CART 360

Final Project Proposal

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EVERYWHERE = NOWHERE = NOW

Final Project Proposal

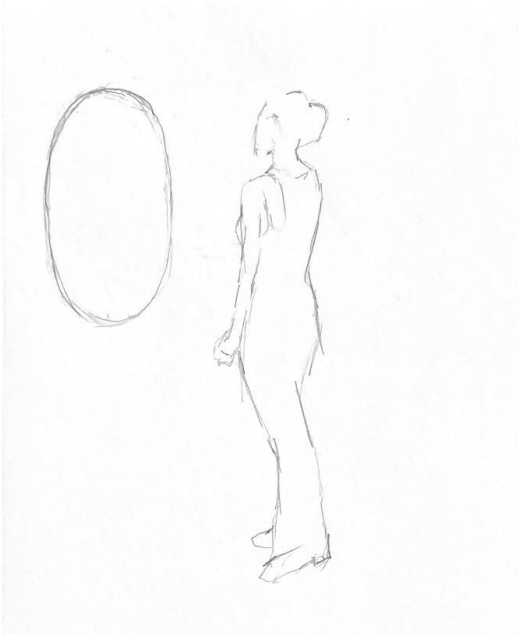
INTRO

For our project we want to create a magic mirror of sorts, an object for nourishing reflection. By default, our mirror would be a translucent piece of glass. It will stay transparent until interaction is initiated by a human providing an input through a hand held device—until it is turned on, so to speak——and only then will the user have access to their own reflection. The mirror will also request biometric data from the user and cast that information back onto the user through LED lights emitting from behind the glass. The user's body temperature will inform the color temperature of the LEDs, the brightness of which will rhythmically adjust to the bpm of the user's pulse. Without a continuous offering of both the user's heart rate and body temperature, the mirror will refuse to engage in any interaction and will stop reflecting.

HUMAN-MIRROR RELATIONSHIP

& INTERACTIVE DESIGN STRATEGIES

A typical mirror is static, it won't act or change based on the environment nor do we expect it to. We expect our mirrors to reflect the same familiar image of ourselves back exactly as we are, from a third person perspective. While considering the kind of relationship we wished to see between users and our mirror, we decided that we



wanted to distort this typical human-mirror interaction by demanding information before affording the user with their reflection.

Our mirror has the autonomy to refuse service to someone without payment. It will only provide the human with their reflection if the mirror receives what it wants, information—what the mirror wishes to do with its biometric income is undisclosed to the user. But this gift of information provides the human with an image that transcends a typical mirror-reflection: our mirror visualizes the internal and invisible functions of our body that we tend to passively ignore, and casts this data back onto the user. The exchange between our mirror and the user creates something analogous to symbiosis in nature; the interaction is initiated by "physical processes…" heart rate and body temperature, "which are analyzed so that energy inputs can be transformed into energy outputs by means of a logical switching or programme… and the ultimate outputs are within the range of human perception, so that an interaction between the organism and the environment is established."(Benthall). Both parties in this symbiosis benefit from interacting with each other, both get something they want. Through biometric data, we want to attempt to capture and reflect the user's psychological state through measurable physical data from the user's body. Temperature, colors, and heart rate can all be indicators of a person's internal state. For example, thermal infrared imaging and heart rate tachograms (Figure 1 and 2) showcases how different emotional and mental states reflect the body temperature and the heart beat.

In initiating a human-mirror interaction, one is seeking an accurate image of oneself provided by the mirror. Currently, mirrors are the foundation for self-identification. Lacan's concept of the mirror stage, represents the psychic response when a child first encounters a mirror which gives rise to the

mental representation of an "I" , Imago) which is themselves and strives to be Ideal-I which is the people around him. (their mother or father), as it is the first object which we use to emerge perceptions of selfhood and it is when we start comparing ourselves to others. While Freud's stage of primary narcissism, is the stage of human development when the subject is in love with the image of themselves and their own bodies and which precedes the love of others. Depending on the person, when looking at a mirror it can psychologically boost self esteem or lower it. Depressed people compared to non-depressed people have less facial expression and facial recognition of emotion when looking at the mirror. (Caputo et al). Furthermore, one's reflection is distorted by how it feels to look at oneself; what you perceive is merely a representation constructed by your brain, therefore many external factors such as mood, sound, and lighting can greatly affect the experience of gazing at your own reflection. For example, psychologists tested 50 adolescents in front of a mirror in low light and within minutes, they started seeing strange faces, distortions of their own faces, and often saw hallucinations like monsters, archetypical faces, faces of relatives and deceased, and animals. (Caputo et al).

