Technology Review

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Abstract

This article will provide a detailed analysis of the technical plan and implementation. When the user implements interaction with our project, these technologies implement data storage and recall to facilitate user upload and download operations. In addition, these technologies add effectiveness and usability to the user experience, and we need to ensure the correct output of the 3D model. This document consists of three parts, UI visualization and usability, Data storage and processing, and User interface design and organization.

1 Introduction

My role in our team is to organize the UI and implement user interaction. Online Case Designer is a tool that can generate a 3D model that can fit students' specifications to be used for fabrication. The tool will visualize the output as a 3D model that reacts live to the users input. We are going to implement a website application that can help students complete the design of enclosures without restrictions. Our ultimate goal is a simplistic and suitable application for most students, although they don't have the design experience or access to 3D printers and laser cutters, we can help them. In addition, Users will also be able to specify holes in the case to accommodate the needs of their project. Our final product will provide greater levels of freedom than currently available tools to support development of student projects at Oregon State University.

2 Piece 1: UI visualization and usability

In the process of user interaction, the project needs to ensure availability. Each button can perform its intended functions, such as uploading and downloading files, which requires consideration of the type and format of the file, which may use JavaScript to implement reading and downloading functions and provide constraints. The project will correctly generate 3D models to ensure the visualization of the project. This may include the following technologies: HTML5 (Tool: JSFiddle), WebGL in JavaScript, Algorithm in C++.

2.1 HTML 5

HTML5 is the latest version of the website language, which is suitable for large multi-function calls and supports user interaction. Our project is a web application, and HTML5 is the primary method of user interaction. For example, the normal display of all functions, including the generation of 3D models, requires the help of HTML5. In addition, the use of some APIs also requires HTML5 support, like WebGL to generate 3D models. JSFiddle is a HTML5 design tool that can be compiled and helps us develop and improve web page layout, we can try to use HTML code on this.

2.2 WebGL:Web Graphics Library

WebGL is an API in JavaScript that helps us implement interactive 3D models. WebGL will be used in conjunction with JavaScript, and the visualization of the project will be improved and invoked in JavaScript. For example, we need to make the 3D model arbitrarily dragged and zoomed in and out. This may use the function jQuery to get the user's actions and improve the output of the image according to the user's preferences.

2.3 Algorithm in C++

Algorithm is a library in C++ that can help project optimization algorithms to help users get more accurate data, such as the length and width of the graphics, volume, area, and more. The Algorithm library can integrate the data provided by the user to get the coordinates and position of the graphic, so as to correctly generate the 3D graphics. And the Algorithm library can calculate the availability of data, so that the user's graphic design is best improved. A good example is that the Algorithm library can treat user input as visual data and analyze them to generate a suitable coordinate system to display a 3D model or provide an effective solution based on user input.

3 Piece 2: Data storage and processing

The reading and processing of data can realize the main functions of user interaction, such as user-designed uploading and downloading. This helps the user's data not be lost and guarantees that they can continue to work after interrupting the design. In addition, this project can process the user's data to facilitate the accuracy of the data and the correct generation of the graphics. The main technologies that may be used are Mysql, PHP, Struct in C/C++. In addition, we may use html2canvas.js to implement a user's web page capture to get a quick overview of the design.

3.1 MySql server to store data

The data can be stored and processed using Oregon State University's server storage, and using Mysql in conjunction with HTML, JavaScript to read and call data. Files can be stored and called in CSV format and allow users to manipulate and use the files. For example, users can upload data, download data, and delete data on the website. These operations need to call Mysql, get from the database, and store the data. We will connect

the HTML to Mysql so that the user can directly retrieve the target file. In addition, this allows each user to sign up as a member and view recently available files for easier and faster design.

3.2 PHP

PHP is the current popular WEB development language, which can be used in conjunction with HTML and Mysql to ensure data storage and processing. We need PHP to do multi-file processing, such as user uploading more than three files, which requires PHP and JavaScript to generate a queue and layered processing, and finally use Mysql storage. In addition, PHP and Mysql, HTML calls can provide visibility into the reading of the target file to increase the processing efficiency of the application. The main goal of our project is to generate 3D design models, and PHP applications can effectively help the rendering of WEB programs.

3.3 Struct of C/C++

A struct in C/C++ programs are extremely helpful for reading and processing data. For example, when a user uploads graphical data information, we need a C/C++ program to help analyze the usability of the data and generate and represent them graphically. The program can create a Struct and analyze each data as a Struct. The final result will be a 3D model in HTML and output as a coordinate. These outputs can be read and implemented by PHP and JavaScript, and combined with the use of WebGL to generate 3D models, increasing the effectiveness and usability of the project.

4 Piece 3: User interface design and organization

The user interaction design will be designed as a prototype and concept map. This project will provide visual targets for the students, and we will ensure the usability of the design and systematic design with a simple and easy to understand design. A good user interface can enhance the user experience. We want every button and application to be easier to use, and they should be able to learn quickly when they are used for the first time. we will use the following technologies: Balsamiq cloud, CSS: Cascading Style Sheets and Mockplus.

4.1 Balsamiq cloud

Balsamiq is a web application focused on user interaction design that will help us design and implement designs more easily. When we create a new project on Balsamiq, we can clearly build computer screens, create menus, buttons, and various web features. In addition, we can add a link to each function to jump to the page that should be. This is easy to modify, and we can use this as a prototype to let the target users interact and improve the final solution based on their feedback.

4.2 CSS: Cascading Style Sheets

CSS is the main language for designing user interaction interfaces. It can edit the display of HTML and modify font, spacing, size, position, etc. It must be used in conjunction with HTML. For example, we can modify the font color to maintain design consistency, or modify the position of the button/graphic to visualize the user interface and make it easier to learn. In addition, the use of CSS can see the changes of the page more directly, making our design easy to modify. We will focus on typography and formatting to make all features easier to find, all designs support user interaction.

4.3 Mockplus

Mockplus is also a user interaction design application that enables the design of application prototypes. It provides a large number of icons and graphics, and allows the user to design the UI interface in a drag-and-drop format without the need for code participation. This makes it easy for designers without any experience to complete the design. In addition, it allows users to collaborate on design, and users can invite team members to complete the design. This is a great help for user interaction design.

References

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