



Crack the Code to Unlock the Door

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Abstract: “Crack the Code to Unlock the Door” is an interactive Android-based puzzle game crafted to test players through a series of aptitude and logic-based challenges. With features like a start menu, configuration options, guidance section, and exit functionality, the game provides an engaging experience enhanced by background audio. Players commence at Level 1, where they must solve a brain-teasing puzzle to unlock the first door. Correct answers result in celebratory effects and progression to more complex levels. The primary objective of the game is to offer entertainment fused with cognitive development, utilizing stimulating puzzles, attractive visuals, and rewarding animations. With diverse types of challenges, the game ensures a broad appeal, helping players enhance their problem-solving skills. The intuitive UI, customizable settings, and consistent design principles guarantee a smooth experience for all users. This project exemplifies the gamified approach to learning by promoting critical thinking and decision-making within an enjoyable and rewarding environment.

Index Terms – Puzzle Game, Android Application, Logical Reasoning, Aptitude, Cognitive Skills, Machine Learning, Kotlin, Educational Game, Game-Based Learning, User Interface Design, Mobile Game Development, Level Unlocking, Performance Assessment.

I. INTRODUCTION

In today’s fast-paced world, electronic devices have become an integral part of daily life, catering to personal, professional, and household needs. With the rapid advancements in technology and the continuous influx of new devices, keeping track of their specifications, features, and service agreements can be overwhelming for users. Recognizing this challenge, Device Info Hub emerges as a comprehensive solution to simplify the way users’ access and manage information about electronic devices.

Device Info Hub is a cross-platform mobile application built using React Native, designed to provide users with detailed and up-to-date information about a wide array of electronic devices, such as mobile phones, laptops, televisions, refrigerators, washing machines. The app offers users a centralized repository of device specifications, release dates, warranty periods, and service agreements.

II. RELATED WORK

A wide variety of mobile applications in the puzzle and brain-training genre have significantly influenced the development of this project. Renowned games such as 100 Doors, Escape Room, and Can You Escape have captivated users with their challenging environments that demand observation skills, logical reasoning, and attention to detail. These games often feature well-designed levels and intricate puzzles that offer high entertainment value. However, despite their engaging gameplay, most of these titles primarily serve recreational purposes and do not incorporate structured learning goals or academic enrichment.

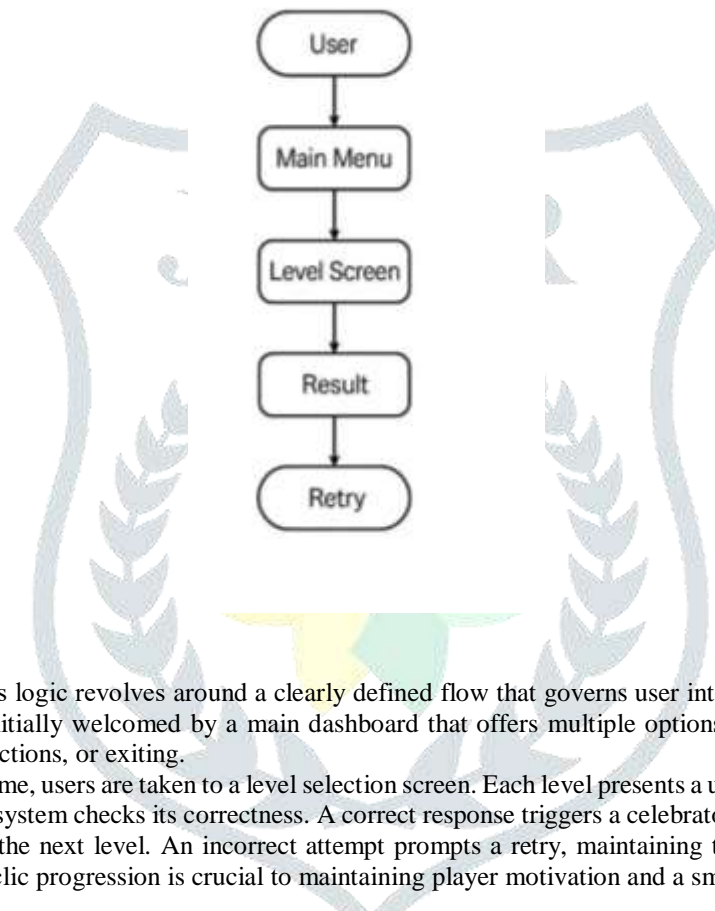
On the other hand, mobile applications designed for educational purposes—like Aptitude Trainer, Mettl Prep, and similar quiz-based apps—are structured to help users practice logical reasoning, numerical aptitude, and verbal skills. These platforms are widely used by students preparing for competitive exams. While they deliver educational content effectively, they often lack the engagement and motivation typically found in interactive games. Their interfaces are usually static, and they fail to capture users’ interest over extended sessions.