What you see reflected in a mirror is not the same as the real, but is *virtually* the same in appearance because a mirror reflects in real-time. Despite their reputation of being reliable narrators, most mirrors are dishonest in their reflections and will display the world at about half the size they appear in real life, and of course backwards. Mirrors are at most virtual reality, there is a virtual version of the real object reflected within the mirror. A mirror acts as a mediator between the user and the reflection, as philosopher Gilles Deleuze puts it "the real object is reflected in a mirror-image as in the virtual object which, from its side and simultaneously, envelops or reflects the real: there is 'coalescence' between the two. There is a formation of an image with two sides, actual and virtual."(Deleuze) As far as the human eye is concerned, the virtual object inside the mirror exists just as much as any real object, so this fusion of our virtual and actual appearance delineates our self perception.

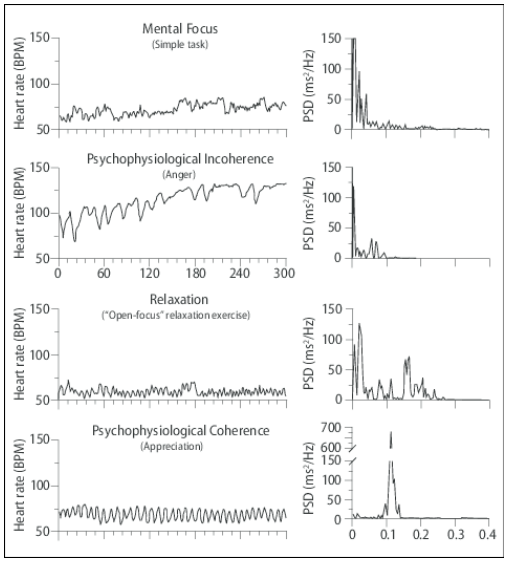


Figure 1 Heartbeats contrast depending on the mental state

McCraty, Rollin. "Heartbeats Contrast Depending on the Mental State." *Researchgate*, HeartMath Institue, https://www.researchgate.net/figure/Emotions-are-refl-e-c-t-ed-in-heart-rhythm-patterns-The-lefthand-graphs-are-heart-rate_fig1_45284251/actions#reference. Accessed 8 Oct. 2022.

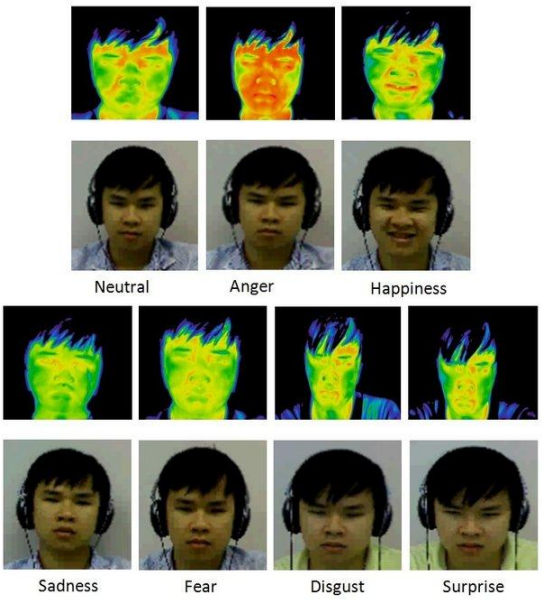


Figure 2, "Does Our Body Temperature Rise When We Are Angry?" *Quora*, https://www.quora.com/Does-our-body-temperature-rise-when-we-are-angry. Accessed 7 Oct. 2022.

We wanted our project to challenge users to re-think their relationships with objects that are ubiquitous. Our project attempts to rekindle some of the magic that could occur while looking at one's own image by transcending what we expect when we look in a mirror. That is not to say that the user themselves are transcending their image, in fact the opposite is true—the use of biometric data ground the user in their bodily experience, reminding them of their physical reactions to what they are viewing. Furthermore, the use of biometric data informs the user that there is more occurring than meets the eye, forcing the user to actively consider how they *feel* while observing their self-image as their body's physical reaction is reflected back to them. This project will help the audience with viewing their image less passively and help users navigate their feelings, as they shift depending on the user's internal state which can reflect outwards in a manner of either mimicry, synchronization, or emotional connectedness.The user may also

reflect on how their data is being used to create a new type of virtual reflection, illuminating and reconfiguring the virtual—or the individual themself—as a continuous multiplicity.

