YOU MUSIC

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Github Source Code

What is YouMusic?

- YouMusic is a **music generator**, based on the user's physiological state:
  - Uses heart rate and emotion as input
  - Creates chord progressions and a drumbeat

The Process

Heart Rate & BPM

With a pulse sensor or button, as well as Python using Fourier series, it calculates beats per minute (BPM) determined by the user's heart rate.

AI & Mood

Using input from a GUI, facial recognition determines the users mood, affecting dissonance, modulation, and chords in generated music.

Music Generation

These inputs are continuously sent to Pure Data via IP sockets, which generates a drumbeat and chord progressions.

View Full Abstract

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Significance and Practical Use

Create Connections

Users experience the excitement of hearing customized music, which creates a strong connection to music on a personal level.

Spark Interest

Users interact with YouMusic and can enjoy the output both auditory and visually, providing variety and stimulation for their brains.

Motivate Musicians

Understanding how music can become very personal promotes people to improve and create/play (more) music.

Health Benefits

Coordination with heart rate allows users to relieve stress, increase focus, reduce blood pressure, promoting a healthy lifestyle.

Enhance Emotions

YouMusic plays your physiological status back at you, amplifying how users feel allowing them to further express their emotions.

Have Fun!

Music is meant to be enjoyed! YouMusic allows anyone, regardless of music experience, to express themselves. Must there be anything beyond that?

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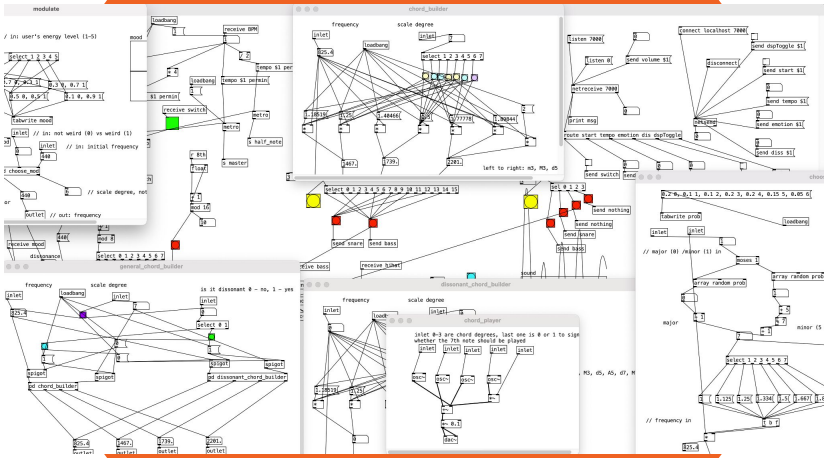

1: Music Generation – Pure Data

- A massive Pure Data file with many subpatches generates chord progressions and controls key modulations
- Chords and keys chosen through weighted probability tables reflect the user's emotions (modulation, chord progressions, major/minor, etc.)
- Drum machine music is generated using audio sampled from Ableton Live

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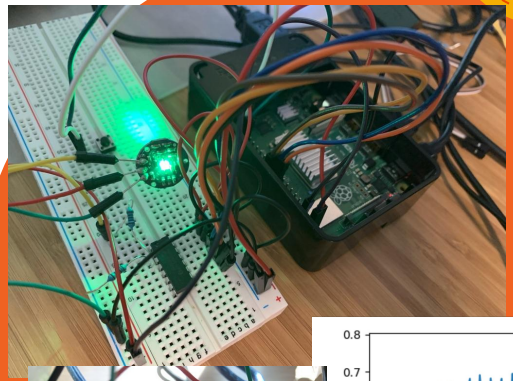

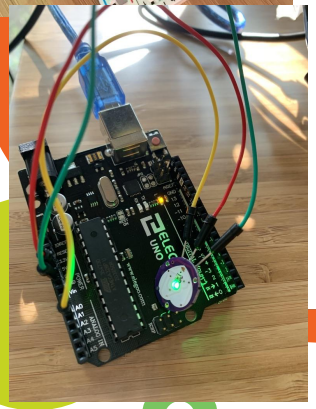

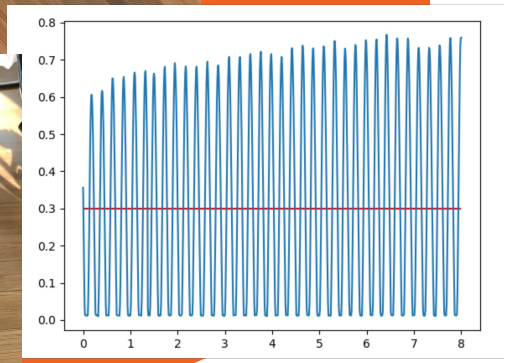

2: All The Hardware

Pulse Sensor

- We soldered jumper cables onto the sensor!

