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Final Project Description - Palm Palette

Palm Palette was inspired by a desire to improve the way in which the visually impaired interact with color by creating a tool that would allow them to “feel” a tactile representation of color. Our device is used to transform color, a visual input, to tactile output and vice versa. However, our project also forced us to explore ways in which a user could intuitively interpret tactile information corresponding to color. The device functions as assistive technology or an artistic tool, allowing any user to translate between touch and color by “reading” color, which is translated into a physical representation, or by “setting” color on the device which is displayed on an LED on the device. While this concept seemed simple at first, we found that the implementation of Pam Palette presented a number of interesting artistic and engineering challenges.

The first artistic challenge we faced was presented by the first moment of translation. How could we design a simple, elegant, and unobtrusive movement that translates into the more intangible and conceptual nature of color? In other words, how can color be physically represented in a way that is easy to understand, and that doesn’t necessarily rely on a concept of how people with sight experience color? The way we did this was to reduce color to a very small set of variables, a set of data that could provide all of the information we needed without being too overwhelming. We decided to use the Hue-Saturation-Value color model as a basis for our tactile color display. Hue maps directly well to a rotary dial, which helps to give the intuitive sensation that color is a spectrum. A stepper motor controlled a pointer on the dial to indicate the hue of a color being translated. We could label a few key colors like primary colors, and it would be fairly simple to understand the relation between colors based on their spatial distribution on the color wheel. Saturation and value are traditionally linear scales, and we ended up using motorized sliders to represent these parameters. Using simple sliders and dials, we strove for an interface that would make the translation feel seamless and easy to understand.

With that, we were left with another artistic consideration: How does representing color through another medium change the way that we can interact with it? To that end, how could these interactions be applied artistically? Eventually, we would hope to use the color glove device to control lighting in a theater or as a digital drawing tool, to ‘record’ the perception of color over time, and to even seek out colors in nature using the ‘set’ function of the apparatus. In this way, the device can redefine our perception of color, using the world as very tangible artistic palette.

The key engineering consideration influencing the design of Palm Palette was the need for the device to be portable. Early on, we realized that the device needed to be easy to move around and made a conscious effort to make Palm Palette as compact and wearable as possible. To this end, we took advantage of rapid prototyping techniques, working with 3D modeling software, 3D printers, and laser cutters to fabricate custom parts. We worked through many iterations of the block that mounted the dial and electronics to the user’s arm, playing with parameters such as curvature and size until we found a balance between stability and wearability. Palm Palette also entailed a fairly substantial amount of electronics and software. A Teensy microcontroller runs the various control loops interpreting color data from the color sensor and regulating the position of the dials and sliders. Many of these tools were new to us, and we were able to learn to use them with the help of course staff. Overall, the making of Palm Palette was a thoroughly exciting and instructive process that challenged us to use technology to approach the concept of color for a completely new artistic direction.