SECP 1513 REPORT
Session 2023/2024-1
Software Engineering
Faculty of Computing

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1. Introduction

In the dynamic landscape of problem-solving methodologies, Design Thinking has emerged as a transformative and human-centred approach, redefining how individuals and organizations tackle complex challenges (Brown, 2008). Rooted in empathy, creativity, and iterative processes, Design Thinking provides a structured framework for understanding user needs, defining problems, and generating innovative solutions (IDEO, 2015). This academic exploration aims to delve into the key stages and principles that underpin the Design Thinking process, shedding light on its application across diverse industries.

The multifaceted nature of Design Thinking encourages a collaborative and interdisciplinary mindset, emphasizing the inclusion of individuals with diverse skills and perspectives (Kelley & Kelley, 2013). Through an iterative cycle of empathizing, defining, ideating, prototyping, testing, and implementing, Design Thinking seeks not only to solve problems but also to optimize solutions based on real-world user feedback (Tschimmel, 2012). This methodology operates under the optimistic premise that, through creative thinking and continuous refinement, even the most intricate challenges can be addressed effectively (Brown, 2008).

As we navigate the intricacies of Design Thinking, this exploration will dissect each stage, highlighting their significance in generating user-centric solutions. Additionally, we will scrutinize the key principles that guide this methodology, including its human-centred focus, iterative nature, collaborative essence, and inherent optimism. By immersing ourselves in the foundations and applications of Design Thinking, we endeavour to gain a deeper understanding of its impact on fostering innovation and addressing contemporary challenges in various academic and professional domains.

2. Design Thinking
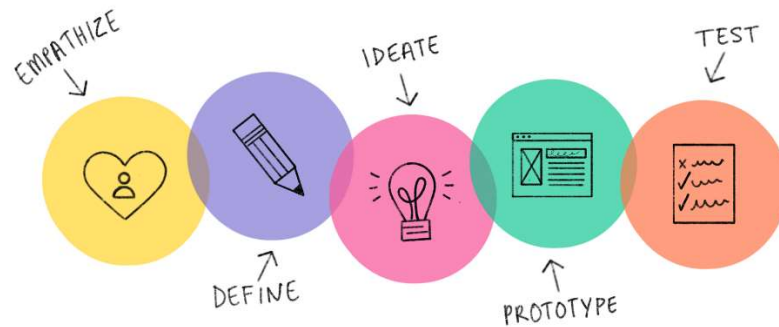
2.1 Empathize

Empathize is the first stage in the Design Thinking process, and it involves understanding and gaining insights into the needs, experiences, and emotions of the end-users for whom a solution is being designed. To empathize the end-user's problem, observe user activities when user is doing their work. Then, engage with user to know more about their experience and understand their struggles. Lastly, immerse us by experiencing what the user experienced.

1. Users are public that has or no experience on coding and programming language. Our aim is to make learning coding fun and easy to learn anytime and anywhere.
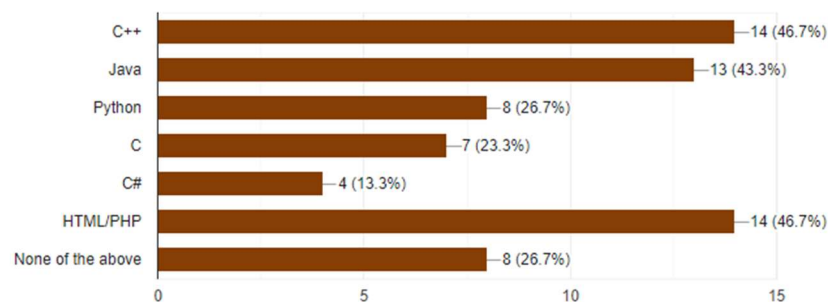

Have you ever tried to code?

30 responses
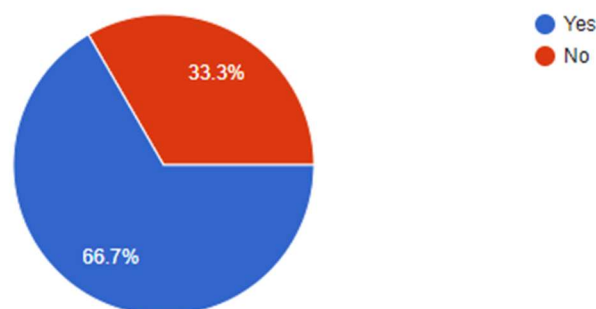
Derived from a survey conducted through Google Forms, the findings reveal that a significant majority, compromising sixty-six-point seven percent of the respondents, have indeed ventured into coding. On the other hand, thirty-three-point three percent of the respondents indicated that they have not tried coding. This data underscores the noteworthy presence of coding experience among the surveyed individuals, showcasing a diverse range of engagement with programming endeavours.

Do you know any of these language?
30 responses

Language	Count (Percent)
C++	14 (46.7%)
Java	13 (43.3%)
Python	8 (26.7%)
C	7 (23.3%)
C#	4 (13.3%)
HTML/PHP	14 (46.7%)
None of the above	8 (26.7%)

The data presented in the chart illustrates the programming language preferences among respondents. C++ emerges as the most favoured programming language, with 46.7% of participants indicating proficiency or interest in it. Following closely is Java, with 43.4% of respondents showing a similar inclination. Python holds the third position at 26.7%, indicating its popularity among the surveyed individuals.

Additionally, the distribution of expertise or interest extends to other languages, such as C at 23.3%, C# at 13.3%, and HTML/PHP at 46.7%. It's noteworthy that 26.7% of participants reported having no experience or interest in any of the mentioned programming languages.

This insightful breakdown provides a comprehensive view of the diverse programming language preferences within the surveyed group.

2.2 Define

   In the conducted survey, respondents were presented with a simple C++ code snippet:

```
Quiz Questions (C++)

#include <iostream>
using namespace std;

int main()
{
   // Using cin without std::
   int number;
   cout << "Enter a number: ";
   cin >> number;

   cout << "You entered: " << Number << endl;

   return 0;
}
```

Following the code presentation, respondents were asked the question, "Can the code run?"

