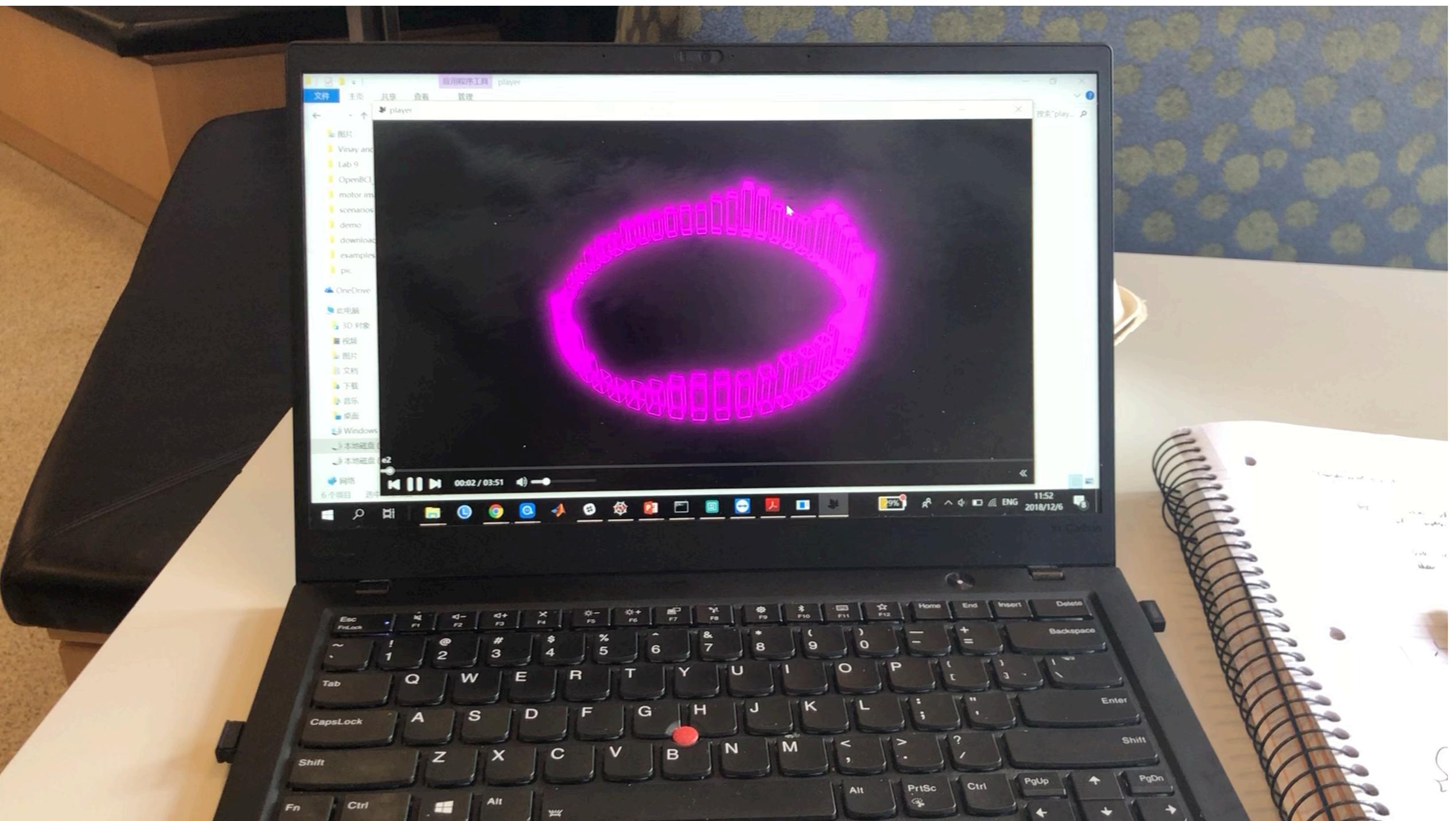
Selects the genre of music that best fits the occasion without any effort on your side.

A thoughtful collection of music that boosts your efficiency during work, relieves your stress when you want to relax, and much more.



Music Player

The customized player for our project.



