CMPM 169: CREATIVE CODING
SPRING 2024

Synesthetic Heart Rate Visualizer

Description

The Synesthetic Heart Rate Visualizer is a prototype that simulates the interaction between heart rate data and abstract artistic visuals using p5.js. This prototype allows participants to input their heart rate (in beats per minute, BPM) manually, and the system generates dynamic visual patterns based on this input, providing a glimpse into the potential of a larger biometric-driven installation.

Prototype Elements

- Heart Rate Input:
    - Participants manually input their heart rate (BPM) using a simple slider input field on a webpage.
- Visual Output:
    - Using p5.js, the entered heart rate data drives the generation of abstract visual patterns on the screen.
    - The visual patterns change in real-time based on the input heart rate, simulating a synesthetic experience where physiological data influences artistic expression.

How It Works

1. User Interaction:
    - Participants access a webpage featuring the Synesthetic Heart Rate Visualizer.
    - They enter their current heart rate (in BPM) into a slider input field and submit the data.
2. Data Processing:
    - The entered heart rate value is captured and used as a variable within the p5.js sketch.
3. Visual Generation:
    - Within the p5.js sketch, algorithms translate the heart rate data into parameters for generating abstract visuals.
    - For example, heart rate data could influence the size, color, movement, or complexity of geometric shapes rendered on the screen.
4. Real-time Interaction:
    - As the participant's heart rate input changes, the visuals respond dynamically, creating an interactive and synesthetic experience.

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Ideal Environment (Future Implementation)

- The prototype can evolve into a larger installation with actual biometric sensors capturing other real-time biometric data (heart rate, skin conductance, etc.).
- Ideally situated in a serene, immersive space (e.g., a gallery) with ambient lighting and soundscapes.
- The gallery is situated in a secluded indoor space, surrounded by HD screens and softly illuminated by carefully placed LED fixtures.
- Pathways wind through the gallery, guiding participants to various interactive projection installations.
- Participants interact with projections that respond to their physiological states, offering a multisensory journey.

Implementation Details

- Technology:
    - Biometric sensors (heart rate monitors, skin conductance sensors).
    - Microcontrollers (Arduino or Raspberry Pi) for data processing and sculpture control.
    - LED lighting systems with programmable RGB fixtures.
    - High-brightness projectors for dynamic visual projections.
    - Large speakers for immersive audio playback.
    - Wireless communication modules for biometric data transmission.
- Cost:
    - Minimal for the prototype (software development tools).
    - Estimated cost for full installation with sensors: $20,000 - $30,000+ (depending on scale and hardware).

Immersive Set Dressing:

- Lighting Design:
    - Soft, changing LED lighting creates an ethereal atmosphere, responding to participants' biometric data.
    - Pathways are subtly illuminated, guiding participants through the gallery.
- Projection Installations:
    - Each projection represents a different aspect of human physiology and emotion, translating biometric data into visual metaphors.
    - Projections may include kinetic elements that move or change shape in response to participants' heart rates or other biometric data.
- Soundscapes:
    - Custom-composed ambient music and soundscapes respond dynamically to participants' physiological states, enhancing the synesthetic experience.
    - Directional audio elements guide participants' attention and evoke emotional responses.

Conclusion

The Synesthetic Heart Rate Visualizer prototype provides a foundational exploration of the interaction between physiological data and abstract visuals. While the current prototype relies on manual input for heart rate simulation, it lays the groundwork for a more sophisticated and immersive installation incorporating other different types of biometric sensors and responsive elements in a future realization of the concept.