The survey yielded the following outcomes:

Can the code above run?
30 responses
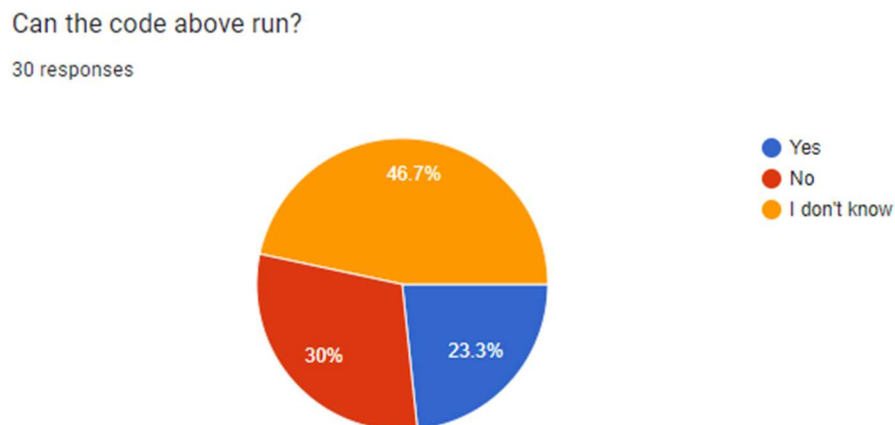
These responses reflect the diverse levels of confidence and familiarity among respondents in assessing the functionality of the provided C++ code. Most respondents, 46.7% of respondents expressed uncertainty regarding the code's executability, suggesting a need for further examination or knowledge refinement in this aspect. The distribution of responses provided valuable insights into the respondents understanding and comfort levels in evaluating simple C++ code structures.

2.3 Ideate

The Ideate stage in Design Thinking, a pivotal phase in the iterative problem-solving process, is characterized by a deliberate shift to divergent thinking and creative exploration. Academic discussions on this stage emphasize the generation of a wide spectrum of innovative ideas through techniques like brainstorming, encouraging wild and unconventional thinking. In scholarly contexts, researchers explore factors influencing creative ideation within design teams, delve into the role of tools and frameworks, and investigate the impact of interdisciplinary collaboration. The Ideate stage serves as a crucible for cultivating a culture of innovation, fostering an environment where diverse perspectives converge to generate novel solutions to the defined problems.
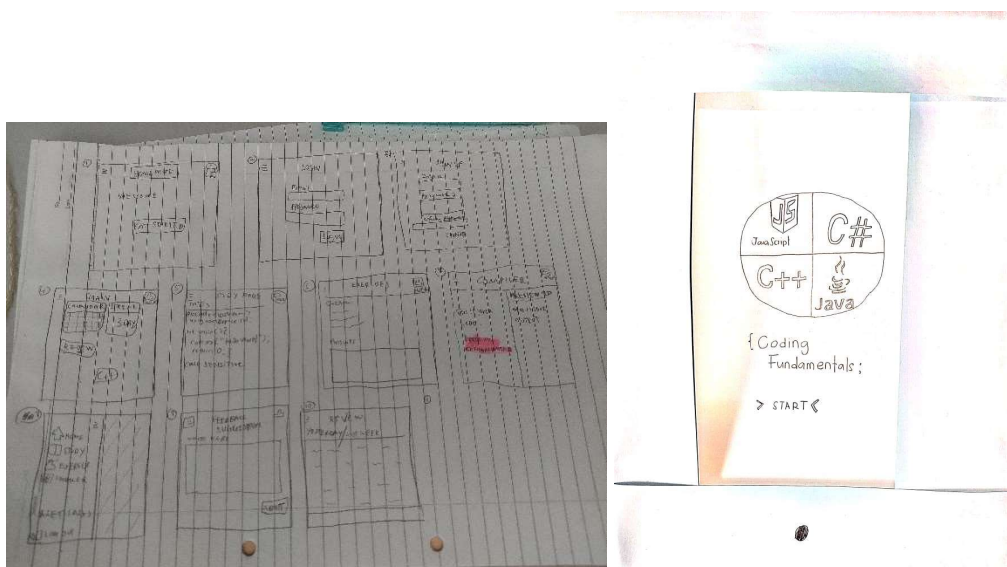

During the initial phases of ideation, our focus was on the generation of interactive and user-friendly design concepts. In a collaborative effort involving a team of four members, each participant contributed a minimum of three ideas for designing interfaces. The collective brainstorming sessions yielded a total of 10 distinct interface concepts, each undergoing careful consideration. Additionally, to provide a preliminary visualization and set a foundation for our design trajectory, we collectively endeavoured to sketch the main page. This strategic approach serves as a precursor to the design process, enabling us to refine our