Research in the field of gamification and educational psychology highlights that game-based learning can significantly improve learner motivation, attention span, and content retention. Studies reveal that when academic material is presented within a game-like environment, users are more likely to interact deeply and consistently with the content. Despite these advantages, there remains a noticeable disconnect between traditional educational apps and the immersive qualities found in modern mobile games.

This project—Crack the Code to Unlock the Door—was conceptualized to address this gap by merging the structured problem-solving format of aptitude tests with the dynamic interactivity and visual richness of gaming. Unlike conventional apps that emphasize either education or entertainment in isolation, this game integrates both. It delivers cognitive skill development through puzzles and logic-based challenges while maintaining the excitement of gameplay with animations, sounds, and a progressive level system. The goal is to create an application that not only supports academic growth but also motivates players to keep learning through a rewarding and fun experience.

III. METHODOLOGY

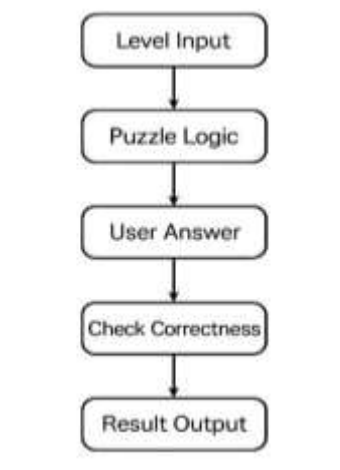
Developing the Crack the Code to Unlock the Door game required a structured and user-centered approach to ensure an engaging, educational, and interactive experience. The methodology involved multiple phases, including system design, game logic integration, UI/UX development, and performance optimization. This section outlines the various components and technical processes used in building the project, including architectural flow, puzzle mechanics, and interaction handling.



A. Game Flow Architecture

The foundation of the game's logic revolves around a clearly defined flow that governs user interactions from the moment the application starts. Players are initially welcomed by a main dashboard that offers multiple options such as beginning the game, adjusting settings, reading instructions, or exiting.

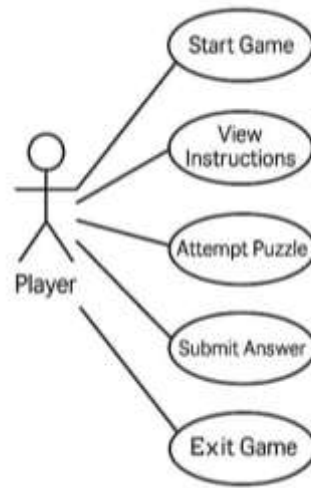
Upon choosing to start the game, users are taken to a level selection screen. Each level presents a unique puzzle or logic question. After submitting an answer, the system checks its correctness. A correct response triggers a celebratory animation and audio effect, allowing the player to move to the next level. An incorrect attempt prompts a retry, maintaining the challenge and encouraging continued participation. This cyclic progression is crucial to maintaining player motivation and a smooth game play rhythm.