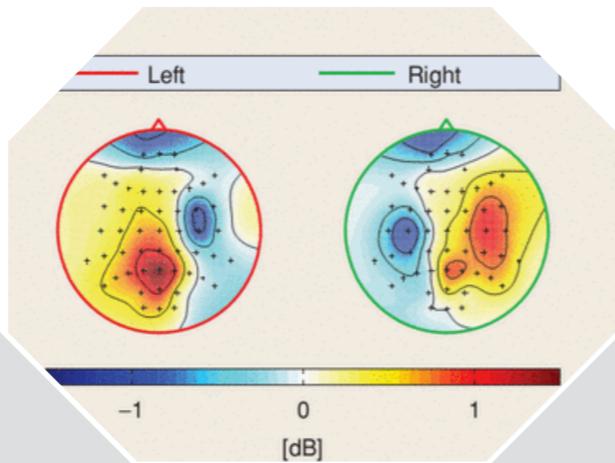


How We Train Our Models

Wow Factors

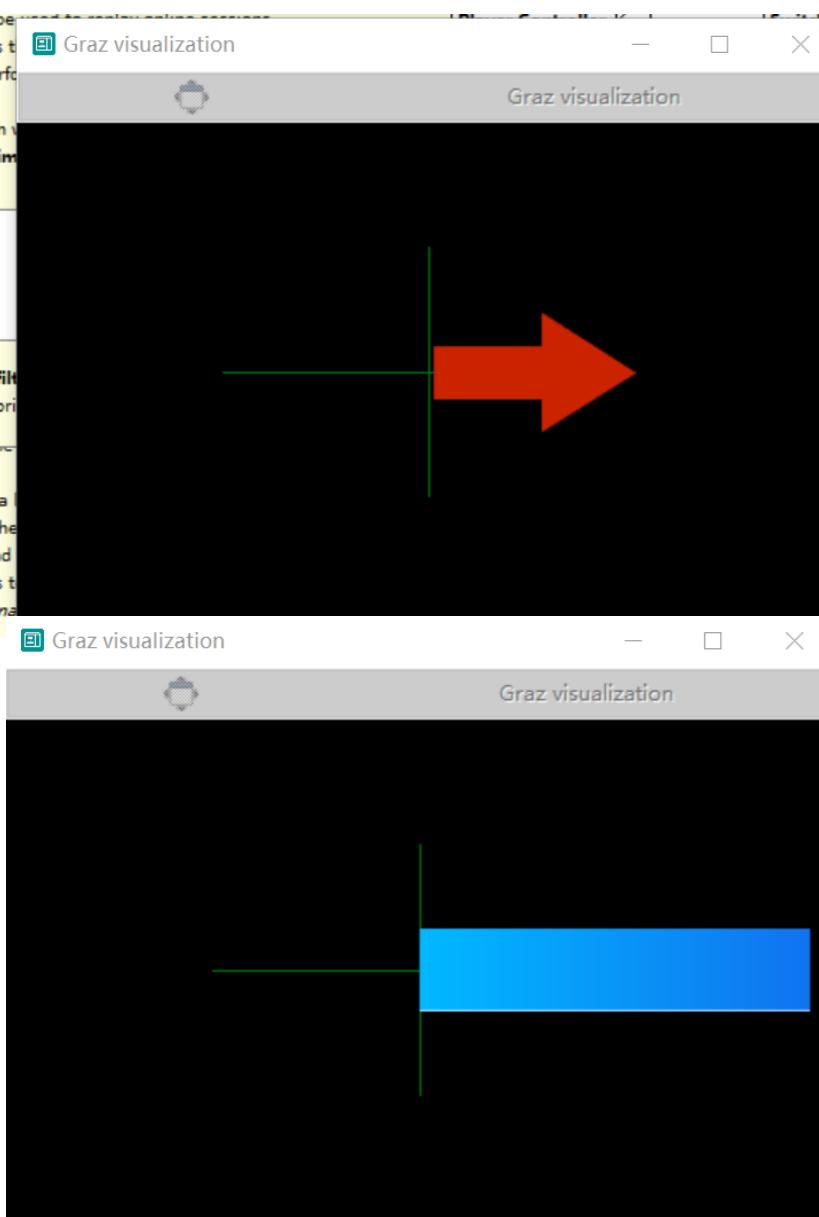
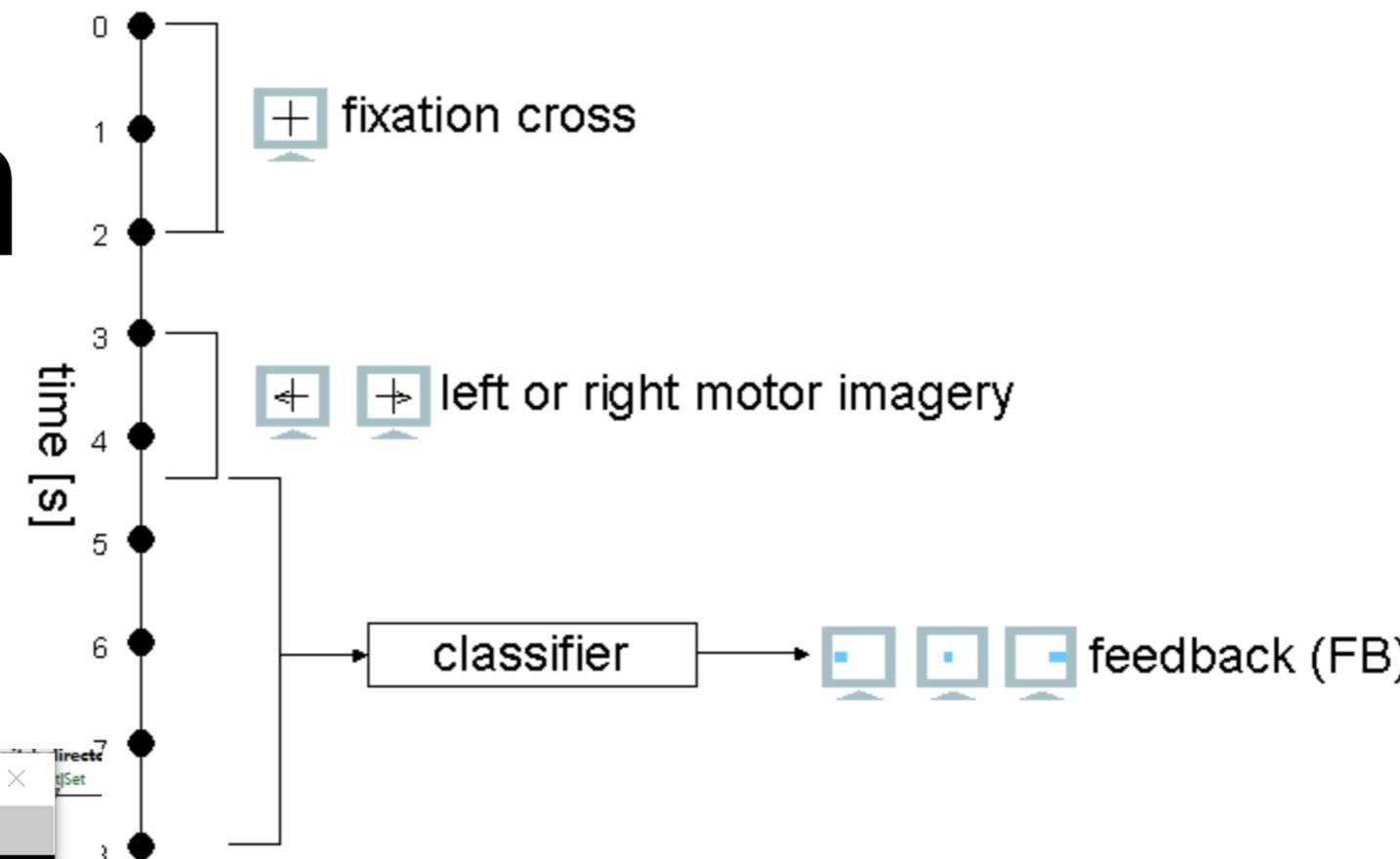
Change Song