conceptualizations and establish a cohesive direction for the subsequent stages of development.
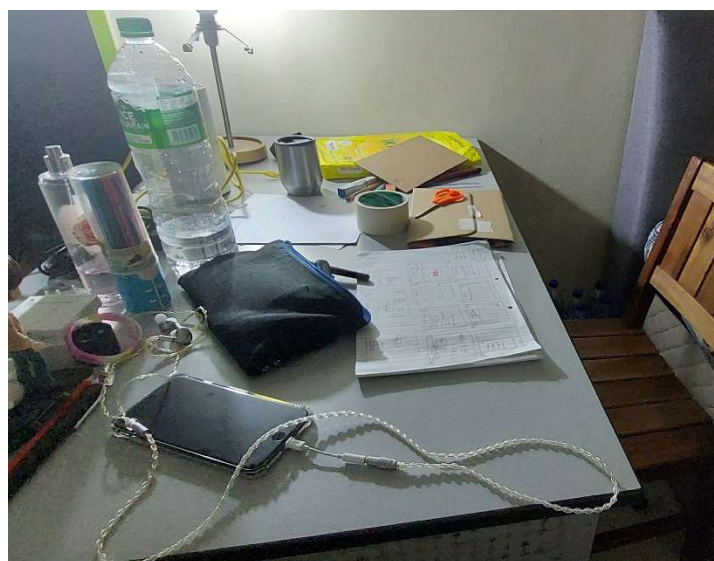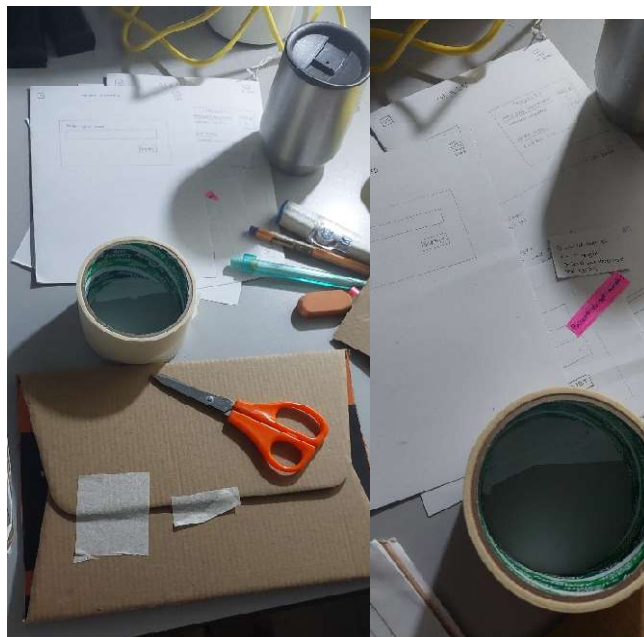
2.4 Prototype

The Prototype stage in the Design Thinking process involves the construction of tangible representations of conceptualized ideas, ranging from low-fidelity sketches to high-fidelity prototypes, contingent upon the intricacy of the proposed solution. This critical phase serves as a bridge between ideation and practical implementation, facilitating a more concrete understanding of the envisioned concepts. Low-fidelity prototypes, such as sketches and paper representations, offer an initial visualization of design elements and interactions, fostering rapid iteration. Conversely, high-fidelity prototypes provide a more detailed and realistic representation, incorporating interactive features and functionalities to simulate the user experience. This deliberate choice between fidelity levels allows for efficient testing and refinement, aligning with the iterative nature of the Design Thinking methodology and ensuring the ultimate development of solutions that are both innovative and user centric.
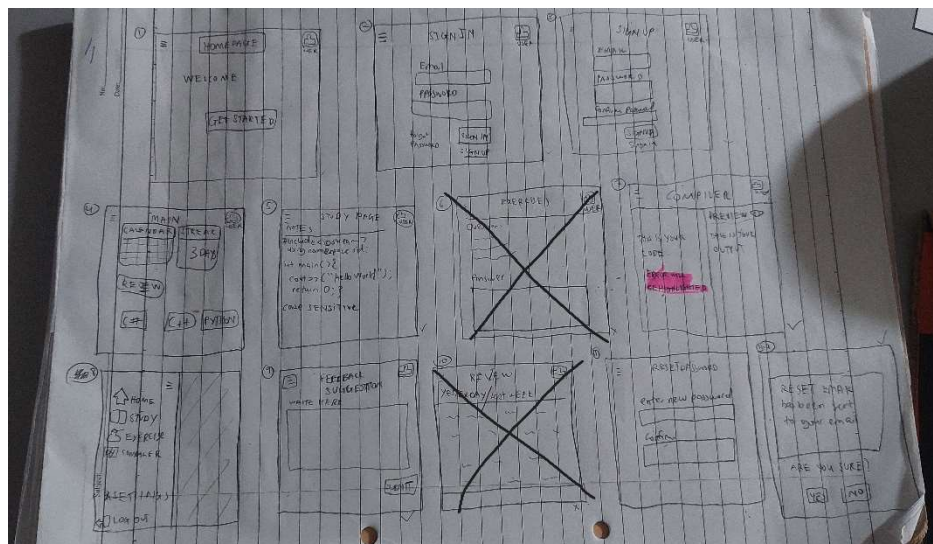
The primary objective of our project was to conceptualize and design 12 interfaces, each endowed with distinctive functionalities. In a strategic decision, we opted to exclude two interfaces due to perceived redundancy and a dearth of innovative features. Our

overarching goal was to craft straightforward interfaces, ensuring accessibility for all users and fostering an enjoyable learning experience in coding and programming. The ideation process involved the collaborative contribution of ideas from each group member, which were meticulously compiled. Subsequently, these concepts were translated into sketched interfaces, forming the foundation for our application. This methodical approach aligns with the principles of user-centric design and innovation within the realm of educational technology.

2.5 Test

      The test stage in the Design Thinking methodology involves the systematic collection of feedback from actual users through the evaluation of prototypes. This critical step serves to refine and iterate upon proposed solutions based on the insights garnered from user interactions. By subjecting prototypes to real-world testing, designers gain valuable perspectives on usability, functionality, and overall user experience. This empirical approach not only validates the effectiveness of the proposed solutions but also identifies potential areas for enhancement or modification. The iterative nature of the Test stage aligns with the overarching Design Thinking principles, emphasizing continuous refinement to ensure the ultimate development of solutions that resonate with user needs and preferences.

