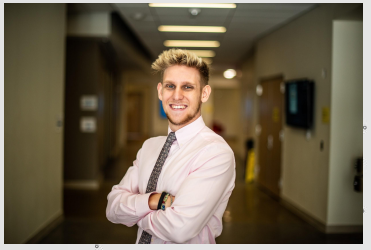
SpectralSearch Final Presentation

Bandr Alswyan, Ryan Chu, Thomas Horgan & Sheng Kai Liao

WELCOME! Here are your presenters:

Bandr AlSwyan

Sheng Kai Liao



Thomas Horgan

Ryan Chu

Recap: 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

Recap: 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. The end goal will look to not only calculate SPD metrics but also compare SPD values through different mediums of light.

Where are we now? (Our Latest progress)

- Met with the old team to discuss strategy to complete the equation work from their past experience.
- Contacted the creator of the Excel sheet Dr. Yoshi Ohno.
- Gained ground on the filter and enhanced the front end.
- Updated the client with the issue we are encountering.
- Updating the database with relevant CIE tables & cleaned up the data outputted using a clean table format.
- Bugs that have been fixed:
  - A search bar bug would show result only one time and then lag afterwards
  - A signup bug which not allow user use his account which just be signed
  - Upload bug which can not operate upload function functionally
  - Data export bug which reflect wrong spectral data

Recap with no update: What do the client require from our team?

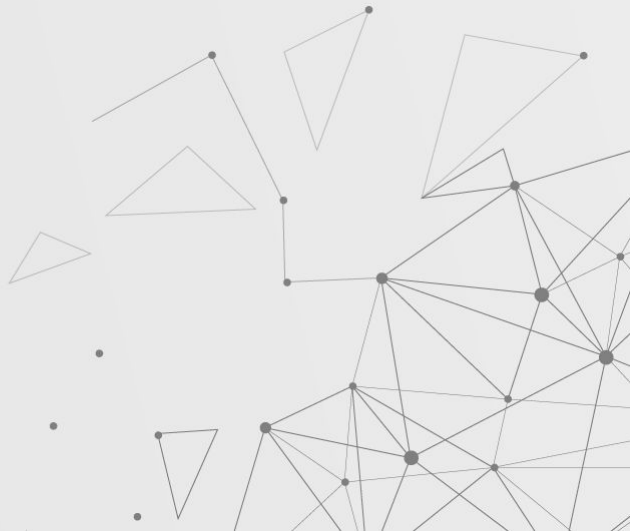
- **Pending:**
  - An accurate (SPD) calculator to calculate certain lighting metrics and an advanced light mechanics.
- **Implemented:**
  - Update the function standard into the TM30 protocol (IES Technical Memorandum).
  - Cleaning the application and shaping the performance of it.
  - Clean the field. 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.
- **Unable to implement:**
  - 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 there is no industry standard calculator available prior to us exist, so we have to learn it to transmit it to the application to satisfy the client.
  - Include Things like (Gambot of the light (RG) and Fidelity (RF)) into the calculator.

Recap: 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

Recap: What is the client end goal with us?

- Our client updated the goal to include prioritizing calculating Fidelity and Gamut regarding the TM30.
- Working on having outputs that show SPD data and their different effect on different mediums.
- Categorizing the information within the database to be more user friendly and easy to work with.



Updated: What is the client end goal with us?

- Following the setbacks of the main priorities previously discussed the end goal has now shifted
  - For the end of the project the team aims to now build up the database to be much larger in scale
  - Be able to combine SPD data currently in the database with new data provided by the client
- Finish any current front end enhancements to improve usability
- Possibly build up the product and database to be a substantial product to be continued for future teams

Recap: 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.

Meeting 3 (Monday Oct 26, 2020)

The CSV upload function was presented to the client. The team was provided with further information on the equations pertaining to TM-30 calculations. Due to an issue with GitHub the client was not able to access the current version of the software. The client left us with a new requests, asking us to include a filter function in order to give a better user experience in navigating through the information within the database.

Updated: Brief Summary Of The Meetings With The Client

Meeting 4
(Wednesday Nov 30th, 2020)

Client requested that we include more data of different lighting sources into our database to make the application more practical for everyday use. He advised us to contact Dr. Ohno one more time in order to gain more knowledge on the SPD equations if time permits.

Recap: 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

Continuing the learning of the TM-30 protocol and attempt to create a functional driven calculator using the resources that the client provided.

Nov 28

By this point at the end of the semester, the team will have taken the clients an input. The web app should be able to be take in some spectral data (Wavelength & Intensity), both accurately & cleanly present all metrics

Updated: Milestone

After consulting the client about the complications we've encountered through the project, the final goals have been revised and finished accordingly.

System architecture live demo

Recap: 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 implemented into calculator page and upload page.

Updated: System architecture

- **Front end architecture consists of:**
  - A filter function which is able user to search data by using dropdown options to search the data relate to it and showcase the data with well organized table
  - A table that reflect the result from the filter function in a modern way.
  - Added the logout feature to the logged in user.

Updated: System architecture

- **Back end architecture consists of:**
  - Updating the database with relevant CIE tables

Recap with no update: 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.

Recap with no update: 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).

Recap with no update: Technical

- For Javascript and React: developers should be able to understand the programming structure and language so that they are able to add new features to the application.
  - The developer should have an understanding of Javascript in the web building realm and the ability to tailor the application with other component such as the database (PHP My Admin) or etc….
  - React Native: Developer should have an understanding of how to use the library to enhance the user interface development process as needed.

Recap with no update: Technical (package and accomodation tutorial)

- React package that are in the use:
  - Semantic-ui-react: This is used for building the look of the front end, such as the search bar, dropdown & the interactive Icon. Reference: https://react.semantic-ui.com/
  - Html2canvas: This package provide all the need functions that allow the app to transform the webpage into a PDF format file. Reference:https://html2canvas.hertzen.com/
  - Recharts: We use this package to visualize the data that is being calculated using the calculation function. Reference:https://recharts.org/en-US/guide
- Accommodated tutorial:
  - http://www.ies.org/redirect/tm-30/
  - https://www.energystar.gov/sites/default/files/asset/document/TM-30%20ES%20%28Final%29_0.pdf

Recap with no update: Potential issue or risks

1. **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.

2. **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.

3. **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.

Faced Issues

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.

B. **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

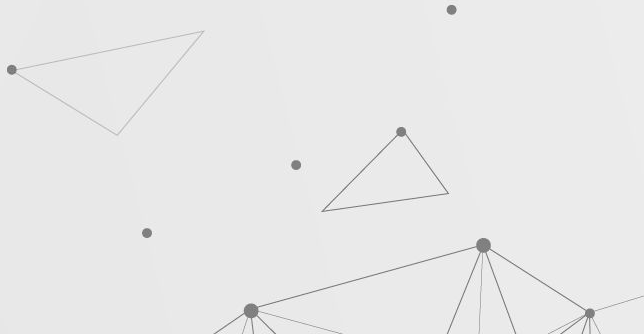
C. **Issue:** Software issues such as lost code or slow runtimes
Fallback: If any code is lost we will have the last updated piece of code from github as all of our progress will be continually updated through their, if any slow run times are found with the code we will work as a group to either determine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

D. **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.

E. **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.

F. **Issue:** Understanding ™-30 data and equations and all of the in depth pieces that come with that..
Fallback: Learn more about these equation extends and get help from the client where needed.

Any Question?



Thank You