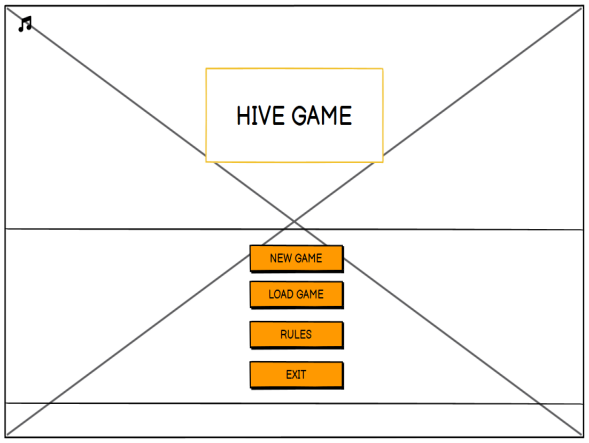
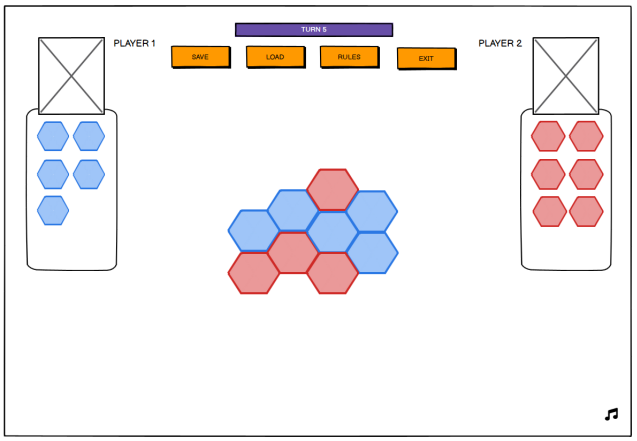
PROTOTYPE:

Design 1: By Hieu Tran

Start Up Menu:



Game Interface:

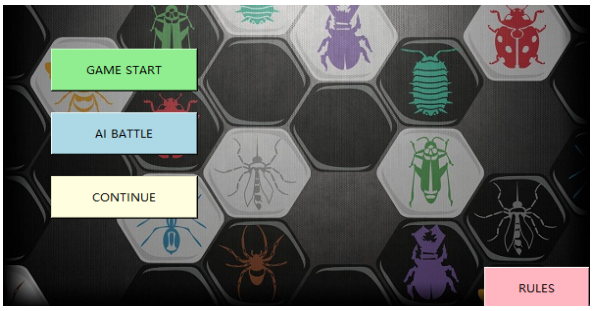


- ***Strength:*** The design prototype showcases several strengths that contribute to its usability and appeal. The reasonable button layout facilitates efficient navigation, while the inclusion of a music on/off button adds a bonus feature for customization. The consistent design of buttons, following the Gestalt principle of Similarity, aids in quick recognition and differentiation. The minimalist menu design eliminates unnecessary information, focusing on essential functions and maintaining a clean aesthetic. Collectively, these strengths enhance the user experience by ensuring intuitive interaction and a visually pleasing interface.

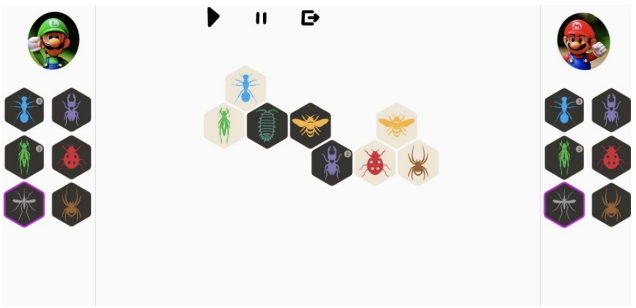
- ***Weakness:*** A significant concern is the potential accessibility issue arising from the small size of buttons and icons. This could make it challenging for users to interact with the game effectively and might pose problems for those with visual impairments. Additionally, the design does not sufficiently support users in the event of mistakes, such as moving the wrong pieces or error interaction with the opponent's pieces. This lack of user guidance can lead to confusion or frustration during gameplay. Lastly, the design lacks clear communication regarding the state of the game. Without visual cues indicating player turns or explicit indication of which player is active each turn, users might struggle to follow the game progress**.**

Design 2 : Zhaofeng Jiang

Start Up Menu:



Main Interface:

