Experimental Procedure

Design and Development of the Emotional Representation Tool

**Design.** For our study, we designed and developed a generative art tool to represent emotions through parametric design and animation. The design of this tool draws inspiration from radial audio visualizers in consideration of the structure that biometric signals utilized in emotion modeling have. Biometric signals like ECG and EDA share similarities in their basic structure with audio waveforms, which further reinforced our choice of inspiration for the tool [1][2].

We chose radial visuals for their aesthetic appeal and efficient space utilization [3]. Modeled after the star-like pattern of polar plots, the design focuses on deviations from a central focal point, producing symmetry or asymmetry. We believe that this symmetry or asymmetry has the potential to represent emotions as they can evoke positive or negative responses in the viewer [4].

Our parametric design consists of multiple radiating layers of rings. A brief description of each parameter follows.

Polygon shape defines the visualizer’s geometry, ranging from a circle to a decagon. This aligns with previous studies that discuss emotion recognition through shapes [5]. Polygon deviation and deviation speed control the distortion of the shape and animation dynamics which are intended to visually valence (symmetry) and arousal (animation intensity) dimensions of emotion [6][7]. Ring thickness and layer spacing each correspond to the stroke weight and spacing of the rings within the layers.

In summary, our design establishes a framework between biometric signals and parametric design elements to represent emotions through animated visuals.

**Development.** To implement the proposed design, we used p5.js, a JavaScript library well-suited for creating interactive and dynamic visuals. Each of the multiple radiating layers of rings is represented by 360 points evenly distributed around a circle and connected by lines. The designed parameters ring thickness and layer spacing each control the thickness of the lines and the distance between each ring respectively. The implementation of polygon deviation and speed was achieved by slightly altering the position of each point in the ring, causing them to oscillate away from their original position at a defined speed. This motion creates a distorted shape, forming jagged peaks along the polygon’s sides.

We also introduced a feature that allows users to modify the color scheme of the rings. By defining parameters for the colors of the innermost and outermost rings, the system interpolates (lerps) the color transition between these two extremes, gradually blending from the inside out. This addition was included as an exploratory exercise to investigate whether there is any potential link between color variation and the emotional representation in the visualizations [8].

Citations

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