

IT351 Assignment 2 - Report

Sachin Prasanna - 211IT058

February 29, 2024

1 Problem Statement

Describe your proposed Alphabet Learning System and its Design along with corresponding principles, Guidelines and Activity Theory considered in the proposed system [10 Marks]. Describe detailed design according to software engineering model. Explain the User Experience Design considered in your proposed system. [05 Marks]. Presentation and report [05 Marks].

2 Proposed Design

The design mainly consists of 2 pages - A home or landing page, where the user first lands to when accessing the application and A page for learning each alphabet. Both the proposed designs are shown in Figures 1 and 2.

The **Landing Page** is designed to provide an engaging and user-friendly interface for kids interested in learning alphabets. Typography is carefully selected with the 'Arial' font family ensuring readability, while larger font sizes in headers draw attention to key messages. A soothing color scheme, featuring peachpuff for the background and contrasting red for letter buttons, adds visual appeal without compromising readability. The layout, is centered so that the user is focused on the content. Rounded corners and hover effects on letter buttons enhance interactivity, encouraging user engagement. The inclusion of background imagery of books and a forest enriches the overall aesthetic, contributing to a visually engaging experience. The landing page offers straightforward navigation with clickable buttons representing each alphabet. Users can easily navigate to their desired section without confusion. The interactive nature of the letter buttons encourages user engagement. Upon clicking a button, users are directed to the canvas page where they can further interact with the selected alphabet.

The **Canvas Page** integrates various design elements to create an engaging and user-friendly experience. The color scheme, featuring a peachpuff background for the canvas area and red accents for buttons, ensures visual contrast and consistency with the overall design. Utilizing a flexbox layout allows for clear separation between sections, optimizing space utilization and maintaining visual hierarchy. Visual elements like the aeroplane image enhance engagement and provide context for drawing practice, while button styling with

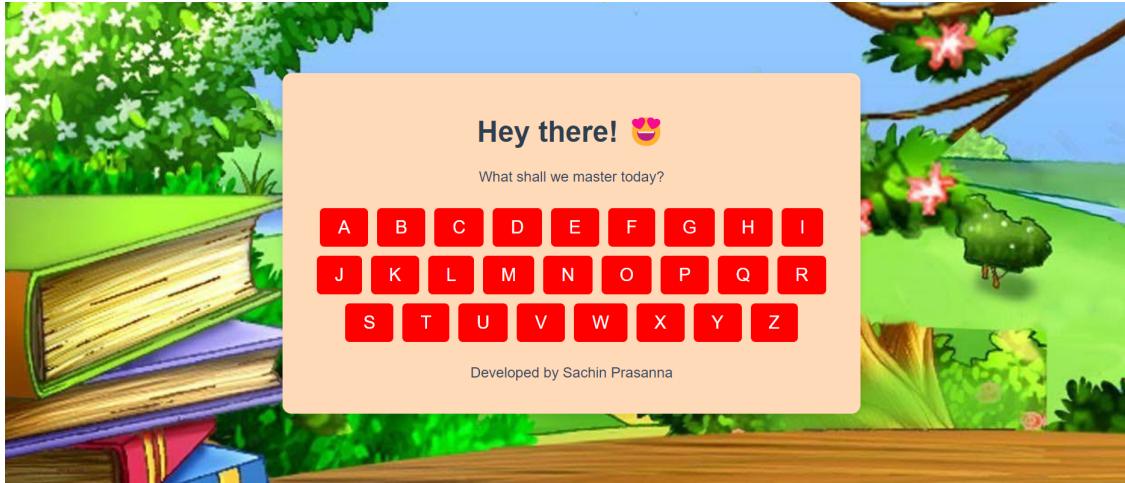


Figure 1: Landing Page



Figure 2: Alphabet Learning Page

rounded corners and hover effects ensures intuitive interaction. These design choices, coupled with clear instructions, contribute to an intuitive and visually appealing canvas interface for alphabet learning.

The page offers several key functionalities to enhance the user experience. Users can utilize the drawing canvas, which enables them to draw alphabets using mouse input. Additionally, the clear button allows for easy resetting of the canvas, enabling users to make multiple attempts and refine their drawing skills. Moreover, an engaging firework animation feature, activated by correctly drawing the alphabet, provides a delightful and unexpected element to the learning experience, contributing positively to user engagement and enjoyment. Also, when hovered over the aeroplane image, an audio cue of "A FOR AEROPLANE" is played, helping the child foster learning. Finally, the dotted lines for each alphabet can make the kids learning much easier because they just have to connect the dots.