ARTIST RESEARCH

We began our research with the idea of capturing and quantifying human emotion, and reflecting that data back to the user. We looked at installation artist Lisa Park, who created Eunonia Vr.2: an interactive performance and installation that attempts to display invisible human emotion and physiological changes into auditory representations. The work uses a commercial brainwave sensor to visualize and musicalize biological signals as art. The installation consists of 48 speakers and aluminum dishes, each containing a pool of water. The layout of "Eunoia (Vr.2)" was inspired by an Asian Buddhist symbol meaning 'balance.' The motif of number 48 comes from Spinoza's 'Ethics' (Chapter III), classifying 48 human emotions into three categories - desire, pleasure, and pain. In this performance, water becomes a mirror of the artist's. During the performance, the brainwave sensor (Emotiv EPOC) continuously transmits emotional values (data). The detected brain data is used to modulate the speed, panning, and volume of a recorded-sound. The intensity of sound results in a vigorous water vibration, which corresponds to the intensity of the brainwave data. internal state. It aims to physically manifest the artist's current states as ripples in pools of water. (“Eunoia II — Lisa Park”). While coming up with a design we considered a similar approach for capturing data as Lisa Park, and played with the idea of using commercial brainwave sensors.

Another example of art with biometric data we took inspiration from is “Eyes” by Yoon Chung Han. Eyes is an interactive biometric project that transforms human's Iris data into a unique musical sound and 3D animated image based on the colors, patterns, brightness and size of the iris. Yoon Chung han wanted to play with the notion that a lot of capitalistic technology are relying and abusing biometric data to access their own personal information digitally, which causes the question what the notion of “real” identity means and what methods can be used to define identity and hidden narratives. (Han)

Lastly, we looked at an interactive installation “Pulse Room” by Rafael Lozano-Hemmer. The installation consists of 300 clear light bulbs, which are distributed over the room it is exhibited at, filling it completely. There is an interface placed on a side of the room that has a sensor that detects the heart rate of participants. A computer detects the heart beats and sets off the closest bulb to flash at the exact rhythm of his or her heart. When the interface is released, the lights turn off for a minute and it starts the flashing sequence which then advances by one position down the queue, to the next bulb in the grid. “Each time someone touches the interface a heart pattern is recorded and this is sent to the first bulb in the grid, pushing ahead all the existing recordings” (Pulse Room)

All three projects included the project using biometric data to create a visual or change the environment based on that input. In a way, each project is a mirror, creating a reflection of the user. We wanted to be more direct in our approach, asking the user to turn their attention inward to their own body while interacting with the mirror. Using a mirror makes it more personal and impactful. Mirrors are a way for a person to see their own physical entity, usually people perceive other people in the world rather than themselves. Because mirrors are so commonplace we are accustomed to them, we are all too familiar with our reflection in the mirror, we thought this would be the perfect pattern to disrupt.

A NON-TECHNICAL EVALUATION OF SENSORS .

Ideally we want to use an electrically switchable mirror that can rapidly change between a state of reflection and then total transparency, and vice versa, either letting light pass through completely or presenting the viewer with their own reflection. If this technology is unavailable, the design could be modified to use smart glass technology, glass that can change from translucent to transparent. We would put a regular mirror behind the smart glass to create the illusion of a mirror switching between a reflective and an opaque state.

This change in state would be activated once a user’s heart rate and body temperature can be detected through a controller. This controller will be a very important feature of our object as it functions as both a “light switch” and a sensor for detecting and measuring the user’s heart rate and body

temperature. Lastly, we need LED lights that are both powerful enough to emit lots of light but also small enough to be concealed behind the face of the mirror. The LEDs need to be color changing and dimmable. We started this research in the hopes of using a brain sensor, but due to price and time constraints, we decided to stick with pulse sensor and body temperature sensor. As we still wanted to play with the biometric data-combining electronic interactivity with biological entities. We also wanted to use sensors that have an arduino library, like the ProtoCentral MAX30205 Body Temperature Sensor Breakout Board, which has an Arduino library and an High Accuracy: 0.1 °C over a range of 37°C to 39°C. The pulse sensor was more accessible and easier to find in different brands and websites such as MIKROE and SparkFun to measure the electrical activity of the heart, acting as an ECG or Electrocardiogram. We are thinking of sticking with Sparkfun, as MIKROE does not have the library to support Arduino projects. Sparkfun's Pulse sensor plugs right into Arduino and easily clips onto a fingertip or earlobe.

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