Imaging left and right hand to
change music

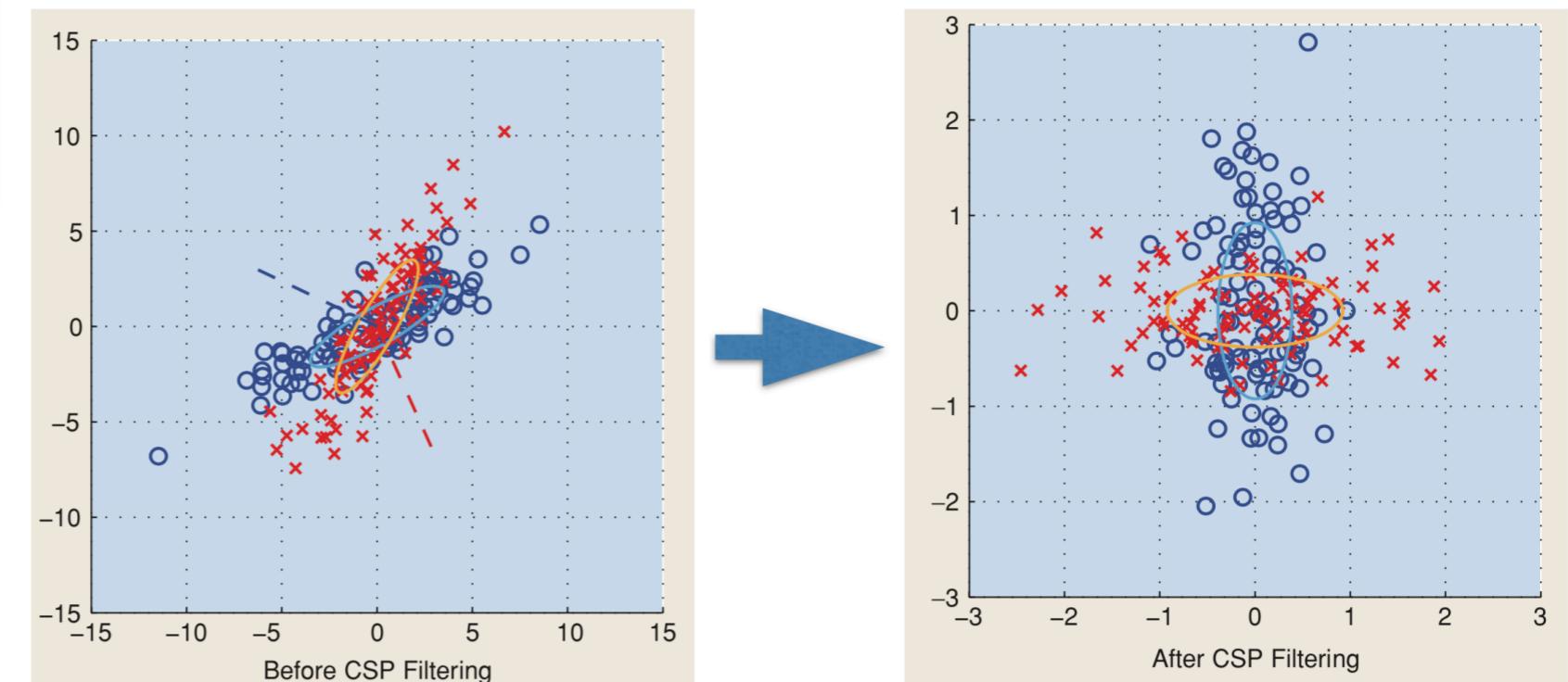


WHAT SETS OUR PRODUCT APART?

Common Spatial Pattern



In the transformed space, the variance of each class is maximized in one direction, and minimized in the other



Python Controller

```
8 from pylsl import StreamInlet, resolve_stream
9 import numpy as np
0 import time
1 import pyautogui as k
2 import os
3
4 shortcut = ['left', 'right', 'n']
5 def send(t): # counterwwl
6     k.tap_key(x)
7     k.typewrite(t, '0.25')
8     time.sleep(10)
9 # first resolve an EEG stream on the Lab network
10 print("looking for an EEG stream...")
11 streams = resolve_stream('type', 'EEG')
12
13 # create a new inlet to read from the stream
14 inlet = StreamInlet(streams[0])
15 c = 2
16 l = 0
17 while True:
18     l = 0
19     class_1 = []
20     while l < 40:
21         sample, timestamp = inlet.pull_sample()
22         class_1.append(sample[0])
23         l += 1
24     c1 = np.mean(class_1)
25     if c1 > 0.55:
26         datastream = 0
27     elif c1 < 0.45:
28         datastream = 1
29     else:
30         datastream = 2
31     print('returned value:', shortcut[datastream])
32     send(shortcut[datastream])
```

Change songs within the same folder

Information Transfer Rate

$$\text{ITR} = \frac{\# \text{ of decisions}}{\text{duration in minutes}} \cdot \left(p \log_2(p) + (1 - p) \log\left(\frac{1 - p}{N - 1}\right) + \log_2(N) \right)$$

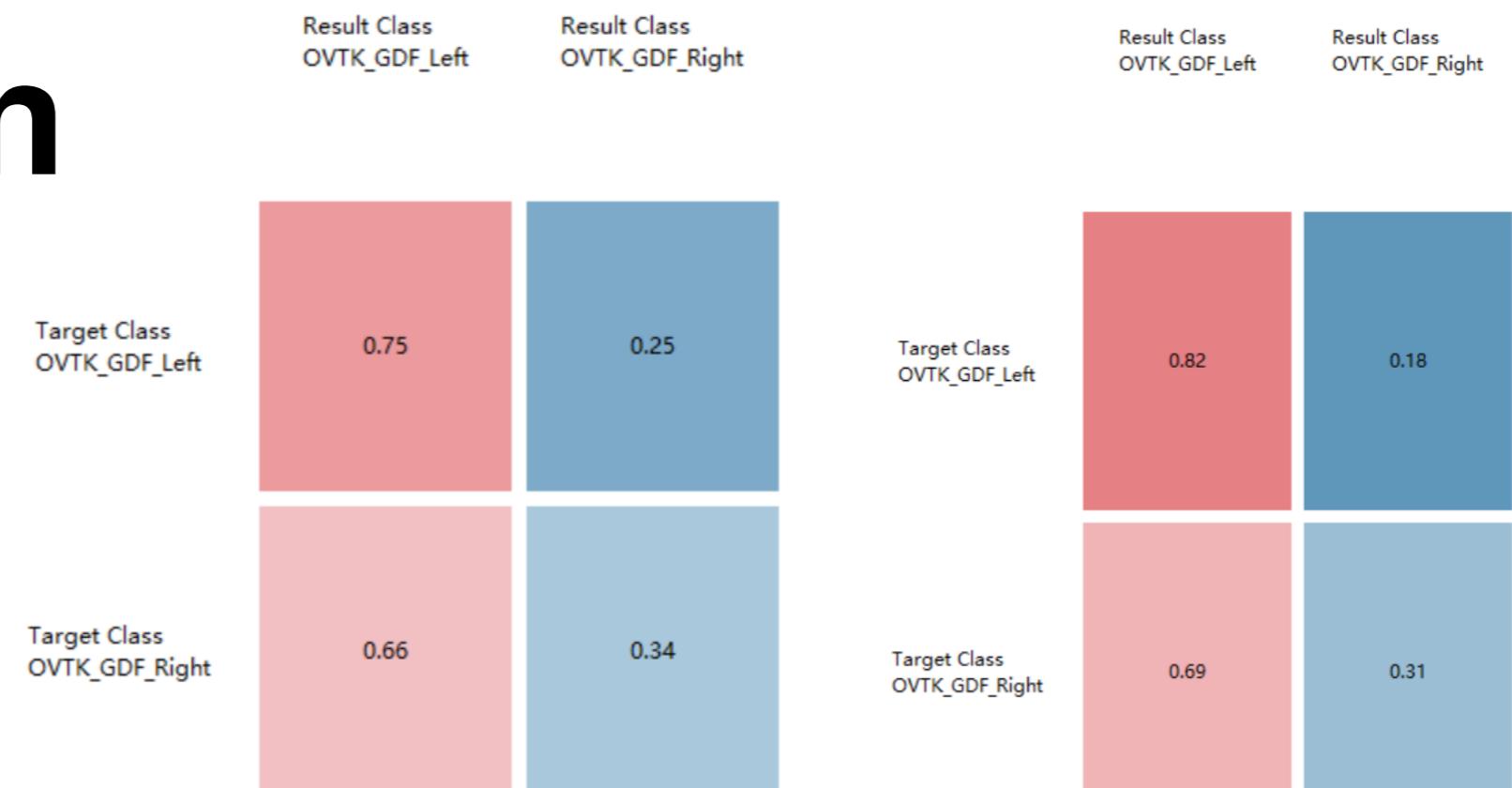
```
|>> ITR_2 = ITR(6,2,(0.75 + 0.34)/2)  
ITR_2 =  
0.0351
```

```
>> ITR_1 = ITR(6,2,0.555)  
ITR_1 =  
0.0525
```

