**Frontend Technologies**

We are using Angular to build our application frontend.

Modern UI

We've adapted our interface to the Glassmorphism design trend to provide a modern and visually engaging user experience. This approach not only aligns with contemporary design aesthetics but also enhances user engagement and immersion, making information more appealing and accessible to our student users.

Accessible UI

In addition, we've prioritized inclusivity and an improved user experience for students with disabilities. There is a color scheme toggle feature accessed through a user-shaped button, catering to those with visual impairments like color blindness (7 Ways to Make Your Angular App More Accessible, 2019). Moreover, our future plan is to incorporate audio descriptions to further facilitate navigation. When users hover their cursor over specific elements, such as buttons or links, they will receive audio feedback providing information about the function or purpose of that object.

A screenshot of a computer

Description automatically generated

A computer screen with a message

Description automatically generated

A computer screen with a black background

Description automatically generated

A computer screen shot of a cloud

Description automatically generated

In our literature review on font types and sizes for accessibility, it was found that Times and Arial facilitated faster reading, while Georgia was perceived as the most attractive but less preferred overall (Bernard et al., 2002). Investigating fonts designed for digital content, researchers concluded that Georgia enhances online readability, emphasizing the importance of considering type size and other factors in font design (Boyarski et al., 1998). Exploring electronic display legibility, the study revealed a "letter superiority effect," favoring individual lowercase letters, and Verdana and Arial as the most legible fonts (Sheedy et al., 2005). For web reading, 12-point Arial was the most preferred and legible, with potential for serif fonts like Times New Roman to enhance comprehension at smaller sizes (L. Bernard & Mills, 2000). A study on fonts for dyslexic readers found that sans-serif, monospaced, and roman fonts improved reading, recommending Helvetica, Courier, Arial, Verdana, and Computer Modern Unicode, while discouraging Arial Italic (Rello & Baeza-Yates, 2013).

This paper emphasizes the continued use of Web Content Accessibility Guidelines (WCAG) as a foundational basis for creating accessible web interfaces and suggests combining user experience studies with these guidelines to ensure comprehensive accessibility (Examining the Perceptions of People with Disabilities on the Use of Accessibility Standards in Web Interface Design, n.d.). This thesis highlights the significance of aural interactive websites, which primarily rely on auditory input instead of visual content. It argues for the importance of considering aural interaction in web development and accessibility(Requirements for Aural Web Sites, n.d.). Audio is an accessible medium for individuals who are blind or visually impaired, as well as those with learning challenges or dyslexia. Audio formats offer an alternative for accessing written materials (Accessible Formats, n.d.). This paper offers guidelines for audio descriptions, including considerations like sentence tense, language simplicity, and avoiding slang. It aims to provide a comprehensive training manual for audio description (Snyder, 2020).

A group of logos with text

Description automatically generated

Fig: Icons for Audio Description (Snyder, 2020)

The research outlines solutions for making image memes more accessible. It introduces an automated method for converting image memes into alternative meme formats and an authoring interface for users to create accessible memes. The study involved 10 Twitter users with visual impairments who had a preference for alternative text memes (Gleason et al., 2019). The importance of addressing various accessibility challenges in game development was discussed in this paper, highlighting spatial sound technology's crucial role in enhancing the gaming experience for blind users by providing auditory cues for navigation. It also advocates for customizable font styles, readable fonts like Helvetica, Courier, Arial, Verdana, and Computer Modern Unicode, and customizable font sizes to improve on-screen readability for low-vision gamers. Additionally, it emphasizes the significance of customizable HUDs in enhancing the gaming experience for individuals with visual impairments and highlights the potential for smoother game development through these accessible features, even citing community-created mods in games like Skyrim as examples of HUD customization(Khaliq & Torre, 2019).

A screenshot of a video game

Description automatically generated

Fig: Color themes for user with colorblindness (Khaliq & Torre, 2019)

We have also researched the Web Content Accessibility Guidelines (WCAG) guidelines to address disability like visual impairments for web applications. While WCAG does not specify specific font sizes or font styles, it does provide recommendations related to text readability and audio descriptions. Here are the relevant WCAG guidelines-

1. Font Size and Text Readability:

* WCAG Success Criterion 1.4.4 - Resize Text: Ensure that text can be resized up to 200 percent without loss of content or functionality. Use relative units like percentages or ems for font sizes to allow users to adjust text size using browser features(“Understanding Success Criterion 1.4.4: Resize Text | WAI | W3C”).
* WCAG Success Criterion 1.4.5 - Images of Text: If images of text are used, ensure that the text is provided in a way that can be visually customized by the user without loss of content or functionality (“Understanding Success Criterion 1.4.5 | Understanding WCAG 2.0”).
* WCAG Success Criterion 1.4.10 - Reflow: Content should be designed so that when the page is zoomed or text size is increased, users do not have to scroll horizontally to read a line of text. This helps ensure that users can read content without losing context (“Understanding Success Criterion 1.4.10: Reflow”).
* WCAG Success Criterion 1.4.11- Non-text Contrast: This guideline focuses on ensuring that user interface components and graphical objects have sufficient contrast. While it doesn't specify font size directly, it relates to the readability of text against its background (“Understanding Success Criterion 1.4.11: Non-Text Contrast”).
* WCAG Success Criterion 1.4.12 - Text Spacing: Ensure that users can adjust the spacing of text without loss of content or functionality. Some users with visual impairments may need to adjust text spacing for readability (“Understanding Success Criterion 1.4.12: Text Spacing”).

1. Font Style:

WCAG does not have specific guidelines related to font style. However, it emphasizes the use of clear and legible fonts and sufficient contrast between text and background to ensure readability.

1. Audio Descriptions:

WCAG provides guidelines for audio descriptions in video content to make it accessible to individuals with visual impairments.

* + WCAG Success Criterion 1.2.3 - Audio Description or Media Alternative (Pre-recorded): For prerecorded video content, provide an audio description of the visual content to make it accessible to individuals who are blind or have low vision. This involves describing key visual information that is not otherwise conveyed through the main audio track (“Understanding Success Criterion 1.2.3: Audio Description or Media Alternative (Prerecorded) | WAI | W3C”).
  + WCAG Success Criterion 1.2.5 - Audio Description (Prerecorded): For prerecorded video content that includes audio descriptions, ensure that the audio description can be turned on or off by the user, so they have control over the additional audio information (“Understanding Success Criterion 1.2.5: Audio Description (Prerecorded) | WAI | W3C”).

Screen Mock-ups

We have used Lucid Chart to create the initial mock-ups or medium fidelity prototypes of five pages. The ‘Data Preview/Visualization’ page have not been implemented yet; its execution is planned for the next release.

A screenshot of a computer

Description automatically generatedA screenshot of a data visualization

Description automatically generatedA screenshot of a data analysis

Description automatically generatedA screenshot of a data cleaning

Description automatically generatedA screenshot of a computer

Description automatically generated

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