



# Feasibility and Application of Gal Game on Virtual Reality

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**Abstract.** In recent years, the field of virtual reality (VR) technology has undergone rapid development, leading to notable advancements in VR games. The market has witnessed the emergence of numerous VR games since 2016, among which Gal Game has gained prominence with its adaptation for VR devices. This paper aims to delineate the distinctive features of Gal Game and its target demographic. It seeks to elucidate the factors contributing to the sluggishness observed in the Gal Game market in recent years and explores the current integration of Gal Game into various Anime, Comic, and Game (ACG) mobile games. Furthermore, this paper outlines the unique characteristics of VR Gal Game and highlights its advantages compared to traditional Gal Games. Additionally, it undertakes an analysis of existing issues related to VR Gal Games and proposes potential solutions to address them. In conclusion, a summary of VR Gal Game is provided, along with a prospective outlook on its future.

**Keywords:** virtual reality, three dimensional (3D) games, immersive experience, gal game

## 1 Introduction

Virtual reality is a cutting-edge technology that emerged from computer science in the 20th century. It utilizes computer simulations to create an immersive 3D world, providing users with simulated senses like sight, sound, and touch. Within this virtual environment, individuals can observe and interact with real-time and 3D objects [1-3]. Since 2016, VR technology has undergone significant advancements and has been widely implemented across various industries such as education, healthcare, construction, machinery etc., with electronic entertainment being one of its most mature applications at present.

The fundamental characteristics of virtual reality encompass three key aspects:

- a) Immersion: By utilizing specialized equipment, users are capable of immersing themselves in a virtual environment and experiencing a profound sense of presence within that particular setting.
- b) Interaction: Through the implementation of sensors or object detection algorithms, users can actively engage with and manipulate objects present in the virtual realm.

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c) Imagination: The authenticity and real-time interactivity offered by the virtual environment enable users to establish connections and associations with elements existing within their immediate surroundings [4].

Among the various types of games, there exists a genre with immense potential for VR technology application - Gal Game. As one explores different game genres, it becomes evident that Gal Games hold great promise for the application of VR technology. This is primarily because they have the potential to offer players an unmatched immersive experience, allowing them to truly feel present within the virtual world (Fig.1). Furthermore, this type of game is primarily a narrative-driven visual novel, making it an ideal template for various genres of games, particularly those that emphasize storytelling.



**Fig. 1.** Screenshot of game ATRI-My Dear Moment [5]

However, Gal Games constitute a relatively small proportion of the current gaming market, even within the non-VR gaming market where there is a limited selection of such games available. This genre exhibits greater prevalence in the game markets of Japan, China, and South Korea, particularly in regions where the "ACG" culture thrives [6].

As previously mentioned, the study of the Gal Game genre extends beyond this particular type of game. Currently, popular games on the market such as the adventure ACG Game Genshin and the text reasoning game Ace Attorney incorporate elements of Gal Game performance in their gameplay. Addressing the current insufficiency in literature regarding the integration of VR technology and Gal Game, this paper conducts an analysis on the challenges associated with VR Gal Game and proposes corresponding solutions.

## 2 The characteristic of Gal Game

The genre known as Gal Game encompasses interactive video games and animated visual novels that showcase attractive female characters. While most Gal Games fall into the visual novel game (VAG) category, there are also alternative versions with interactive elements. Gal games is a distinctive aspect of Japanese culture, with limited comparable offerings in the American or European video game industry [7,8]. These games

have significantly dominated the Japanese market and were previously a staple in PC gaming within Japan. In recent times, this unique cultural trend from Japan has gained popularity in China and South Korea as well [9]. The main characteristic of Gal Game can be summarized as follows.

- Narrative and character design

The seamless integration of narrative and character design is a prominent feature in Gal Games. This genre offers players a multi-linear story development, allowing them to shape the storyline through various choices and form emotional connections with different female characters. Such game design encourages deep immersion in the complex emotions portrayed while also increasing re-playability.

- Exceptional gameplay mechanics and artistic style

Gal Games are known for their exceptional gameplay mechanics and artistic style. These games often incorporate unique gaming mechanisms, such as time jumps and alterations to the world line, which heighten excitement and stimulate imagination within the game's narrative. Additionally, Gal Games showcase distinctive graphics and music that utilize high-quality illustrations and voice actors, providing players with an exceptional visual and auditory experience.

- Target group - predominantly male

The primary player demographic for Gal Games used to be predominantly male. However, there has been a recent increase in the number of female players, although they still remain a minority within the game's user base. Gal Games, which originated in the 1980s, are comparatively simpler from a technical standpoint when compared to other games. Due to their focus on content rather than heavy reliance on technical aspects, many game studios and individuals have ventured into creating their first Gal Game. The interactivity and multi-threaded storyline featured in Gal Games surpass those found in pure novels [10].

- The gameplay relatively simplistic

Compared to console games and online games, the gameplay of Gal Games is relatively simplistic, which can lead players to experience fatigue and boredom during gameplay. In today's era where various 3D games are gaining popularity, the appeal of Gal Game can't be compared to other types of games. Additionally, the user base for Gal Games has gradually declined as male players, who constitute the primary audience, have shifted their preferences towards First Personal Shooting (FPS) games like CS: GO and Multiplayer Online Battle Arena (MOBA) games such as League of Legends. The intensification of competition in the Gal Games market poses challenges in attracting new users. Moreover, Gal Games rely on a single revenue model with limited profit potential. The primary sources of revenue for these games are game sales and merchandise; however, given the growth of the digital economy, these sources have become insufficient. Consequently, developers face difficulties in generating adequate profits from Gal Games, leading to reduced investments in this genre [9].