For Rosalie:

For Fan:

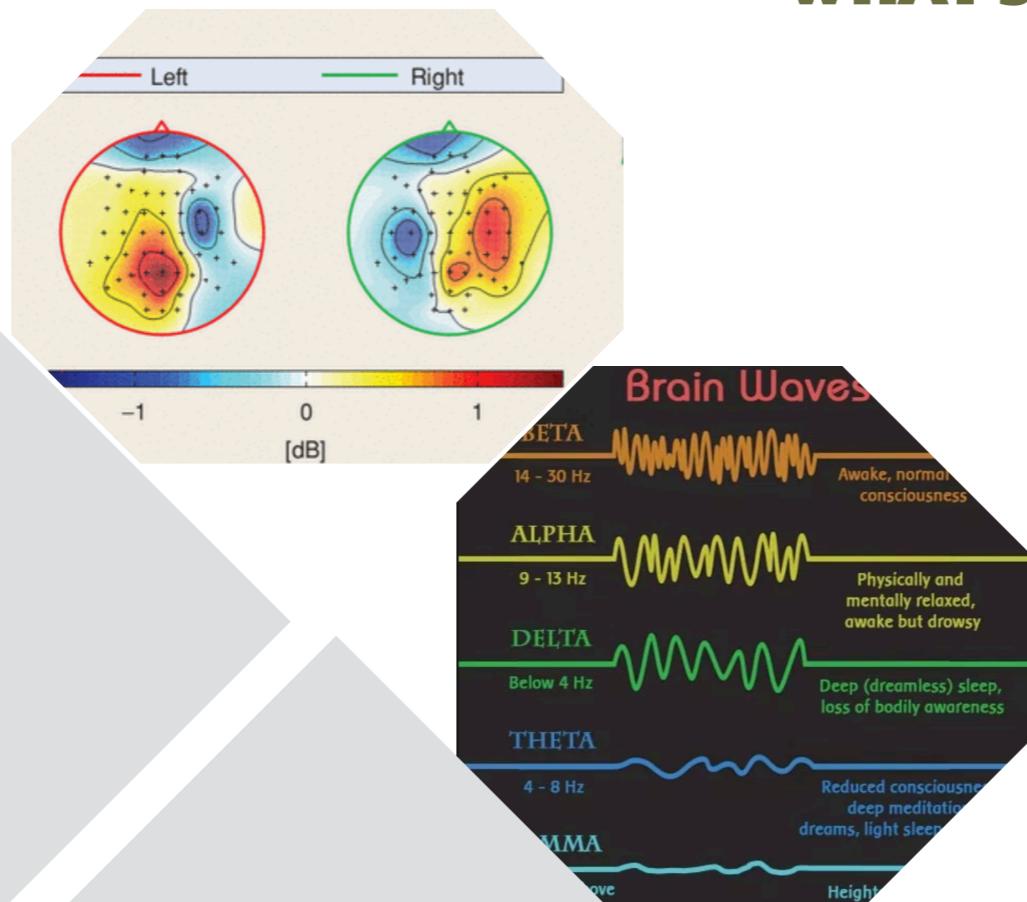
Confusion Matrix



Wow Factors

Change Song

Imaging left and right hand to change music



WHAT SETS OUR PRODUCT APART?