Raspberry Pi

- Pulse sensor translated through a MCP3008 Analog to Digital Converter (ADC)
- Values read with Python using *Calculus and Fourier transforms*, but are slightly inaccurate
- Alternatively, a button can be used and is integrated with “tap tempo”

Arduino

- The heartbeat/pulse sensor connects with the Arduino, attached to a local machine.
- A C++ script uses a voltage graph sent from the sensor to find the BPM
- A python script then uses *serial communication* to fetch the BPM

All values are sent via IP sockets to the Pure Data and update in real time.

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```
file_path = filedialog.askopenfilename()
print(file_path)
try:
    cures = cv2.imread(file_path)
    plt.imshow(cures)
    predictions = DeepFace.analyze(cures, actions = ['emotion'])
    print(predictions)
    print(type(predictions))
    if predictions.get('dominant_emotion') == 'anger' or predictions.get('dominant_emotion') == 'disgust':
        dis = 1
        mood = 5
    elif predictions.get('dominant_emotion') == 'surprise':
        dis = 1
        mood = 1
    elif predictions.get('dominant_emotion') == 'fear':
        dis = 1
        mood = 2

    elif predictions.get('dominant_emotion') == 'neutral':
        dis = 0
        mood = 3
    elif predictions.get('dominant_emotion') == 'happy':
        dis = 0
        if predictions.get('emotion').get('neutral') > 30:
            mood = 2
        else:
            mood = 1
    elif predictions.get('dominant_emotion') == 'sad':
        dis = 0
        if predictions.get('emotion').get('neutral') > 30:
            mood = 4
        else:
```

3: Emotion Recognition – GUI & AI

- Graphical User Interface (GUI) where users submit a photo on their local machine
- Facial recognition software with tensorflow and pandas analyses their emotion with some help from deepface
- Jupyter Notebook runs the AI and GUI on their local machine

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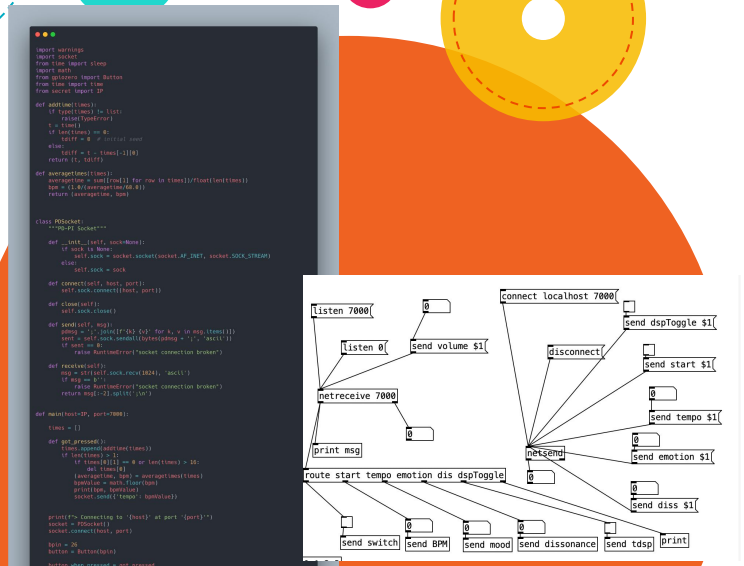

4: Connecting it together – Sockets

- Python sockets update and send information to the Pure Data from the Pi/Arduino to Local Machine via IP
- Pure Data file was too massive to run on the Raspberry Pi
- Generates music on the user's local machine, allowing them to have more flexibility
- All in real time!

Demonstration

anshulgupta.com/youmusic/demo

Source Code
Poster Board

Further Exploration

Given more time, we would love to expand on our project in various ways:

Melody Generator

Outputting a melody to complement the generated chord and drum arrangements

Instrument Choices

Providing the option for a variety of sounds in Pure Data besides the default

Live Video for Emotion Feedback

Using a continuous stream of video to detect changing emotions

Temperature to Volume Output

Modifying volume based on body temperature. In general, adding more components *extra* personalization to further customize the music

Pulse Sensor with Increased Mobility

Allowing for more movement with the pulse sensor, which currently keeps the user next to the computer/Pi/Arduino

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