SpectraSearch Presentation 1

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WELCOME! Here are your presenters:

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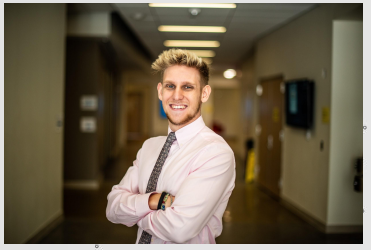
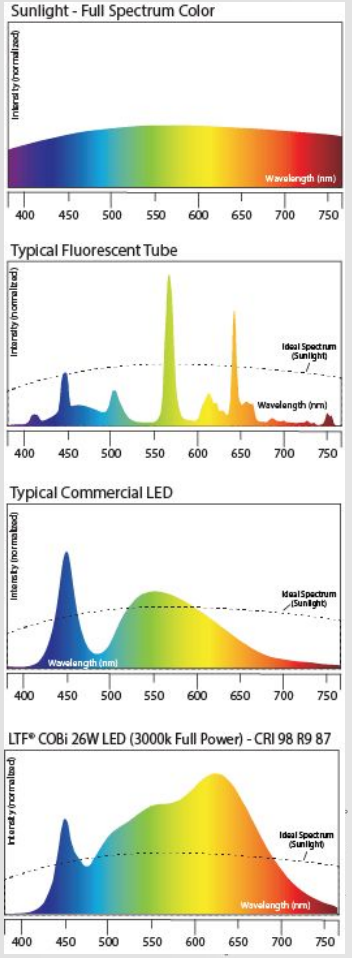


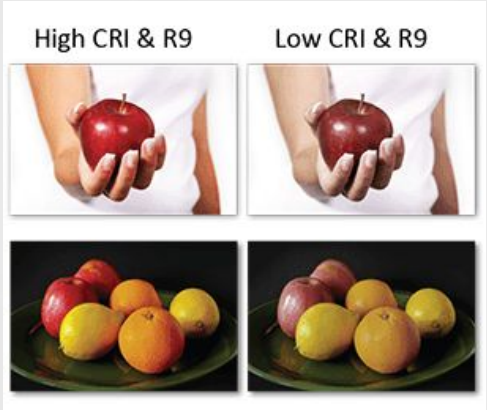
Thomas Horgan

Ryan Chu



Terminology & Vocabulary (CRI)

- CRI - Color Rendering Index
  - Created in the mid 1900s
  - Measures how a light source performs in terms of the ability to recreate the accurate colors.
  - Enabled by comparing the colors to sunlight

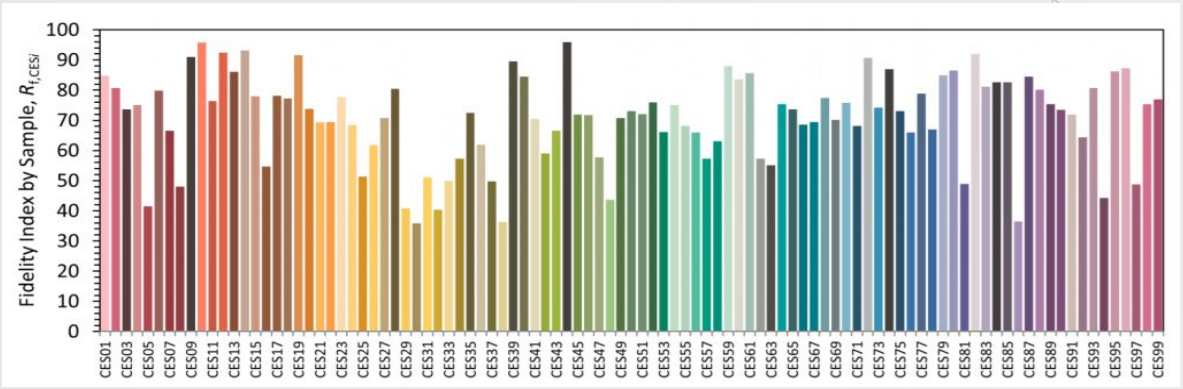


Terminology & Vocabulary (Intro to SPD)

- SPD - Spectral power distribution
- Color Fundamentals
  - Color rendering
  - Color fidelity
  - Color Gamut
  - Chromaticity
- TM - 30 (Technical Memorandum 30): The current standards and methods for calculating and evaluating light source color rendition
  - This new system polishes the flaws and limitations of the CRI method, and displays more information.
  - Although the transition from CRI to TM - 30 could take some effort, the benefits of TM - 30 make it worth the specifiers, manufacturers, and researchers alike's time.
  - The ease of access to the data to characterize color rendering

Terminology & Vocabulary (CRI is outdated)

- CRI only compares 8 colors as TM30 compares 99 colors
- CRI is only based on 8 pastel colors
- CRI is outdated



Who is the client?