<u>Home Page</u>
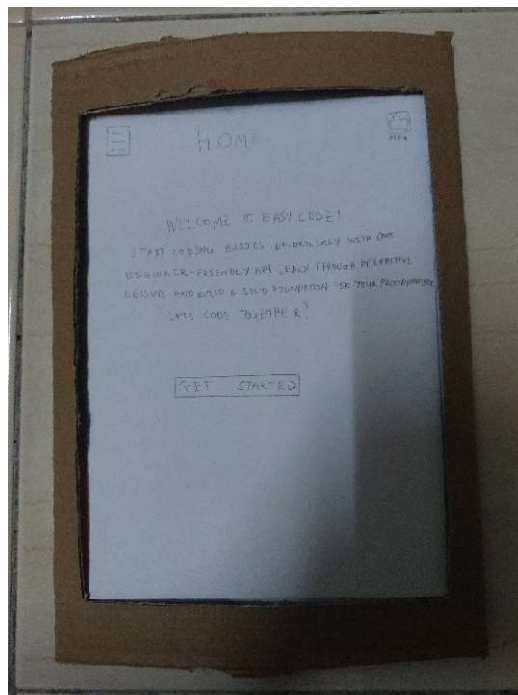
In the design of the homepage, a user-centric approach is adopted to facilitate a welcoming and intuitive user experience. At the centre-bottom of the page, a prominently positioned "Get Started" button is featured, strategically placed to capture users' attention and encourage

engagement with the platform. In the top-right corner, a user identification button is located to cater to individuals who have already registered, providing them with swift access to personalized features. Additionally, the top-left corner incorporates a menu slider, an interface element designed for expedited navigation, enhancing the efficiency and accessibility of the platform. This deliberate arrangement adheres to principles of usability and user-centred design, ensuring a seamless and efficient interaction for both new and returning users.

Sign Up
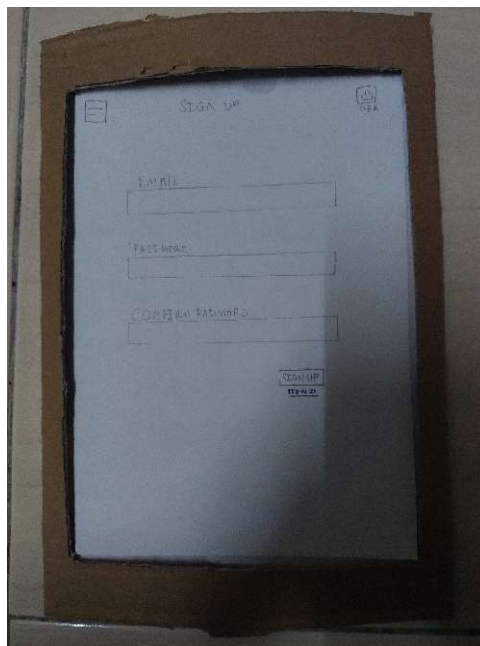
In the sign-up page after clicking the "Get Started" button, a meticulous approach is implemented to solicit essential user information, promoting a secure and user-friendly registration process. Users are prompted to input fundamental details, including their email address and password. The password criteria are rigorously defined, stipulating a length requirement of 6-12 characters, mandatory inclusion of at least one uppercase letter, and one symbol to ensure the creation of a robust and secure password. In the event of an error, an alert mechanism is incorporated to promptly notify users of non-compliance with the specified password requirements, fostering a transparent and instructive user experience. This

commitment to stringent security measures aligns with contemporary best practices in data protection and authentication, reinforcing the platform's dedication to user privacy and digital security.
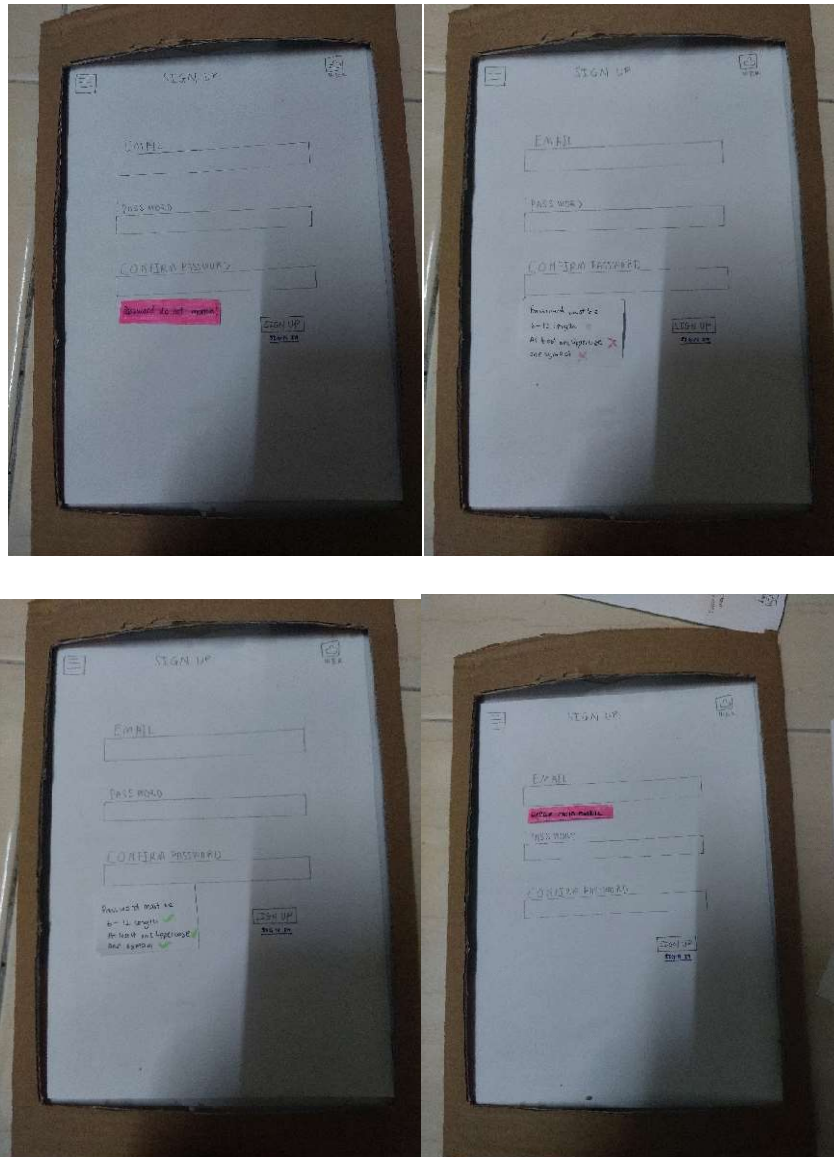

Picture above shows the alert would pop up if user made an error.