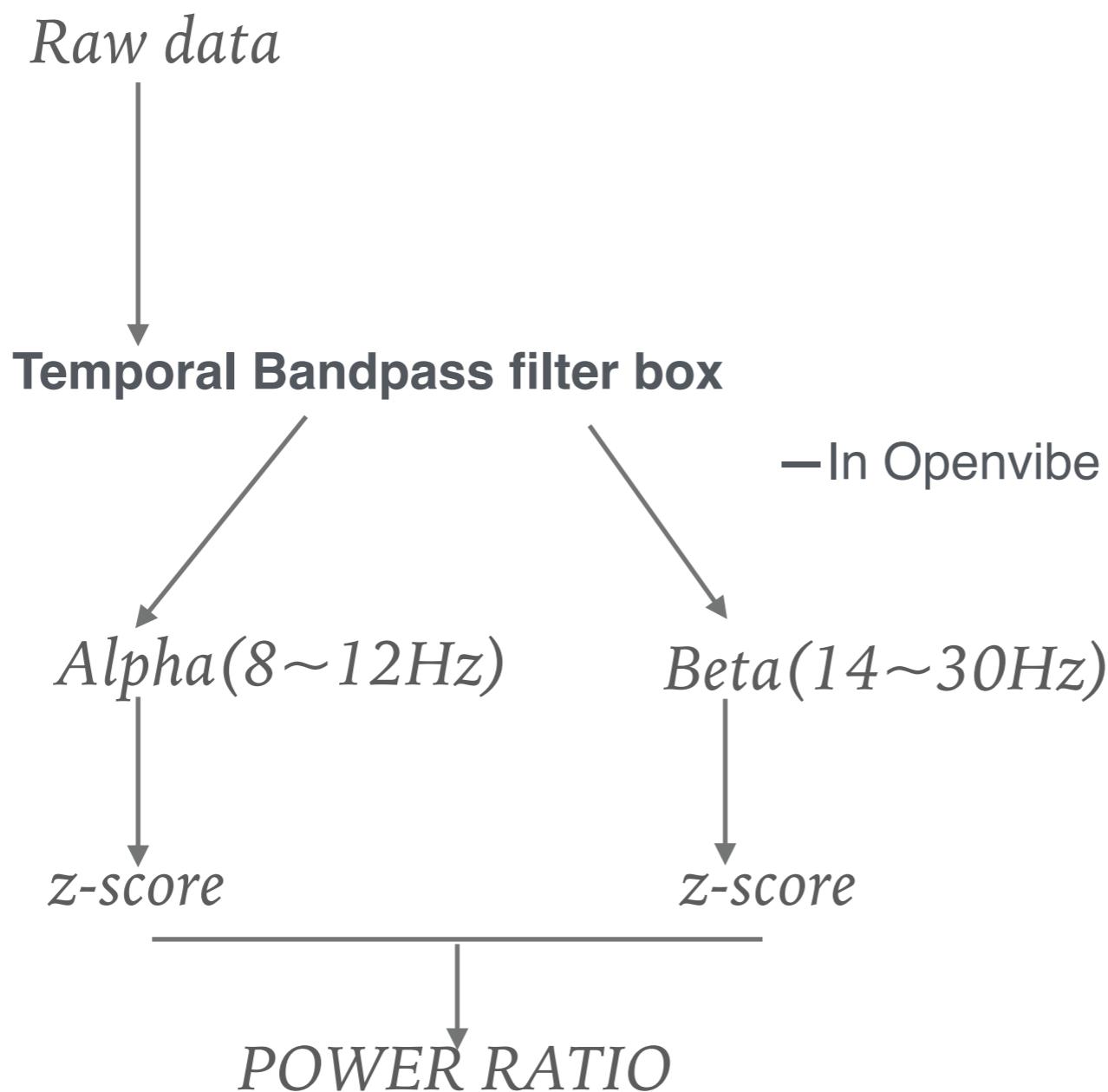
Seamless Efficiency Booster

Choose different genre of music based on your situation

In Different Scenarios



Alpha-Beta Power Ratio



<0.3 WORK

STAY

>0.7 REST

- rest
- work

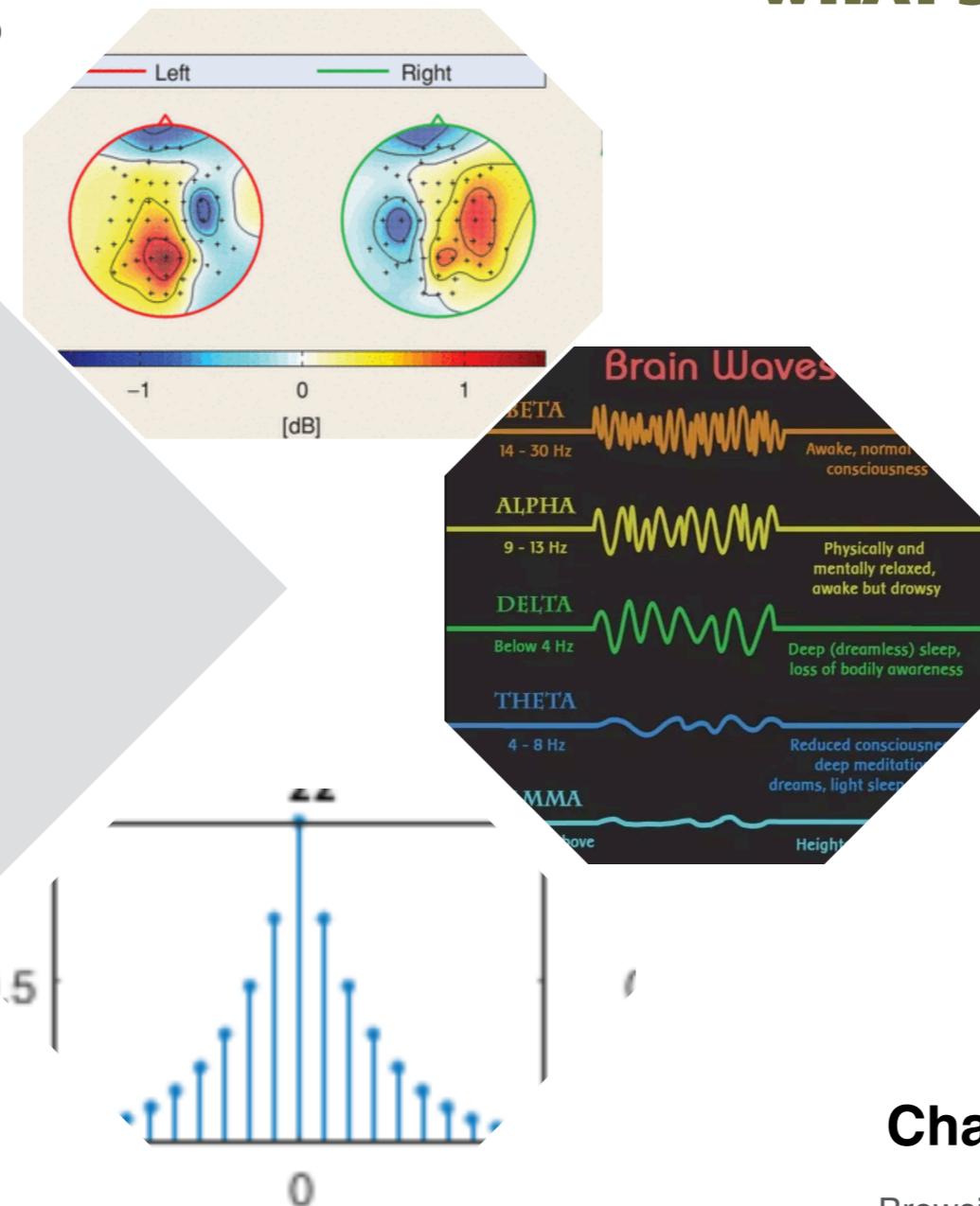
2018/12/6 1:02
2018/12/6 1:13

文件夹
文件夹

Wow Factors

Change Song

Imaging left and right hand to change music



WHAT SETS OUR PRODUCT APART?