Client Information:

Our client is (cascading down):

United States Department of Energy (DOE)

Office of Energy Efficiency and Renewable Energy (EERE)

Building Energy Research & Development

Building Technology Office

For succinctness, the client is referred to as “the client” or “DOE” in the rest of this document.

DOE Contacts:

Dr. Wyatt Merrill
Company: Department of Energy Building Technologies Office
Website: https://www.energy.gov/eere/buildings/building-technologies-office

What do they want? (Product Vision)

a searchable database of spectral power distributions (SPD) from commercial LEDs that has the ability to derive lighting qualities (TM30, CRI, color temperature, etc.) directly from the SPD and the ability to export the data unlike private sector firms and general energy companies or databases technology firms who might charge too much for such a product. The product should undergo user testing to ensure import/export capabilities as well as correct and accurate SPD calculations.

What did the previous team from AU do? (Last team's progress)

- Multiple AU teams previously built a foundation for both the backend and frontend of this software product for the client.
  - 2 teams comprised of a backend team built an SQL database and 2 teams comprised of a front end team constructed the web application.
- After their year of work, the product stood as a somewhat functional web application. It included a very few lighting data example values as well as a non fully functioning calculator. Reason for such incomplation was due to an unfortunate events such as COVID-19.

What do the client require from our team (Now)?

- An accurate (SPD) calculator to calculate certain lighting metrics and an advanced light mechanics.
- Update the function standard into the TM30 protocol (IES Technical Memorandum).
- Cleaning the application and shaping the performance of it.
- Include Things like (Gambot of the light (RG) and Fidelity (RF)) into the calculator.
- Clean the field. We need to clan and shape the website to meet accurate numbers when modeling including cleaning of the unneeded fields to avoid collecting unnecessary data.
- We need to figure out **How can we take the SPD and calculate these things that are part of the TM30 protocol in an accurate manner** since the client does not know how to calculate these things himself, nor is an industry standard calculator available prior to us exist, so we have to learn it to transmit it to the application for him.

Where are we now? (Our current progress)

- We showed the client how can he can run the application
- We added how to run and install the application manuel to him; including screenshots and text with all the supplements he needed. Arranged a one on one meeting to discuss it.
- We have fixed some major functionalities such as upload function, login-logout function.
- We reorganized the website format and data forms as what client wanted.
- We still try to comperhanse how to develop the work tool and try to understand the previous team’s software logic.
- We are learning what TM-30 protocol is and the details of regarding it.

What is the client end goal with us?

- Our client essentially is attempting to create a library that has the purpose of providing information on data concerning lighting quality metrics pertaining to SPDs, allowing easy access to specific calculations and specifications of a variety of different lighting tools.
- This has the potential of:
  - Speeding up the workflow of the individuals in the industry
    - Ease of data access & calculations
  - Providing a centralized database for individuals to access the TM - 30 standard metrics derived from SPD data
- A proper SPD calculator that's able to calculate specific lighting metrics.
  - For a less experienced personnel in the field it's tough to navigate these lighting metrics and data as well as make these calculations

Brief Summary Of The Meetings With The Client

Meeting 1 (Wednesday Sep 9th, 2020)

Establish initial contact with the client, introduce the group and have the client present their needs and goals for the product.

Meeting 2(Monday Sep 28th, 2020)

Going off our clients previous requests and explaining the current state of the product including showcasing how the application work and going through new asks and updates from them. Deliverables: 20 page PDF help manual of how to install/run the application.

Milestone

Sep 29th

First testing meeting with client: Fixed bugs and functionality issues to have a presentable, testable product ready to show the client

October 26th

After numerous recommendations from client, our main goals for October and the next Client update are a fully functional Upload feature and Corrected TM-30 standard metrics that the product will output

Nov 6

Main product function should be in place by this point, both backend and frontend enhancements will be discussed at this point following presentation 2

Nov 13

With close to full functionality, The team will aim to add more advanced features such as specific spectral data output and how it might seem to different mediums i.e the human eye, plants. The team will also work on enhancing the database and the user interface.

Nov 28

By this point at the end of the semester, the team will have taken the clients final input following October 26th meeting and have done their best to add as many advancements as time allows by this point. The web app should be able to successfully take in any spectral data (Wavelength & Intensity), both accurately & cleanly present all metrics

System architecture

- **Front end architecture consists of:**
  - A web application including a searchable lighting quality database; A TM-30 protocol metrics calculator as well as an upload feature to input new Spectral data into the SpectraSearch database.
  - The upload feature require a user login while other like the calculator and search bar does not. These can be accessed from the top left corner of the web Application. Only the login and logout is located on the right top side.
  - Information about the web application is included in main page as well.
  - Built on Javascript and React with HTML code.
  - A CSV upload feature is undergoing the works and has been included in the calculate page.