3 Guidelines for Human Computer Interaction

3.1 Shneiderman's Eight Golden Rules

- **Strive for consistency:** The interface maintains consistency in terms of layout, color scheme, and button styling across the pages, contributing to a cohesive user experience.
- **Enable frequent users to use shortcuts:** While keyboard shortcuts are not provided, the interface offers intuitive button interactions and straightforward navigation, allowing users to access features efficiently.
- **Offer informative feedback:** Users receive immediate visual feedback when interacting with elements such as the drawing canvas and the plane image. The interface also provides audio feedback, enhancing the interactive experience. Also, when the child correctly draws the alphabet, audio cues and a visual cue of crackers will go off, indicating rewards for the child.
- **Design dialog to yield closure:** Each user action results in a clear outcome, providing users with a sense of closure. However, there are no pop-up dialogs as such in the interface. The only pop-up dialog is a visual cue of crackers going off.
- **Offer simple error handling:** The interface does not involve complex actions prone to errors. However, implementing error messages or tooltips for potential issues could improve user guidance.
- **Permit easy reversal of actions:** Users can easily undo their drawing actions or navigate back to the home page using the clear button and the back button, respectively, enabling seamless reversibility.
- **Support internal locus of control:** The interface empowers users by providing clear and accessible controls, allowing them to navigate and interact with ease.
- **Reduce short-term memory load:** The layout and organization of elements minimize cognitive load by presenting information in a clear and hierarchical manner, facilitating easy navigation and interaction.

3.2 Norman's Seven Principles

- **Use both knowledge in world & knowledge in the head** By incorporating both "knowledge in the world" (external cues from the environment) and "knowledge in the head" (internal cognitive processes), the interface maximizes user engagement and usability. It presents familiar visual elements and interactions, tapping into users' existing mental models, while also requiring users to apply their cognitive abilities and memory to understand and interact with the interface effectively.
- **Simplify Task Structures:** The code simplifies the task of drawing on a canvas by breaking it down into intuitive actions. Users can easily understand how to interact with the canvas to draw shapes or clear the drawing area.

- **Make Things Visible:** Critical elements such as buttons for clearing the canvas and navigating back to the home page are clearly visible and accessible. Visual cues like button styling and canvas borders help users identify interactive elements.
- **Get the Mapping Right:** The interface maps user actions (e.g., clicking the clear button) to specific functionalities (e.g., clearing the canvas). This alignment ensures that users can predict the outcome of their actions, fostering a sense of control over the interface.
- **Convert Constraints into Advantages:** The code effectively utilizes constraints such as limited screen space by providing a good and neat design and prioritizing essential features.
- **Design for Error:** Error handling is implemented with the clear button allowing users to correct mistakes easily. If users make a drawing error, they can quickly undo it or clear the canvas to start over, minimizing frustration and supporting a positive user experience.
- **When All Else Fails - Standardize:** The code adheres to standard button design and functionality, ensuring consistency with users' expectations. Buttons for clearing the canvas and navigating back to the home page follow conventional design patterns, making them familiar and easy to use.

3.3 Nielsen's Heuristic Principles

- **Visibility of System Status:** The system effectively communicates its status to users, such as when they are drawing on the canvas, clearing the canvas, or transitioning between pages.
- **Match Between System and Real World:** The interface employs familiar metaphors and representations, such as buttons and canvas drawing, resembling real-world objects and actions. Actions like drawing on the canvas align with users' expectations based on their experiences in the physical world, enhancing usability and learnability.
- **User Control and Freedom:** Users have control over the drawing process, with the ability to initiate, modify, and clear drawings at will. The interface offers freedom by allowing users to interact with the canvas and navigate between pages without unnecessary constraints.
- **Consistency and Standards:** The interface maintains consistency in its design elements, layout, and interactions, ensuring a predictable user experience. Standard UI patterns, such as visual feedback, are employed consistently throughout the interface.
- **Error Prevention:** The system incorporates features to prevent errors, such as clear button functionality to undo drawing actions and reset the canvas. Clear labeling and intuitive design minimize the likelihood of users making mistakes while interacting with the interface.