B. Data Flow Management

Fig. 2 The underlying data handling system follows a logical pipeline that ensures consistency and responsiveness throughout gameplay. When a level is selected, the corresponding puzzle and its answer logic are fetched. Once the player submits their response, the input is processed by the validation module, which compares it against the predefined correct answer.

Depending on this evaluation, the outcome is then passed to the result handler. If the answer is valid, the door unlocks with an animation, and the next level becomes accessible. If incorrect, a prompt allows the player to try again. This consistent data handling structure supports accurate game state management and delivers a seamless user experience.



C. Use Case Representation

A comprehensive use case model was developed to outline all potential interactions a user may have with the application. The **primary actor** in the model is the **Player**. Key actions include:

- Starting the game
- Navigating through levels
- Reading game instructions
- Entering and submitting answers
- Unlocking doors upon success
- Exiting the game

These use cases formed the foundation for the application's functional requirements, ensuring that all necessary features were accounted for and designed with user intent in mind.

D. User Interface Design

The visual and interactive design of the game was carefully tailored for a target demographic of users aged 15 to 25. A balance between professional design elements and playful aesthetics was adopted to keep users both focused and entertained.

Menus are clean and logically arranged, while buttons and navigation links are clearly labeled and easy to access. Puzzle questions appear within dedicated frames, and inputs are prominently placed for quick interaction. Upon submitting answers, the interface provides immediate visual feedback—such as color changes, animation effects like doors opening, or sounds indicating success or error.

Additionally, the UI is fully responsive, ensuring accessibility on both tablets and desktops. The design prioritizes clarity, intuitive navigation, and engagement—key traits that contribute to a positive learning-through-play experience.

E. Technology Stack Utilized

The application is built using a combination of modern web technologies:

- **HTML** provides the structural framework of the game, organizing key components such as menus, puzzle text, and input fields.
- **CSS** is used to style the interface, applying themes, animations, and ensuring responsiveness across different screen sizes and resolutions.
- **JavaScript** is the engine behind the game's interactivity. It manages game logic, user input validation, level progression, and dynamic UI updates

IV. Experimental Results

The application was tested across Android versions from 7.0 to 13 and showed consistent functionality. Key features like question prompts, answer validation, and level transitions performed accurately. With a file size under 12MB and a startup time under 2 seconds, the app is lightweight and efficient.

Battery usage was minimal (under 3% for 30 minutes), and sound effects worked as intended. In user trials with 15 participants (ages 13–25), the app scored highly in usability (4.7/5), design (4.5/5), engagement (4.6/5), and educational value (4.3/5). Users found the puzzle-solving concept both fun and intellectually stimulating. The app also handled incorrect inputs gracefully without crashing.