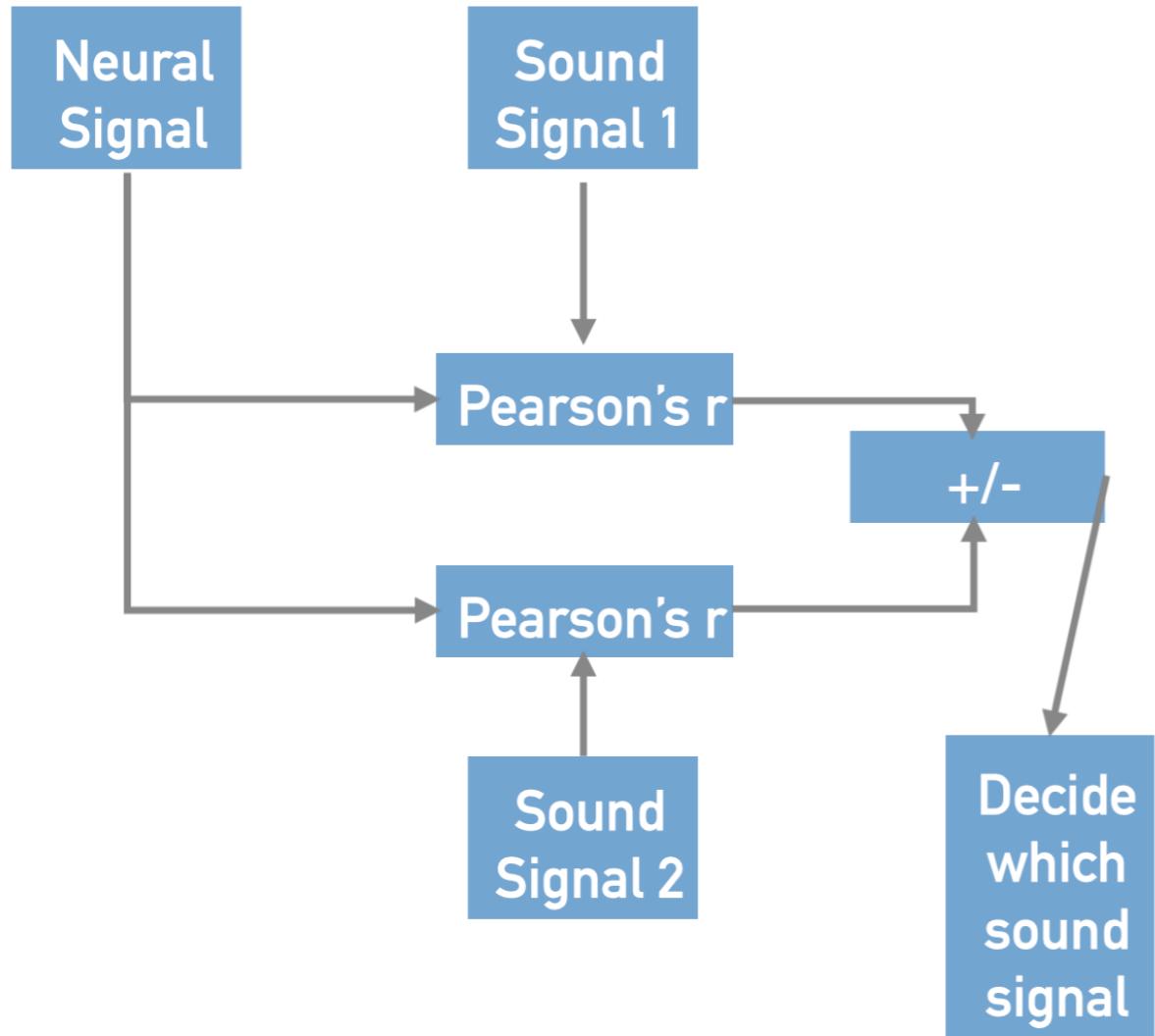
Seamless Efficiency Booster

Choose different genre of music based on your situation

Channel Selector

Browsing the broadcast quickly, turn up the volume of our preferred channel

Channel Selection



Rearranging gives us this formula for r :

$$r = r_{xy} = \frac{n \sum x_i y_i - \sum x_i \sum y_i}{\sqrt{n \sum x_i^2 - (\sum x_i)^2} \sqrt{n \sum y_i^2 - (\sum y_i)^2}}.$$

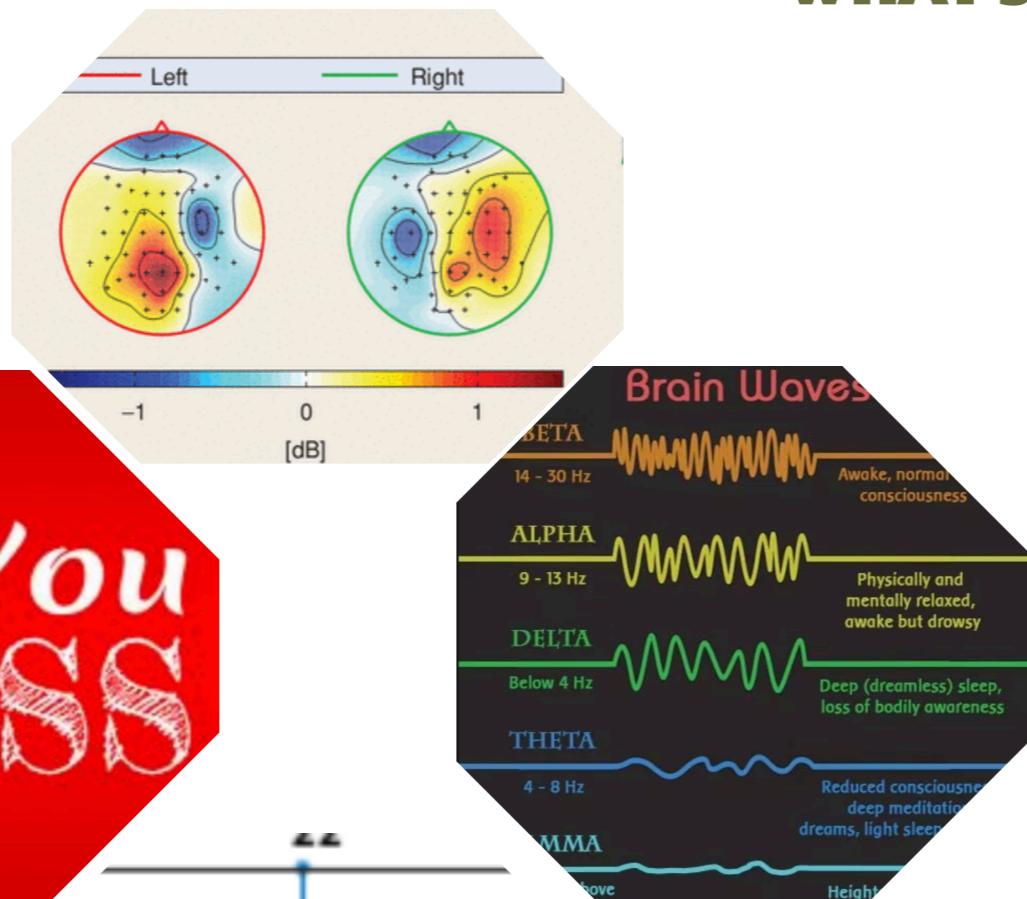
```
function Output(block)
    x = double(block.InputPort(1).Data);
    y = double(block.InputPort(2).Data);
    if length(x) ~= length(y)
        error('dimension mismatch');
        return;
    end
    numerator = sum(x.*y)-(sum(x)*sum(y))/length(x);
    denominator = sqrt((sum(x.^2)-sum(x).^2/length(x))*(sum(y.^2)-sum(y).^2/length(x)));
    if denominator == 0
        coeff = 0;
    else
        coeff = numerator/denominator;
    end
    block.OutputPort(1).Data(1) = coeff;
end
```