- **Recognition Rather Than Recall:** The interface presents visual elements and cues that aid recognition of available actions and options, reducing the cognitive load on users. Users are provided with clear and visible options, eliminating the need to rely solely on memory to recall interface functionalities.
- **Flexibility and Efficiency of Use:** The interface accommodates users with varying levels of expertise, offering a simple and intuitive drawing experience for beginners while providing advanced features for more proficient users. Quick actions enhance efficiency, allowing users to accomplish tasks with minimal effort and time.
- **Aesthetic and Minimalist Design:** The interface prioritizes simplicity and clarity, with a minimalist design that focuses on essential elements and eliminates unnecessary distractions. Aesthetic considerations, such as color choices and visual hierarchy, contribute to an appealing and engaging user interface.
- **Help, Diagnosis, and Recovery from Errors:** The interface includes clear instructions and visual cues to guide users in drawing on the canvas and utilizing other features. In case of errors, users are provided with options for recovery, such as the clear button to undo actions or reset the canvas to its initial state.
- **Documentation and Help:** Supplementary documentation or help resources are available to assist users in understanding advanced features or troubleshooting issues will be released in the future as it is planned.

4 Waterfall Software Engineering Model

The waterfall model will be followed to build the application.

- **Requirements Analysis:**
 - The purpose of the application was thoroughly examined, ensuring alignment with user needs.
 - User requirements were carefully considered to ensure the application's functionality met their expectations.
- **Design:**
 - The application's architecture was carefully planned, with a focus on modularity and organization.
 - User interface elements were designed with consistency and usability in mind, providing a seamless experience for users.
- **Implementation:**
 - The design will be translated into code, with meticulous attention to detail and adherence to established standards.

- Event listeners will be implemented to capture user interactions and respond accordingly.
- The code will be structured to ensure readability and maintainability, following best practices throughout.

- **Testing:**

- Comprehensive unit and integration testing will be conducted to verify the functionality of the application.
- Compatibility testing across different devices and browsers ensured a consistent user experience.
- User feedback will be actively sought and addressed to identify and rectify any usability issues or bugs.

- **Deployment:**

- The application will be optimized for deployment, addressing any final issues to ensure optimal performance.
- Suitable hosting platforms will be selected, and the application will be deployed to make it accessible to users.
- Post-deployment monitoring will ensure continued performance optimization and responsiveness.

- **Maintenance:**

- Regular updates and maintenance will be performed to address bugs, introduce new features, and enhance existing functionality.
- Code reviews and optimizations will be conducted periodically to keep the code-base clean, efficient, and scalable.

5 Activity Theory

In the context of the proposed design, Activity Theory can be applied to understand the interactions between the user and the system, focusing on the goals, actions, tools, and context involved in the learning process.

- **Subject (User):** The users of the system are individuals seeking to learn alphabets, primarily children or individuals new to the language. Their goal is to improve their alphabet recognition and writing skills.
- **Object (Task):** The primary task facilitated by the system is the learning and practice of writing alphabets. Users interact with the canvas to draw alphabets, while the system provides real-time feedback to aid learning.

- **Tools:** The tools provided by the system include the canvas for drawing, event listeners for capturing user actions, and visual feedback mechanisms for reinforcing learning.
- **Rules:** The rules governing the interaction include the clear canvas button for resetting the drawing area and the standardized event handling mechanisms for consistent user experience.
- **Community:** The community aspect involves the interaction between users and possibly instructors or peers who provide guidance, feedback, and support in the learning process.
- **Organisation of Work:** The organisation of work is evident in the roles assigned to users (learners) and the system (educational tool). Users are responsible for engaging with the learning activities, while the system facilitates and supports their learning process through interactive features and feedback mechanisms.

6 User Experience Design

- **User Centricity:** The design focuses on meeting the needs and preferences of users, providing an intuitive and enjoyable experience. Features like the drawing canvas and interactive buttons cater to users' desire to engage and create content easily.
- **Consistency:** The interface maintains consistency in its visual elements, layout, and interactions, ensuring a coherent experience across different parts of the application. Consistent button styles, colors, and typography contribute to a unified and predictable user interface.
- **Hierarchy:** The interface employs visual hierarchy to prioritize and organize information effectively, guiding users' attention to the most important elements. Elements like headings, buttons, and interactive areas are visually distinct, helping users understand their relative importance and function.
- **Context:** The design considers the context in which users will interact with the application, ensuring that elements and features are relevant and meaningful in their specific use cases. Contextual cues and feedback help users understand the purpose and function of different components, enhancing clarity and usability.
- **User Control:** Users are provided with control over their interactions with the application, allowing them to initiate actions, modify content, and navigate through the interface as desired. Features like drawing on the canvas and clearing the canvas give users autonomy and empowerment over their creative process.
- **Accessibility:** The interface is designed to be accessible to users of all abilities, considering factors such as color contrast, text size.

- **Usability:** Usability is prioritized throughout the design, with a focus on simplicity, efficiency, and effectiveness in achieving users' goals. Clear labeling, intuitive interactions, and responsive feedback mechanisms like audio cues and firecrackers contribute to a seamless and satisfying user experience.