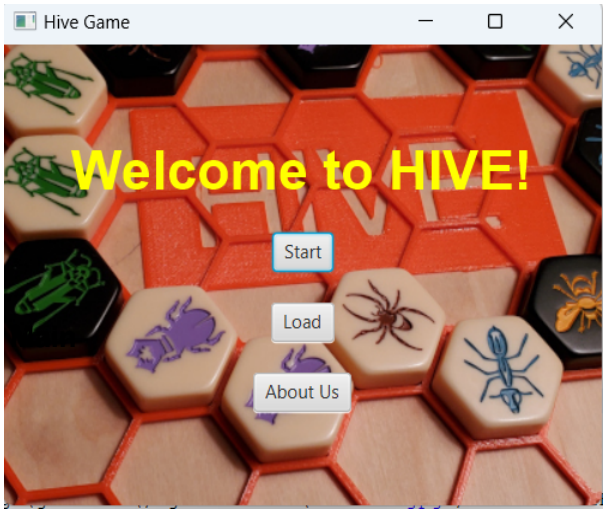


- ***Strength:*** The background image in the menu effectively introduces the Hive game to users, establishing an immediate recognition of the game context. The interface in the main game is intuitively designed, maintaining a high level of consistency that allows players to focus on the game without undue distraction. Further enhancing the user experience is the game's visibility of the players' status, which provides an easy understanding of the game progress. Finally, with the integration of familiar elements like save, pause, and exit buttons, the design significantly minimize cognitive load, making the functions immediately recognizable.

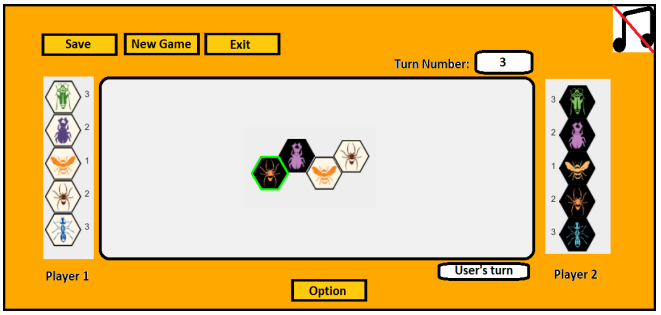
- ***Weakness:*** Despite having a basic design, the first prototype fails in a number of crucial areas of user interface design. Notably, it lacks essential features like settings, save/load choices, and exit capabilities, which negatively affects the navigation and overall user experience in the main game interface. The buttons' incorrect alignment in the menu demonstrates the interface's inconsistent design, which could confuse users. The prototype's use of colour does not follow good colour design guidelines in terms of visual design. The colour selections appear random and do not increase clarity, which is crucial for an interactive and understandable UI design. This problem carries over to the gameplay, where a lack of differentiation between the two players could make it unclear who is in charge of the game pieces.

Design 3: Aswin Budi Rahardja

Start Up Menu:



Game Interface:

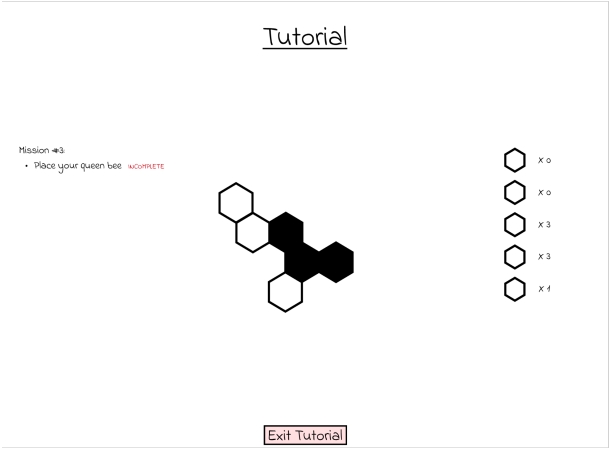


- ***Strength:*** It effectively employs the principle of metaphors from the real world, with familiar background images and button icons creating an intuitive environment for the users. The design also prioritises user freedom, offering the option to enable or disable game music according to individual preference. A key strength lies in its facilitation of recognition rather than recall, particularly when it comes to understanding game rules. It allows users to see the possible moves, reducing the cognitive load and enhancing the gameplay experience. Clear visibility of system status is another strength, enabling users to easily identify which pieces they are moving, their potential locations, and the current number of pieces each player has. Finally, the design maintains a high level of external consistency, conforming to traditional board game conventions.