A Better Way: calculate the cross-correlation

Wow Factors

Change Song

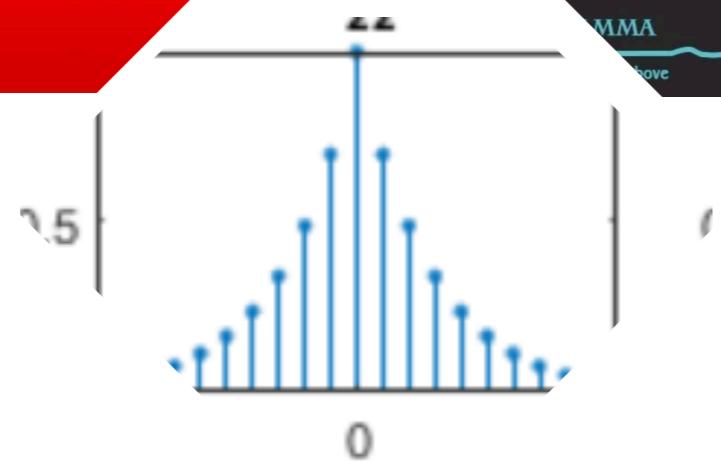
Imaging left and right hand to change music



Can You
GUESS

Smart Shut Down

Shut down without using your hand
Using clenching jaw factor by CSP



WHAT SETS OUR PRODUCT APART?