<u>Sign In Page</u>
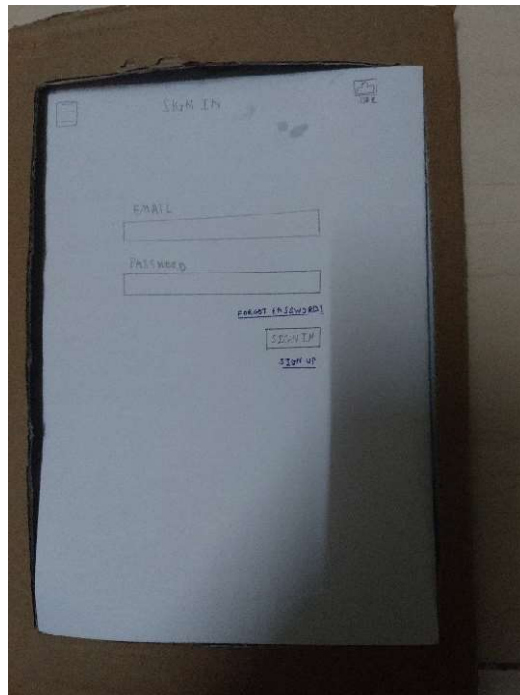
In crafting the sign-in experience for registered users, our emphasis is on ensuring a smooth and secure authentication process. Once users have completed the registration, immediate access is granted upon accurately entering their registered email and password. To assist those who may forget their passwords, a user-friendly "Forgot Password?" link is provided, simplifying the recovery process. For new users, a clear "Sign Up" option is available to streamline their onboarding journey. The authentication protocol for registered users involves thorough validation, requiring precise input of email and password details. Any discrepancies prompt an understandable error message, guiding users to correct inaccuracies promptly. This design approach underscores our commitment to user security, aligning with established best practices in authentication and reinforcing our dedication to delivering a trustworthy and user-centric application interface.
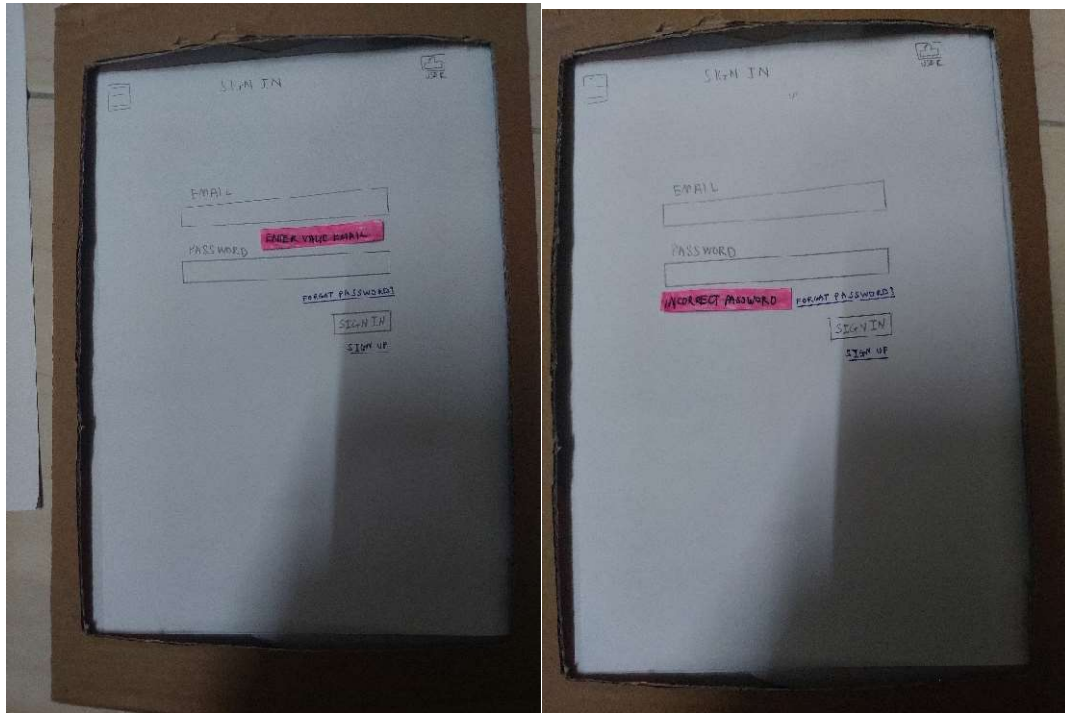
In terms of user interaction, our design ensures that both registered and unregistered users encounter intuitive pathways, creating a positive experience within the application. The inclusion of error alerts for inaccurate input enhances user feedback, fostering a transparent and instructive sign-in process. The provision of a "Forgot Password?" option aligns with user convenience, recognizing the potential need for password recovery. Simultaneously, the straightforward "Sign Up" link for unregistered users streamlines the onboarding journey, reflecting our commitment to a user-centric approach. Ultimately, the carefully designed sign-in interface seeks to strike a balance between user accessibility and security, embodying our dedication to providing a robust, reliable, and user-friendly digital environment.

<u>Main Page</u>
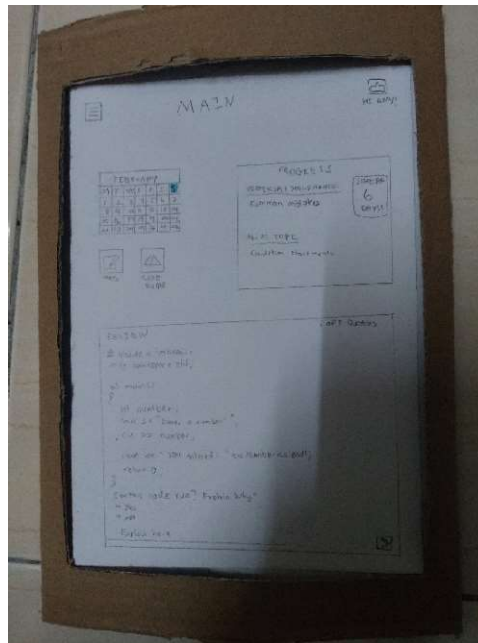
The main page of the application is thoughtfully designed to enhance user

engagement and learning experiences. It features a calendar, providing a visual representation

of days where learning activities might be lacking, aiding users in optimizing their study

routines. Two prominently placed buttons facilitate easy navigation. The first button leads to

the "Notes" page, offering a dedicated space for users to access and review educational

materials, fostering continuous learning and exploration of new topics. The second button

directs users to the "Code Editor," a practical space where they can actively engage in coding

exercises to improve their comprehension and skills. This design approach seeks to provide a

user-friendly interface that encourages consistent learning practices through accessible

resources and hands-on coding opportunities.