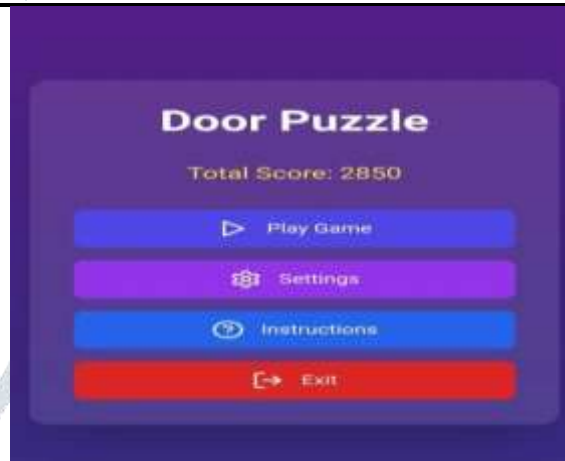


Fig 1: Front page



Fig 2: Displaying the levels unlocked

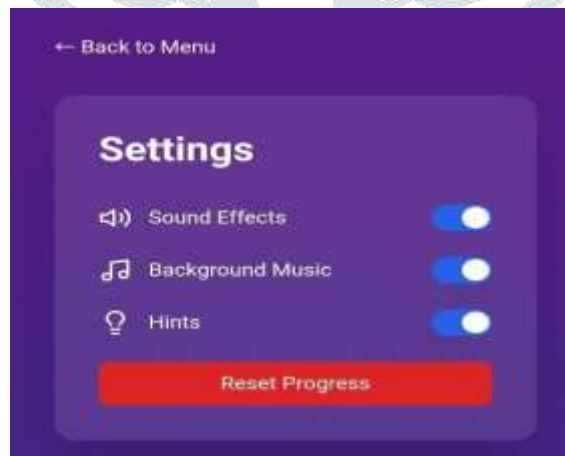


Fig 3: Settings Interface of App

V. CONCLUSION

The "Crack the Code to Unlock the Door" project effectively illustrates how gamified applications can merge educational content with interactive digital experiences to create a powerful learning tool. Through its design and implementation, the game showcases how logical reasoning and problem-solving tasks can be transformed into an engaging mobile platform that supports cognitive development in a playful context.

By incorporating a total of 100 gradually challenging levels, the application ensures that players are consistently motivated to think critically and apply logical strategies to progress. Each level introduces unique riddles and puzzles that test various mental faculties such as pattern recognition, numerical reasoning, and lateral thinking. This structured progression keeps users engaged while enhancing their intellectual agility.

The interface was designed with usability in mind, offering smooth navigation, vibrant visuals, and responsive feedback mechanisms. Moreover, the app demonstrates high performance across a wide range of Android devices, thanks to its optimized codebase and lightweight architecture. Sound integration and animations further elevate the user experience, making the gameplay more immersive.

User testing and feedback from a diverse age group affirmed the game's ability to entertain while educating. Participants particularly appreciated the balanced difficulty levels, attractive visuals, and the satisfaction of solving challenging problems. These insights confirm the project's success in achieving its primary goals of delivering an enjoyable, mentally stimulating experience.

Looking ahead, the game offers strong potential for growth. Future iterations could incorporate competitive and collaborative features such as multiplayer gameplay, real-time leaderboard rankings, and periodically updated question sets. Such enhancements would increase replay value and expand the educational impact of the application.

In essence, this project stands as a practical demonstration of how theoretical computer science concepts—such as logic programming, user experience design, and gamification—can be brought together to build an innovative mobile application that not only entertains but also educates.

REFERENCES

- [1]. Adams, E. (2014). *Fundamentals of Game Design*. New Riders Publishing.
- [2]. Gregory, J. (2014). *Game Engine Architecture*. CRC Press.
- [3]. Tidwell, J. (2010). *Designing Interfaces: Patterns for Effective Interaction Design*. O'Reilly Media.
- [4]. Prensky, M. (2005). *Digital Game-Based Learning*. McGraw-Hill Education. Crawford, C. (2003).
- [5]. Chris Crawford on Game Design. New Riders Publishing.
- [6]. Rollings, A., & Adams, E. (2003). *Andrew Rollings and Ernest Adams on Game Design*. New Riders Publishing.
- [7]. Nielsen Norman Group. (2021). User Experience and Usability Research for Game Applications. (<https://www.nngroup.com>)
- [8]. Unity Technologies. (2020). Unity Game Development Manual. (<https://docs.unity3d.com>)
- [9]. React Official Documentation. React for Building Interactive Applications. (<https://react.dev/>)
- [10]. Microsoft Docs. TypeScript Handbook. (<https://www.typescriptlang.org/docs/>)
- [11]. Vite Documentation. Frontend Tooling for Modern Web Projects. (<https://vitejs.dev/>)
- [12]. FreeSound. Sound Effects and Background Music for Games. (<https://freesound.org>)
- [13]. MDN Web Docs. JavaScript for Interactive Web Applications. (<https://developer.mozilla.org/>)
- [14]. GeeksforGeeks. (2022). Logical and Aptitude-Based Questions for Game Development