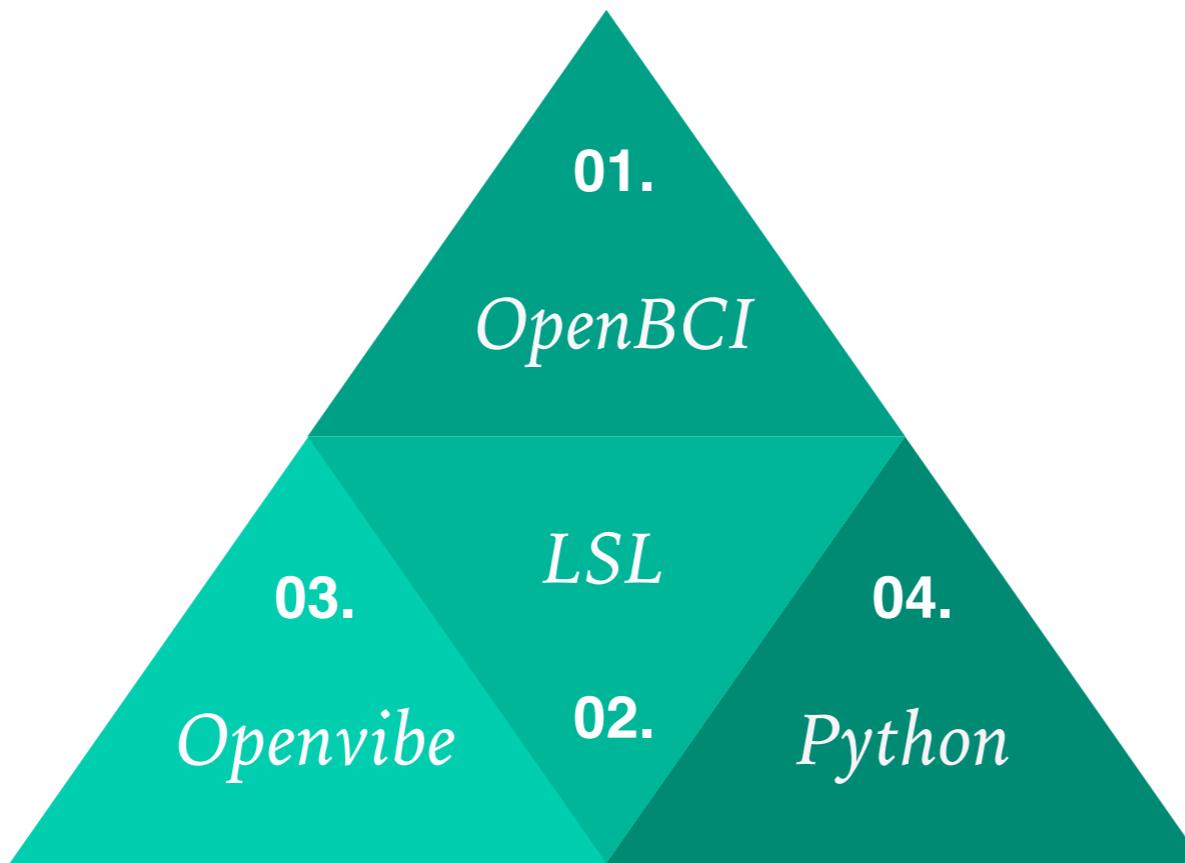
Seamless Efficiency Booster

Choose different genre of music based on your situation

Channel Selector

Browsing the broadcast quickly, turn up the volume of our preferred channel

BCI Software



01. OpenBCI

Receive data from Cyton

02. Lab Streaming Layer

Signal processing

03. Openvibe / Matlab

Send classification results to Python

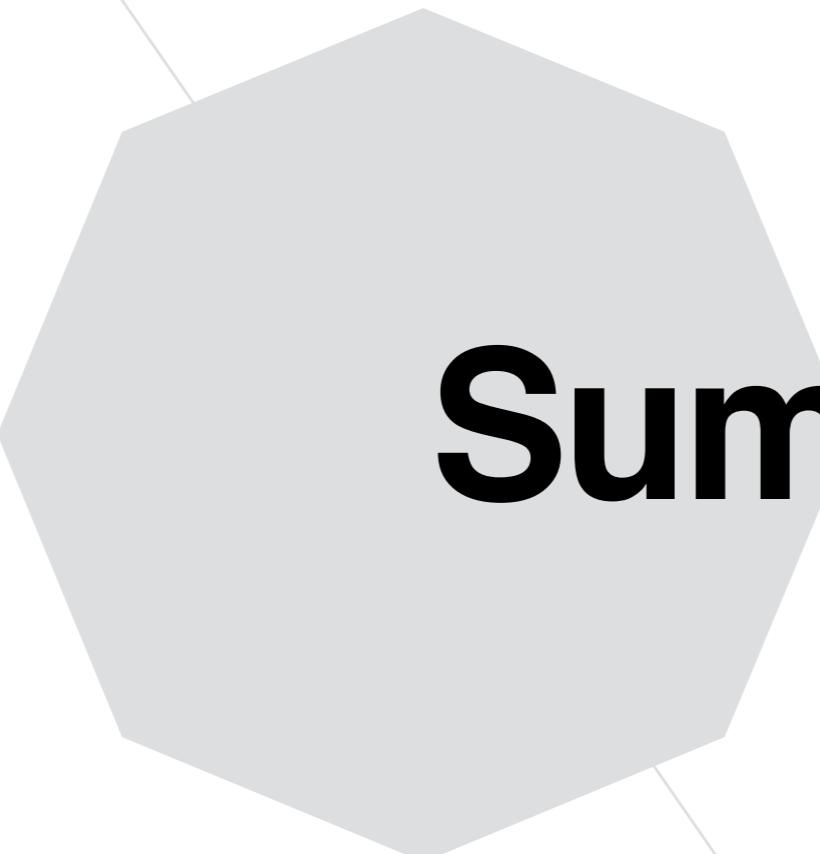
04. Python

Control the smart player

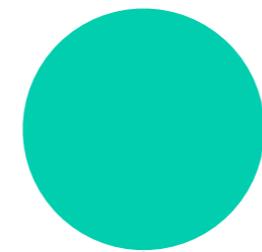
Video Demo

HOW IT WORK?



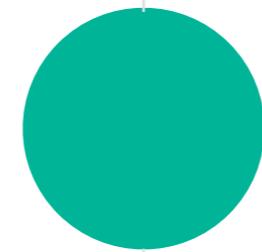


Summary



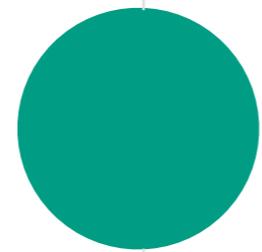
Motor Imaginary

CSP—Imagining left and right hand movement,
then train our data



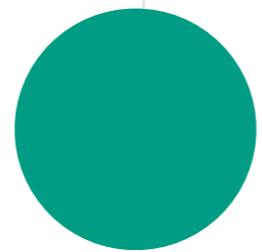
Alpha - Beta Ratio

Alpha-Beta Ratio > 0.5. → Rest
Alpha-Beta Ratio < 0.5. → Work



Clenching Jaw

Pause music



Acoustic Attention

Decode attention
for different audio resource



Tech-Saavy

Your private assistant.
Use music to improve your
life quality



Effortless

Boost your efficiency
Enjoy your life with music easier



Evolvable

Can be implemented in
any music device



Aesthetic

Combining with other
portable EEG devices

BLUE PRINT

MUSIC PREFERENCE

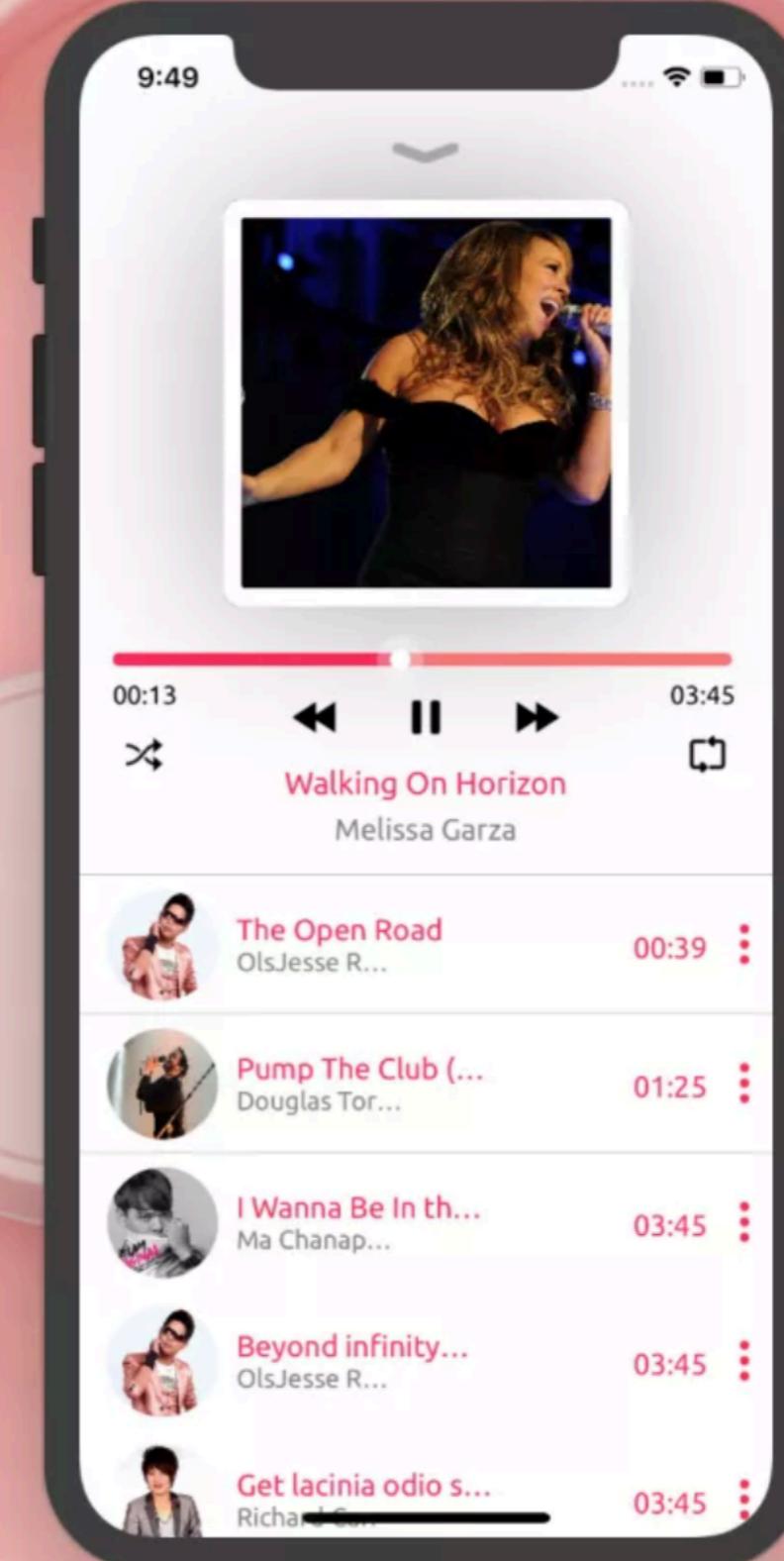
MORE FEATURES

LARGE MUSIC BANK

COMBINE USER PREFERENCE

GAMING

RANDOMLY CREATE YOUR OWN



**Thanks
For
Watching!**