The introduction of a "Progress Window" within the application is designed to offer

users a comprehensive overview of their learning journey in a user-friendly manner. This

window serves as a retrospective tool, enabling users to revisit their prior lessons and gain

insights into the specific topics they have covered. Additionally, the "Progress Window"

provides forward-looking functionality by offering visibility into the user's upcoming topics, thereby aiding in the planning of their learning trajectory. An innovative feature embedded in this interface is the "Streak" indicator, strategically implemented to motivate users to sustain a consistent engagement with coding and programming learning activities. This visual representation of consecutive learning sessions is intended to serve as an encouragement mechanism, fostering a sense of achievement and reinforcing the significance of regular participation in educational content. By incorporating these elements, the application seeks to facilitate a transparent and encouraging environment that supports users in monitoring their learning progress, planning for future topics, and fostering a continuous commitment to coding and programming education.

The "Review" feature in the application serves as a brief assessment tool aimed at gauging users' comprehension of the materials they have studied. This component is designed to be a quick and accessible quiz, allowing users to self-assess their understanding of the learned concepts. The purpose of this feature is to reinforce the learning process by providing users with an opportunity to apply and test their knowledge in a structured manner. By incorporating this quiz element, the application aims to foster active recall, a recognized cognitive strategy for enhancing retention and reinforcing the mastery of acquired information. This approach aligns with pedagogical principles that emphasize the importance of formative assessment as a means of promoting effective learning outcomes. The "Review" feature contributes to a well-rounded educational experience, encouraging users to reflect on their understanding and solidify their learning progress through thoughtful self-assessment.

<u>Notes Page</u>
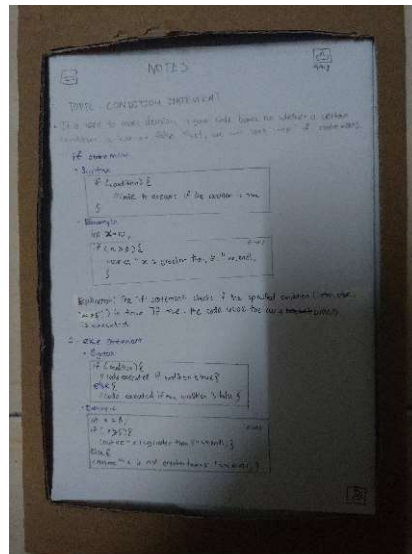
The designated "Notes" page in the application serves as an integral component for users to engage in a focused and individualized learning experience. Here, users could access educational content while concurrently creating succinct notes to underscore pivotal information. The objective is to empower users with a tool for capturing and consolidating key concepts, fostering a personalized and interactive learning environment. The provision of a dedicated space for notetaking acknowledges the pedagogical significance of active learner engagement and the reinforcement of understanding through the process of summarization. This design approach aligns with educational principles that emphasize the value of learner-generated content as a means of enhancing comprehension and retention. Consequently, the "Notes" page facilitates a dynamic and user-centric learning experience, enabling individuals to customize their educational journey by distilling information in a manner that aligns with their unique learning preferences and requirements.

<u>Code Editor</u>

The "Code Editor" feature within the application is designed as a bifurcated interface, with the left side designated for code input and the right side reserved for the corresponding output. This purposeful design ensures a clear and organized workspace for users engaging in coding activities. One noteworthy attribute of the Code Editor is its automated detection capability, discerning the programming language being employed by the user. This intelligent feature streamlines the coding experience, allowing users to focus on the code composition without the need for explicit language specification. Furthermore, the application incorporates a real-time output display, promptly showcasing the results shortly after the user completes their code entry. This feature enhances user efficiency, providing immediate feedback and facilitating a seamless coding practice. By integrating these functionalities, the Code Editor aligns with pedagogical principles that emphasize an accessible and user-friendly coding environment, fostering an effective learning experience.
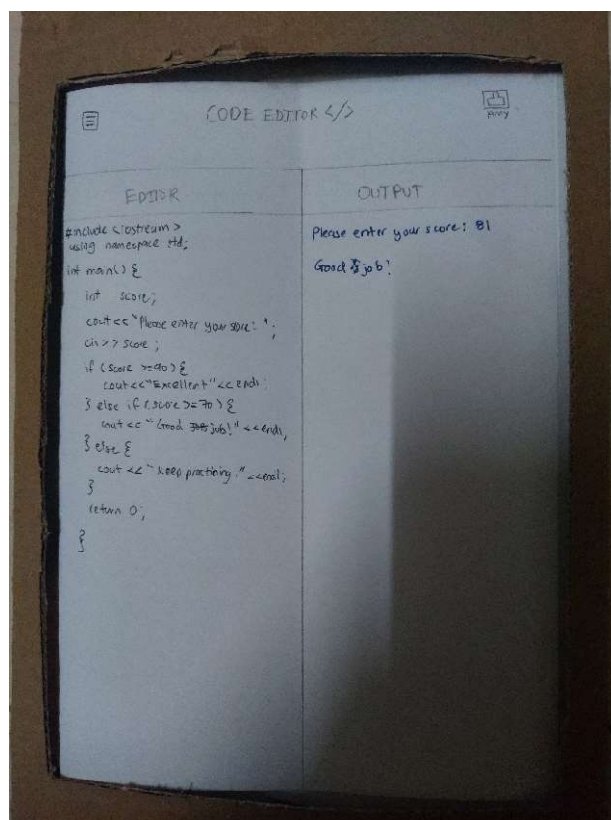
<u>Feedback Suggestion Page</u>
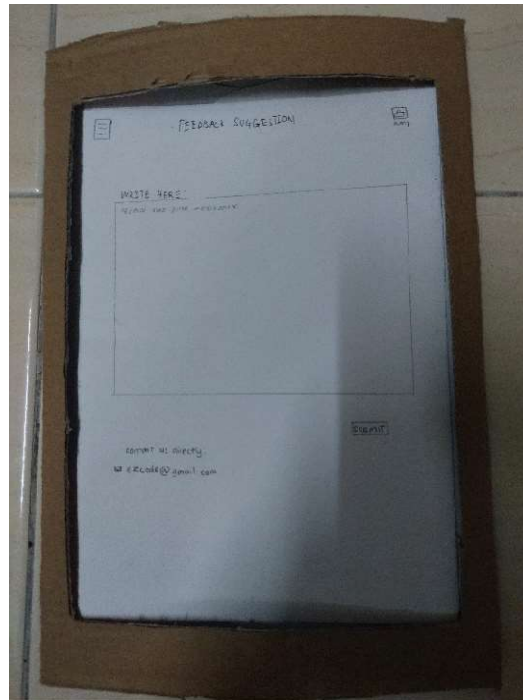
The "Feedback" feature serves as a valuable avenue for users to communicate their