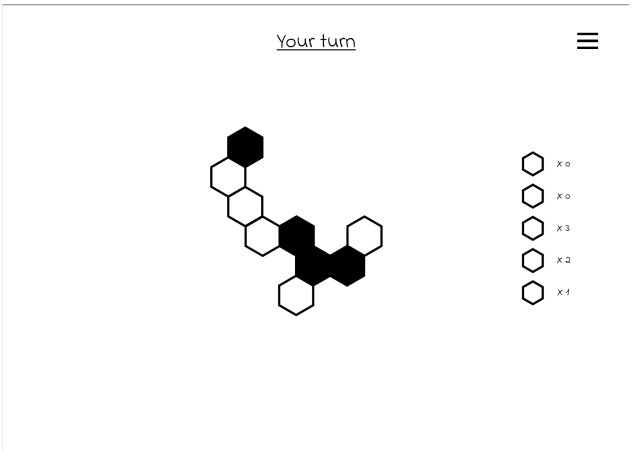
- ***Weakness***: Despite its advantages, the second prototype has glaring flaws that could negatively impact the overall user experience. The absence of a help function or documentation is a major problem because it makes it challenging for new players to become familiar with the game. The interface also exhibits a lack of consistency in button sizes, potentially leading to confusion or difficulty in navigation. Moreover, the button alignment lacks coherence, which is a violation of the Gestalt principle of similarity. Crucial buttons like Save, New Game, Exit, and Options, despite having the same colour and shape, are not grouped together, creating an inconsistent and potentially confusing user experience. These shortcomings highlight areas of improvement to enhance the design's usability and intuitive functionality.

Design 4: Kathy Cho

Tutorial Interface:



Game Interface:

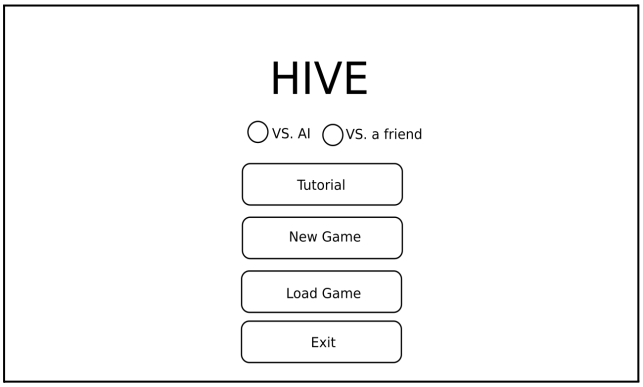


- ***Strength:*** The third prototype demonstrates various qualities in its user interface and user experience design by skillfully fusing interactive design with a minimalist approach. The availability of a thorough and understandable help manual, which gives new users simple instructions. The game's usefulness for new players is greatly improved by this feature. Flexibility and efficiency are emphasised in the design, demonstrated by the streamlined accessibility of several functions such as save, load, and exit, all under a single icon. This feature not only simplifies navigation but also reduces the cognitive load on the users. The design also succeeds in clear communication of the game's status. It effectively delineates user turns and uses contrasting colours to differentiate between two players or a player versus AI.

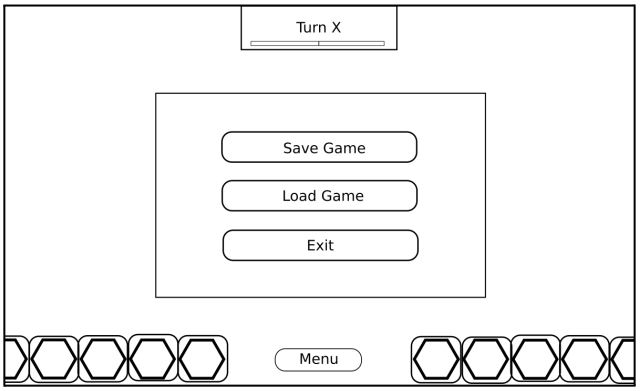
- ***Weakness:*** A notable issue is the lack of consistency, as the game only displays pieces for one player on the right side. This imbalance could confuse users and negatively affect their gaming experience. Moreover, the game interface is lacking in additional functional buttons that could enhance user interaction and experience. For instance, providing more detailed information like turn numbers could help users better understand the game flow. The interface also falls short in guiding users to recognize, diagnose, and recover from errors. This omission could lead to frustration or confusion, especially for new users or in instances where mistakes are made during gameplay.

Design 5: Andy Chen

Start Up Menu:



Game Interface:



- ***Strength:*** It places a high value on giving user control by allowing players to choose their opponents—whether artificial intelligence or another player—and thereby provide a customised gaming experience. The design maintains a simple style and a unifying concept, especially in the button layout and game mode display. The user interface is made easier to use and the game is easier to play because of this consistency. The design's adaptability and effectiveness stand out, as evidenced by the way many crucial operations like save, load, and leave are available through a single icon. This function dramatically reduces cognitive burden and streamlines game navigation, greatly simplifying the user interface and improving the user experience.

