COSMOS UC San Diego
California State Summer School for Mathematics and Science

ANSHUL GUPTA
KATHERINE GUO
ANDREW LIU

YOU MUSIC

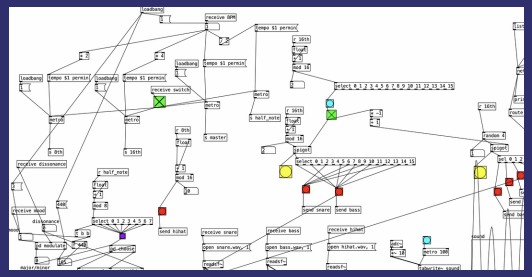
Expressing **you** through **music**
anshulgupta.com/youmusic

What is YouMusic?

YouMusic sparks interest in music and adds more significance to it. By customizing it to listeners' physiological statuses, YouMusic allows users to create an **emotional and personal connection with music**.

Tools and Technologies

Pure Data, Raspberry Pi/Breadboard/Cables, Pulse Sensor, Button, MCP3008 ADC, Soldering Iron, Python, Sockets, GUI, Matlab, Juypter Notebook, Computer Vision/Tensorflow with DeepFace, Git/Github, Calculus, Music Theory, Arduino, Ableton Live, Microphone



Acknowledgements

To our amazing faculty and TAs:
Thank you for all your help. You're the best!
Mauricio de Oliveria, Gualter Moura, Shlomo Dubnov
Nicholas, Stephen, Benjamin, Jonathan, Ross

Abstract

YouMusic incorporates a user's heart rate and mood to compose music tailored to them. Using a heart rate sensor or button, Raspberry Pi, and Python, it converts pulse to beats per minute (BPM) using Fourier transforms. It utilizes a GUI where users can upload a photo of themselves. DeepFace analyzes the emotional state of the face to modify major and minor scales, modulation, and dissonance. These values are sent to Pure Data (Pd) via IP sockets. Pd generates chords as well as sampled drum set notes and updates in real-time to illustrate how the user always feels.

Product & Procedure

1. We made a Pd file that continuously generates chord progressions capable of key modulations. Chords chosen through weighted probability tables reflect the user's emotions. Drum machine music is generated using audio sampled from Ableton Live.

2. After soldering jumper cables onto a pulse sensor, we translated it with an ADC on a Raspberry Pi and used Calculus to determine a user's heartbeat with Python. We set up the sensor on an Arduino and coded a BPM calculator with a button as a second option.

3. We coded a GUI for users to submit a photo on their local machine and a facial recognition software with DeepFace analysis their emotion. We used Juypter Notebook to run the AI and UI.

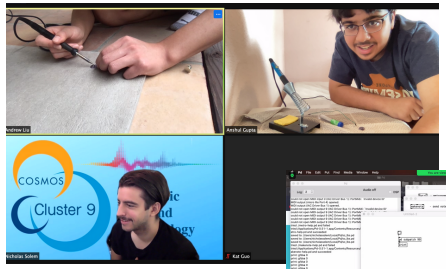
4. Finally, Python sockets continuously update and send information to Pd to generate music on the user's local machine through IP.

Goals, Inspiration, Purpose

Through our own experiences playing music, we found a gap when it came to **personalization** — yet feeling a close bond to music is essential to enjoying it. This inspired us to develop a project that can provide a stronger foundation for that bond, particularly in people new to playing music, such as children. Once forged, the connection motivates people to invest time in music and enjoy what they produce!

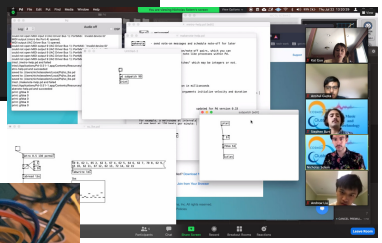
Final Remarks

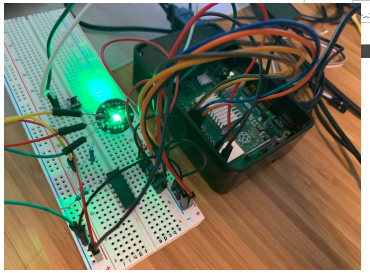
Our journey through building YouMusic has been insightful—as we tested this project amongst ourselves and with family we found that music personalized to our bodies could further enhance our mental state through our emotions and energy. We had a lot of fun with this project, and we're excited to see how others will, too.



At-home soldering

Pd debugging





Raspberry Pi, Breadboard, Sensor, ADC

Heart rate sensor output