Project Aura

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Introduction

As an Information Technology Major and a person very much interested in Art, it was easy for me to be hooked by Digital Art. Project Aura was an idea that stemmed from my passion for Technology and Art. Project Aura is a device that takes people like myself into account. Web Designers, Mobile Application Developers, User Interface Designers, User Experience Designer, and Graphic Designers can all benefit from Project Aura. An Aura is the distinctive atmosphere or quality that seems to surround and be generated by a person, thing, or place. That is exactly what this device intends to capture, the feeling in a particular moment. When using this device, you can essentially get the mood of any situation much like you can with a photograph. This paper discusses the inner-workings of project aura, what it does and a quick comparison to other similar devices. Project Documents are located in the GitHub Repository.

What it does

The world is a big place with more colors than anyone can imagine. Project Aura was designed to take any color in the real world and turn it into values that computers can read. Values that can be used in web pages or any other form of digital art. The device contains a color sensor, a Bluetooth le module, and an Arduino Uno Board. The user connects their Project Aura device to their Mobile Device via Bluetooth. Once the two are connected, the user controls when the device sends it a new color. This way the user is in complete control and he/she can scan the color of whatever they like. For example, lets say a user is walking their dog on a beautiful autumn afternoon. The user's attention is suddenly directed to a red leaf. This radiant leaf separated itself from the rest because of its color. The user brings out the Project Aura Device and opens up the Mobile App. The device is placed over the color sensor and the control on the

user application is evoked. What the user receives on the screen is then the hexadecimal color

value of the leaf. Later I will discuss the inner-workings of the device and why things work the

way they do. As well as reasons for selecting particular modules over alternatives.

I have mentioned that Project Aura is designed to capture the feeling in particular

moment. This leads us into areas such as Color Theory and Psychology. Designers are very

familiar with borrowing findings from other fields like Psychology. They use scientific theories

of how the brain works and use these findings to lure customers in. Whether its ethical or not, is

a discussion for another day. However, I am going to say yes and no. There will always be bad

people who just want to make money and will do whatever it takes for that to happen. Color

Theory is the "science behind our emotional connections to color." No doubt that color's can

evoke different emotions. For example, warm colors like red, orange, and yellow are "generally

energizing, passionate, and positive." In theory, with Project Aura the color the users scan will

be a direct reflection of the mood at that moment. Let's take the example from before, the user

scanned a vibrant red leaf. That user will now relate the color of the leaf with the mood that

beautiful autumn afternoon when he/she was walking the dog.

Inner-Workings

Project Aura functions because of the teamwork of a few pieces of electronics. The

devices used include the following: an RGB Color Sensor with IR filter and White LED -

TCS34725 from adafruit, Bluefruit LE - Bluetooth Low Energy (BLE 4.0) - nRF8001 Breakout -

v1.0, an RGB LED, and an Arduino Uno microcontroller. The device also uses other electrical

components for connections to be made and power to be distributed. These include jumpers and

resistors. The Fritzing diagram located in the GitHub repository shows how the electrical

circuitry of the device.

   The color sensor is an integral part of this project. The device includes "an IR blocking

filter … that minimizes the IR spectral component of the incoming light and allows color

measurements to be made accurately." The module has a dynamic range of 3,800,000:1. This is

the ratio of the largest to smallest value that the color sensor can see. Which means that it can

sense many colors.

   Another Integral part of the project is the Bluetooth le module. The Bluetooth breakout is

the device that connects the Project Aura device to the Mobile phone. The device works by using

UART service. ACSII data is sent back and forth between devices. In our case the Project Aura

device and the Mobile device.

   The RGB LED is an LED light. The device can display a wide array of colors. RGB color

values can be passed into the RGB LED. The LED then does its best to display the correct color.

   Another device is an Arduino Uno. Arduino Uno is a microcontroller, which is

essentially a small computer. Arduino is an open source platform. It includes an Integrated

Development Environment (IDE) to create software. Code is uploaded to the Arduino Uno from

the IDE. This code is what will control the other two Modules.

Electricity

   In order for the device to function properly, an electrical circuit needs to be created. An

electrical circuit allows for power to flow for a device. Connections need to be made and Power

needs to be distributed. The Fritzing diagram, located in the GitHub repository, shows the

electrical circuitry for this device.

   For this prototype, a breadboard was used. A breadboard is a board that is used to make

electrical circuits. Breadboards are especially used for experimenting since they are solderless.

Meaning changes are easy to be reverted. First, power needs to be passed to the breadboard from

the Arduino. This is done by connecting jumpers from the ground and 5 volt pins on the Arduino

to the Ground and Power strips on the breadboard. The RGB led, Bluetooth module, RGB color

sensor were placed on the breadboard.

The RGB legs were connected to pins 6, 5, and 3 respectively. The ground pin was

connected to ground Resistors were added to the RGB leg connections to restrict the flow of

electricity. Electricity can be tough to deal with. Resistors resist the flow of electricity so there is

not too much of it. Without resistors many components can be burned out.

For the Bluetooth module the following connections were made. SCK was connected to

digital pin 13. MISO was connected to digital pin 12. MOSI was connected to digital pin 11.

REQ was connected to digital pin 10. RDY was connected to digital pin 2. RST was connected

to digital pin 8. GND and VIN were connected to ground and power respectively.

The following connections were made from the RGB color sensor. LED was connected to

digital pin 3. SDA was connected to analog pin 4. SCL was connected to analog pin 5. GND and

VIN were connected to ground and power respectively.

Data Collection

The RGB Color sensor was used as the data collection device. It was the device used that

gathered the data that was needed to reach the goal. The goal being, capturing a color and

receiving computer friendly values. The device contains a TCS34725 color sensor. The sensor

detects RGB and Clear light. The component is used by placing an object over the sensor while

the led is on. The LED on the component, is used to control the led used to illuminate the object

the device is sensing. The component creates values from the light that is reflected back to the

sensor. SDA and SCL pins are used for serial communication since the device uses I2C to

communicate. SDA is the data line and SCL is the clock line.

Data Transmission

The Bluetooth le breakout, is important for data transmission. It connects the Project Aura device to the users most beloved device, the mobile phone. SCK is the SPI data clock pin. MISO is the pin for transmitting data from the module. MOSI is the pin used to receive data. REQ is the pin used to select an SPI chip. RDY is the pin that lets the arduino know it is ready to communicate. RST is the pin used to reset the module.

Data Presentation

Presenting people with color values is a very important part to this project. For presenting data to the user, a mobile phone application and an RGB LED was used. The Mobile application used is Bluefruit, an application from adafruit. The application contains functionalities that help control the Arduino device via Bluetooth. It contains an UART moniter which is used to communicate between the arduino device and the Mobile device. UART stands for Universal Asynchronous Reciever/Transmitter. It is a Bluetooth service that allows for ACSII data to be sent to and from the device. Data from the arduino was sent to the mobile device that contained color value information. The user decides when the device sends it a new color through the application. If the user sends the letter "a" in the serial console, the device sends it new color values.

<div align="center">Comparison</div>

There are many colorimeters that are mostly used for scientific purposes. The Project Aura device is intended for a much broader audience. It is also designed for a different purpose. While the product is still in its prototype phase, the goal is to attract an audience that would want to use the device for fun. A custom application, social media integration, and a lot more work will turn this idea into a possibility.

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