- ***Weakness:*** The design falls short in a lack of clarity with regards to the radio buttons for selecting which type of opponent to play against. They are not particularly close to any specific game mode, and could lead to some confusion as to what modes it applies to. The game interface also uses up a lot of vertical space, while the game does not naturally prefer a horizontal layout. This could lead to several pieces not appearing on the board at once, which would put a larger mental load on the players since they would need to rely on their memory for the whole game state.

Discussion on Final UI model:

Discussing the evolving of the final UI, the team carefully incorporated the best elements from each prototype and applied key design principles to enhance user experience and interaction. Kathy's design was chosen as the foundational framework for the final UI due to its favourable reception. Improvements were made to ensure balance and consistency by attaching playable pieces on both sides of the interface, inspired by Aswin's, Hieu's, and Jiang's designs. Andy's design contributed to enhancing user flexibility and control with the addition of a Load button and an option to choose the opponent at the start menu. Users have the option of enabling or disabling game music thanks to the integration of a little music icon from the prototypes created by Aswin and Hieu. Turn counter, a feature drawn from Andy's, Aswin's, and Hieu's designs, was included to provide clarity in game progress.

Furthermore, a pop-up menu, a feature initially implemented in Andy's design, was included in the main game interface for better navigation.

UI Design principles applied to Final UI:

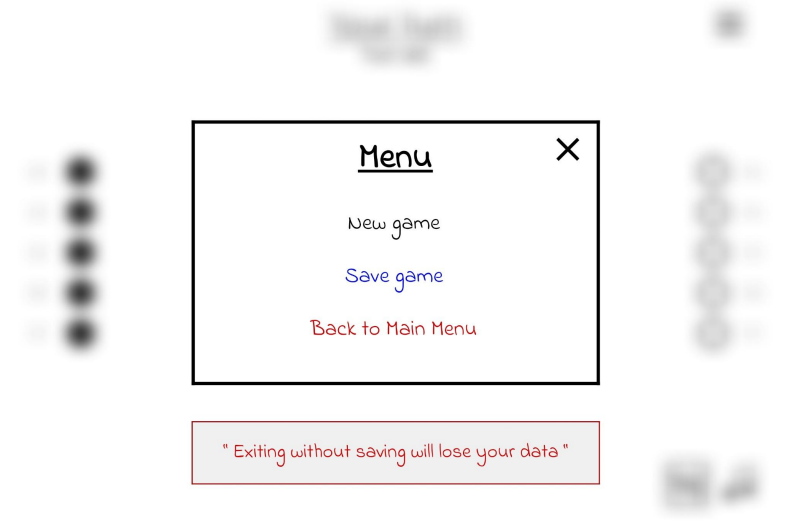
- **Colours for text (Colours theory and Text format)**
  - Indicate negativity, exit, help, etc
- **Help the user in Usability Heuristics:**
  - Pop up clear error/caution message with red and additional description of what a button does as hovering over the buttons
- **Efficiency:**
  - A menu bar on the top right of the gameplay interface to hide buttons that doesn't necessarily have to be visible every time.
- **Visual hierarchy (communicate the state clearly):**
  - Indicate the order of importance by using bold text, larger text, different colours
- **Proximity and Similarity from *Gestalt design principles*:**
  - Separate components (board in the middle, pieces on each side, title/stage indicator on the top centre, and small features like help and menu on corners so it won't distract user) from each other so they are easily distinguishable

Final UI:

Start Up Menu:

Game Interface:

In Game Menu:



DESIGN PATTERNS:

1. Flyweight

The flyweight pattern was used for the game pieces, implemented in the class PieceFlyweight. A piece's extrinsic state is its position, as long as the game that it belongs to. The intrinsic state of each piece is what kind of piece it is. The flyweight pattern was used due to the duplication of images needed for each piece to draw itself. This would cause the same image to be stored in memory up to six times in the case of the Ant and Grasshopper pieces.

2. Factory method

We used a factory method on the buttons used to create the pieces, implemented as the getPiece method in the PieceButton abstract class. Each game piece differs from the other game pieces in type alone, without any distinction between pieces of the same type. For this reason a Prototype would not have been beneficial to use. Using a factory method allows for the game to ignore what kind of piece has been selected for placement and perform the exact same operation when the player decides to put a piece down.

3. State

To determine the appropriate responses to inputs, the State pattern was used in the UI. The BoardPanel class contains a field that holds a BoardPanelState. The three currently implemented states are MoveState. PlaceState, and SelectionState. The BoardPanel adds each state as its handler for mouse events, as different states have different responses to clicks. Additionally, each state is able to draw an additional overlay onto the game board to give additional information, such as displaying legal moves. By using the State pattern, the BoardPanel (or some other mouse handler) does not have to support several different codepaths for determining what to do with each input.