System architecture

- **Back end architecture consists of:**
  - React code that supplies the calculator and metric displays with correct equations, data values and graph features to allow the web app to correctly pull in, calculate and display the correct metrics, spectrum colors, and graphed values.
  - The sql code includes multiple variables that allow for the presentable SPD data on the front end. The sql code is being derived using AMPPS PHPMyAdmin.
  - Sql files and code that currently have example lighting metric data stored that is used to supply the web application with the correct values used to present the metrics when someone searches the database.
  - Javascript code is responsible for the display of the website, processing of information and connecting database through out PHPMyAdmin all the way to managing URL render and organizing the sql code.

System architecture

Summary of system architecture features:

- Sql code is functional but in progress and lacks a lot of data, user interface is presentable and clean with a simplistic style of a search bar with the home, calculate, and upload buttons located top left, login button top right. Both the calculator and Upload features are somewhat functional but contain a lot of bugs, for the most part and need bit of work on. They are presenting accurate metrics based on user input data (SPDs) but still need to find the data that relate into getting the wanted result.

System architecture demo

Recorded Demo

Technical

- What a user need to know to use our application:
  - We have offered a basic setup and implement manual to client and he can give it to anyone he desire to start using the application designed .
- What other developers need to know before jumping into the application:
  - Fundamental skills of Javascript and React.
  - Fundamental knowledge of SQL/PHPMyAdmin.
  - Familiar with HTML & Programing Structure.
- How will your customer maintain what you have?
  - Stand alone open source application and/or on the DOE servers (Customer still not sure).

Potential issue or risks

A. **Issue:** Communication issues due to pandemic and social distancing
Fallback: With increased mandates pushing social distancing due to the Coronavirus pandemic mostly all of group communication and client communication is now digital. With this in mind group members must work harder and smarter to increase communication to decrease loss of efficiency and communication errors that may come with this issue. Weekly meetings and deadlines as showcased above will be set up at least a week ahead of time and contact with clients will also be set up in a timely manner to ensure nothing is lost in digital communication.

A. **Issue:** Loss of support and findings towards the DOE
Fallback: With increased attention and funding toward other government organizations focused on coronavirus efforts the DOE may see decreased funding and therefore support for this project. The solution here will be for our group to work with what resources and progress the project currently has and hope to not see decreased support and resources from the DOE. If we see decreased support from the governmental organizations we will have to work to make a more generalised database product that could work for other non governmental agencies.

A. **Issue:** Technical Integration with in the DOE infrastructure
Fallback: Technical issues may be raised during the implementation of our project into the DOE infrastructure. This might be either due to incompatibility with the tools and services they have or that they are not ready for such an integration.

A. **Issue:** Not uploading/input incorrect data into the program
Fallback: This upload feature on the web app will require, in its current state, a specified form of data inputted (first column is wavelength, second column is intensity) via CSV file for example. We will start by creating a functional upload feature presuming the user is inputting only wavelength and intensity data values and also clearly state on the web app to upload in this way.

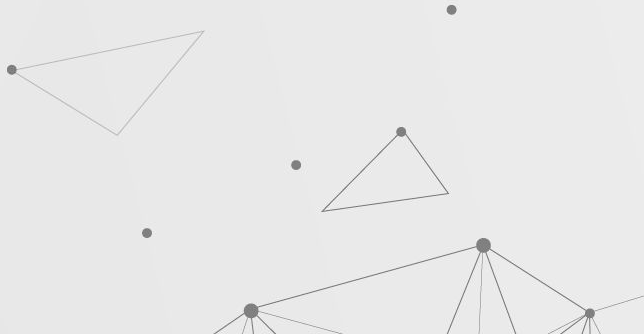
A. **Issue:** Team issues
Fallback: If problems arise either with team members not being able to finish their part before the next sprint or team members are falling behind in keeping up with project work we will, as a group all work together to help the group member catch up and finish their part because the team cannot be successful if we are all at different points in our progress. This may include issues in pushing/pulling new code, solving code problems or other issues regarding team communication and progress. These problems will all be addressed as a team and solved as a team. If a team member leaves the team or does not come to any meetings all work from their end will be redistributed among the rest of the current team members

A. **Issue:** Software issues such as lost code or slow runtimes
Fallback: If any code is lost we will have the last updated piece of code from github as all of our progress will be continually updated through their, if any slow run times are found with the code we will work as a group to either determine if the problem is with the hardware it is run on or if its a bug in the code itself.

A. **Issue:** Time zone issues
Fallback: With multiple group members being in various time zones we will always implement strict but reasonable timelines for submitting work to keep progress on track and set meetings ahead of time.

A. **Issue:** Not knowing enough about the subject proposed by the client
Fallback: Learn more and try to adapt and do review & revise session more often.

Any Question?



Thank You