perspectives and suggestions, contributing to the continuous enhancement of user experience

within the application. This interactive platform is designed to facilitate open communication

between users and the development team, fostering a collaborative environment. Users are

encouraged to share insights on potential improvements, additional features, or any elements

that could enhance their overall experience. By providing this feedback mechanism, the

application aims to establish a user-centric approach to development, acknowledging the

importance of user input in shaping the evolution of the platform. This aligns with principles

of user engagement and iterative refinement, ensuring that the application remains responsive

to the evolving needs and preferences of its user base.

Reset Password Page
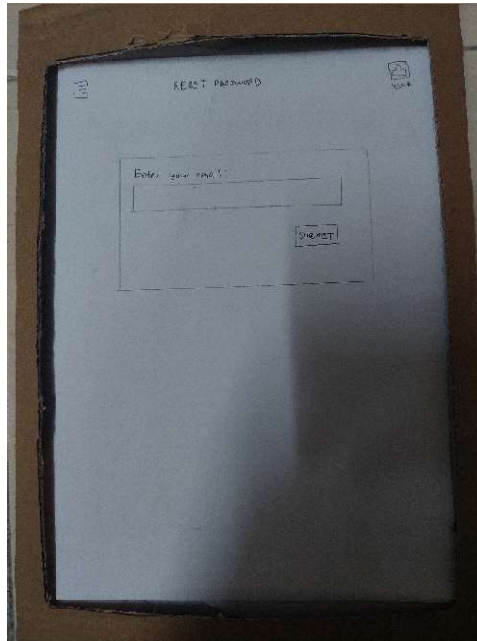
   The "Reset Password" page functions as a user-friendly mechanism to facilitate

account recovery within the application. Users encountering access issues need only provide

their registered email address and follow a straightforward process. Once the email

information is submitted, users receive a confirmation message in their registered email

inbox, seeking their acknowledgment to proceed with the password reset. Upon successful

confirmation, users are prompted with a confirmation message, signalling that they can now

proceed to enter a new password. It is imperative to note that the new password must adhere

to specific security criteria, as visually depicted for user reference. In the event of non-

compliance with the stipulated password requirements, an error prompt is strategically

incorporated to guide users in rectifying any discrepancies promptly. This systematic

approach to account recovery aligns with contemporary best practices, emphasizing user

