Big 2 Mobile Companion Application Proposal

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Introduction

Mobile computing has revolutionized how we use technology, with the ability of users to perform complex tasks on the go. User interfaces (UI) and interaction approaches play critical parts in making sure mobile apps are intuitive, efficient, and fun to work with. The purpose of this project is to create a full stack mobile application for Android to simplify playing and tracking scores of the *Big 2* card game, particularly when played with real money. The *Big 2* game involves complex scoring rules, and this gets especially complicated when money is involved. It is time-consuming and error-prone to manually compute payouts after each round or game. Our application will do the computation for them, providing players with a seamless experience. The application is intended to be used alongside the physical card game, and will allow users to track scores, manage payouts, and customize gameplay settings, making it a must-have application for both casual and serious players.

Related Work

As a guide to informing our design and implementation, we referenced several research papers and existing applications on card game trackers, mobile UI, and performance. Below are four of our most important references:

1. ***Usability in Mobile Card Games* -** Mobile card game research places high emphasis on the need for clear UI/UX design to optimize player engagement. Studies indicate that touch responsiveness, visual feedback, and responsive layouts enhance user experience in mobile game applications. Well thought out UI components, such as drag-and-drop gameplay and gesture-based navigation, significantly improve usability and accessibility for players of varying levels of proficiency
2. ***Performance Considerations in Multiplayer Games*** – Real-time multiplayer mobile games face challenges such as latency, synchronization, and data consistency. Prior work explores methods to minimize server-client latency and optimize data

transmission for mobile multiplayer games. Findings suggest that implementing predictive synchronization algorithms can improve game fluidity, particularly in card games where quick decision-making is crucial

3. ***Energy Consumption in Mobile Gaming*** – Studies indicate that high processing demands in mobile games lead to battery overconsumption, reducing the device's efficiency. Literature recognizes frame rate control, efficient rendering, and intelligent background processing as techniques to extend battery life in mobile applications. Implementation of these power-reduction techniques can increase the longevity of gaming sessions with no compromise on the user experience

4. ***Automated Payment Systems in Gaming*** – Researchers have explored digital payment integration in mobile games in the context of microtransactions and in-game economies. It is explained how automated payout systems enhance user convenience and prevent calculation errors in game transactions. This research will be incorporated into the *Big 2* mobile app to offer seamless, accurate, and secure payout calculations from game outcomes

These studies underscore the importance of usability, performance, energy, as well as automated payments. This will guide our design and evaluation process.

Methodology

Our project will follow a structured methodology to ensure a comprehensive evaluation of the app's usability, performance, and energy consumption.

1. **Participants**:
   Eight participants will be recruited through the developer's associates to test the app during a game of *Big 2*. Recruiting participants who are already acquainted will help create a casual environment, simulating the app's most common usage setting. Both casual and experienced *Big 2* players will be recruited, and if there is an even split in experience levels, between-group comparisons may be considered. Two additional participants will also be recruited solely for exploratory testing of the app prior to the user study.

2. **Hypothesis**:

   We expect that our app will significantly reduce the time and effort required to calculate payouts and maintain scores for *Big 2*, without compromising usability and power consumption. As such, we expect a positive reception towards the app from participants.

3. **Testing Methods**:

   The participants will be divided into two groups of four, as this is the ideal number of players for the game. Each group of participants will play two rounds on a phone and two rounds on a tablet, in order to provide adequate time on the system and to evaluate the app's performance across different platforms. In total, eight games will be held in order to evaluate the app.

4. **Evaluation Design**:

   The following black-box techniques will be used to evaluate the app's most important factors, as highlighted in the literature review.

   - **Usability Testing**: Users will carry out a series of tasks, such as entering scores, calculating payouts, and configuring game options during the user study. We will be present to capture task completion time and user satisfaction using interviews after usage.
   - **Cross-device Testing**: The app will be tested on tablet and phone devices during the user study to ensure consistent user interface and experience.
   - **Behavioural Testing**: Each member will manually evaluate error-handling, state-testing, and end-to-end flow testing individually. Additionally, two testers will be recruited to run their own manual tests prior to the main experiment.
   - **Performance and Energy Consumption Testing**: We will use profiling tools in Android Studio to review the energy expenditure (CPU, memory, battery) of the application during gameplay and payout calculation. The app will also be tested on multiple mobile devices to determine responsiveness and computational pace.

Contribution Form

All team members will contribute equally to the project. Tasks will be divided as follows:

- Front-End Development: Create and build the user interface. *(Elif, Masooma)*
- Back-End Development: Create the scoring and payout calculation logic. *(Ryan, Dustin)*
- Testing and Evaluation: Conduct usability, performance, and energy usage tests. *(All Members)*
- Documentation: Create the proposal, final report, and user manual. *(All Members)*

Topic Description

The *Big 2 Companion App* will feature the following key components:

1. **User Interface**:
    - User Interface: Sleek and simple UI for scoring, tracking the game, and payout calculations.
    - Rules on how to play are laid out clearly on a separate view to be accessed through the Main Activity.
    - Customizable settings for games (i.e. player names, card values).
    - Ability to input scores for each round of a game during play.
2. **Back-End Logic**:
    - RoomDB will be utilized as the database to store Game/Round Data locally.
    - Automatic calculation of penalty points and payouts by following the game rules.
    - Real-time player scores and overall totals.
3. **Performance Considerations**:
    - Efficient algorithms to optimize score and payout calculation.
    - Minimized energy consumption via optimized code and background process management.
4. **Comparative Study**:
    - The app will be tested on multiple devices (phones vs. tablets) to evaluate its performance and usability across different platforms.

Conclusion

The *Big 2 Companion App* intends to enhance gameplay by making complex scoring and payout calculations easier. Through putting usability, performance, and energy efficiency first, we aim to create a tool that is practical and enjoyable to use for players. This venture will contribute to current literature on mobile app design and provide insightful ideas on the development of gaming apps.

References

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