security, and ensures a streamlined process for users to regain access to their accounts.
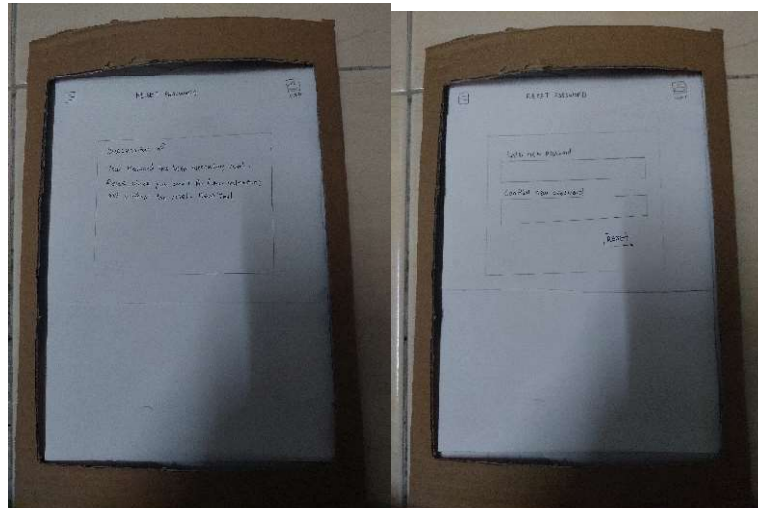
The "Reset Password" page embodies an efficient and secure protocol in line with established authentication standards. By incorporating user-provided email verification and enforcing stringent password criteria, the application prioritizes both user convenience and digital security. This meticulous design aims to empower users with a straightforward and secure means of account recovery, fostering trust in the application's commitment to user privacy and data protection.
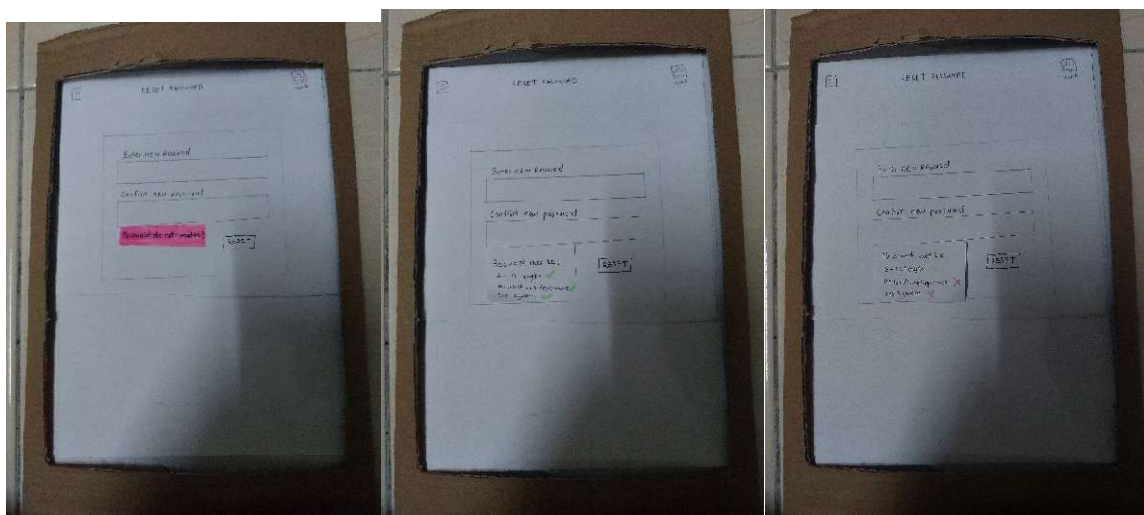
The inclusion of a "Menu Slider" positioned on the left side of the application serves a user-centric purpose by providing a familiar navigation tool. This strategic placement aligns with prevailing interface conventions, as many applications commonly position navigation features on the left side. The "Menu Slider" is designed to enhance user familiarity and ease of use, as users are accustomed to finding navigation elements in this location across various applications. This deliberate choice in design aims to optimize user navigation by leveraging established interface patterns, contributing to an intuitive and seamless user experience within the application.
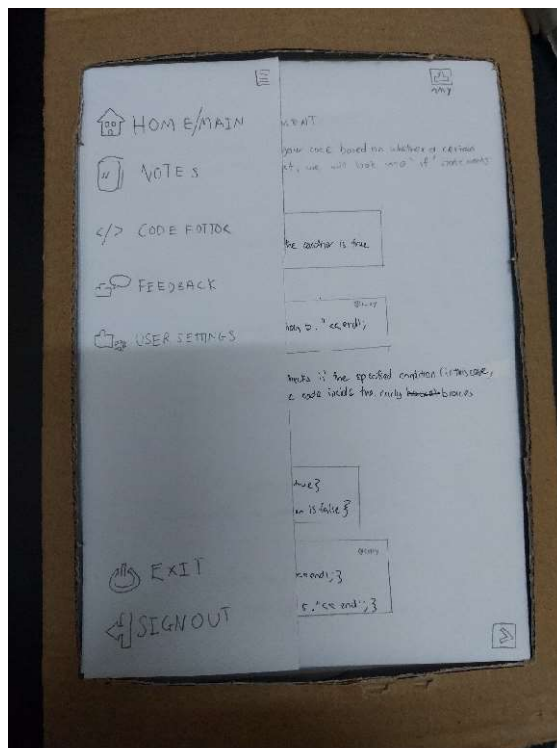
3. Reflections

Adam Azraei bin Ridza

In pursuing my Software Engineering course, my primary objective is to excel as a competent software engineer and establish a fulfilling career in the field. The design thinking project holds significant relevance for my future aspirations as it encompasses an empathize stage, focusing on information gathering and its application in system development. This aligns with my goal to become a system analyst, and the project provides valuable hands-on experience for honing the analytical skills essential for this role. To enhance my capabilities, I plan to refine time management, avoid last-minute tasks, improve teamwork skills, and boost proactivity by participating in coding competitions. These intentional steps aim to bolster both technical expertise and collaborative abilities, contributing to my overall growth in the field of software engineering.

Muhammad Arif Hakimi bin Mohd Sofi

As an aspiring software engineer, my goal/ dream in regards to my course is becoming a successful one. I particularly have an interest in the concept of game development, website making and entertainment related programming topics. With design thinking being apart of this course's assignment, it helped me realize the struggles and dedication of working within a team and is making me prepare for the future of working within an organization. With this experience gained, I can prepare as early as now to get a head start in game development among other programmers. In order to succeed, my plan of action to improve my potential is to be more involved in the practical side of programming in order to familiarize myself and get a feel of the working environment in order to become well-adjusted with the career prospects.

Muhammad Syukri bin Mohamad Taufek

I enrolled in this course with the expectation that it will help me in my journey to become a software engineer. My goal is to acquire knowledge and experience over the next four years of me in the program that will make me an excellent software engineer in the future. Regarding this design thinking project, I think it helps me to visualize what I need to do in the face of problems that will be presented for me to solve if I do become a software engineer. The 5-step process of design thinking will be a good tool to organize my thoughts in devising solutions to any obstacles and setbacks. As for the action necessary for me to improve my potential in the industry, I think it is vital that I have a structured learning plan and continue to stay updated with trends to stay relevant in this rapidly evolving field.

Muhammad Afif Haziq bin Zulkhairi

I hope that I can learn the necessary skills and knowledge required by software engineers by entering this course. As for design thinking, the 5 step process of design thinking can help me to solve problems that I may face as a software engineer in the future. The 5 step process of design thinking requires me to gather information for the problem that I have to solve and design the solution based on the information that I have gathered. Lastly, I have to keep my skill and knowledge updated with the current technology, programming language and industry trend. I also have to hone my programming skills and have a deeper understanding of fundamental concepts related to programming. In addition, I also need to improve my soft skills so that I can have a good communication with my colleagues.

4. Task for each member

Adam Azraei bin Ridza

- Prototyping

- Sketch interface

- Testing

Muhammad Arif Hakimi bind Mohd Sofi

- Writing Report

- Create questionnaire on google form.

- Testing

Muhammad Syukri

- Writing Report

- Sketch interface

- Testing

Muhammad Afif Haziq

- Writing Report

- Create questionnaire on google form.

- Testing