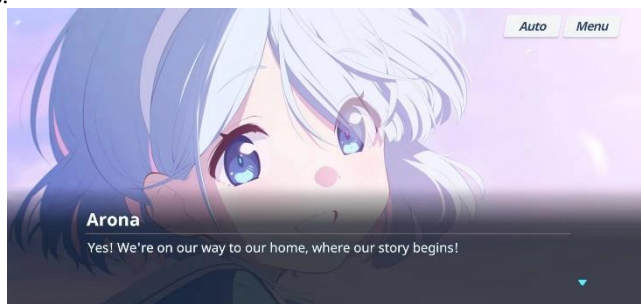
### 3 The Decline of Traditional Gal Games

With the advent of game engines in the 21st century and the growing popularity of mobile phones, traditional Gal Games have witnessed a decline.

Integrating games into mobile platforms has emerged as a prominent trend in the gaming industry. With the widespread adoption of smartphones and advancements in mobile networks, the market for mobile games has witnessed exponential growth. The inherent advantage of mobile games lies in their ability to capitalize on fragmented user time, offer a more convenient gaming experience, and generate increased revenue through in-game purchases and advertising opportunities. This presents a significant opportunity for Gal Game to expand its reach and enhance its revenue stream; however, it comes at the cost of compromising extensive textual content required for narrative storytelling. For instance, within the titles like *Fate/Grand Order* (2015) and *Blue Archive* (2021) only account for 50% Gal Game genre.

Despite the current downturn in the traditional Gal Game industry, its gameplay and storytelling methods offer significant convenience by minimizing the need for extensive production of CG cut scenes. Instead, a multitude of illustrations can effectively convey the narrative, resulting in substantial time and cost savings for game manufacturers. Consequently, this storytelling approach has been adopted by other games as well, particularly those within the ACG culture.

For instance, in the mobile game *Blue Archive* mentioned earlier, except Live2D is utilized at the end of each chapter while character drawing and dialog boxes are employed throughout the plot narration process to convey character dialogue (Fig.2). A plethora of illustrations are also incorporated to fully depict the story of High Schools in “Kivotos”. With only a few key plots utilizing voice actors' dialogue, sound effects replace most of it. This narrative approach unique to East Asian manufacturers may not be as extravagant as that used by American and European game makers with their numerous cutscenes but still manages to effectively showcase a rich storyline using minimal resources.



**Fig. 2.** Screenshot of Mobile game Blue Archive [5]

## 4 Performance of Gal Games ported to VR devices

Compared to traditional games, the most prominent characteristic of VR games is their ability to provide an immersive experience. In VR games, players can fully immerse themselves in a virtual world and perceive an environment that is completely distinct from reality. By utilizing advanced image processing technology, VR games deliver astonishing visual quality and depth-of-field effects. Furthermore, in terms of audio, VR games also offer highly realistic experiences. The implementation of sound systems and surround sound technology allows players to sense sounds coming from all directions, further enhancing immersion. Additionally, through the use of gamepads, gloves, and other devices, players with objects within the virtual world.

Manufacturers of Gal Games will also develop products to keep pace with this technological revolution. One notable title is VR *kananojo*, which was released in 2016 by game company Illusion. Diverging from traditional games that rely on a mouse and keyboard for character interaction, players can employ a gamepad to engage with the character while utilizing a head-worn VR device to observe the surrounding environment in 360°. Furthermore, the sound system enhances an immersive experience that distinguishes it from conventional games.

## 5 Problems of VR *kananojo* on VR platforms

Undoubtedly, being a VR game that emerged during the so-called “first year of VR”, this game inherently possesses an experimental essence in terms of both VR gaming and immersive experiences.

The first issue that arises is the problem of clipping. When the player intends to engage in “deep communication” with the virtual character, their vision camera inadvertently penetrates through the model of the virtual character, revealing internal anatomical structures such as teeth and eyeballs. Consequently, what was initially a love game instantaneously transforms into a horrifying experience akin to a horror game. The example shown in Fig. 3, the screenshot shows clipping, the player's model overlaps with the character's model. This sensation poses a significant threat to VR games as it undermines the immersive experience they are designed to provide, while also shattering any sense of romance or desire by reducing this virtual girlfriend to mere data, dots, and codes [11].



**Fig. 3.** Screenshot of game VR kananojo [5]

The second issue lies in the excessive rigidity of virtual characters' actions, resulting in a procedural game process that lacks authenticity and significantly undermines the comparative advantages of VR games over traditional ones. When a VR Gal Game is limited in its use of text to advance the story through dialog boxes, this design choice can result in overly rigid game characters. Additionally, there are instances where player actions exceed the boundaries set by the program, rendering certain interactions impossible to complete. Consequently, this significantly detracts from the overall gameplay experience.

Moreover, the price of up to 5,000 yen (about 35 USD in 2016) has also discouraged certain players. The high pricing led to elevated expectations for the game, and the final product deviated significantly from players' initial imaginations, thereby contributing to the game's poor reception upon release.

Overall, the game's cultivation system and narrative fail to captivate players. The price is prohibitively high, which fails to deter players. Despite being criticized for its shortcomings, the game achieved success due to its initial strong interactivity and extensive freedom of exploration. However, VR Kananojo's success has also brought to light certain issues that have made many people recognize the limitations of Gal Game on VR platforms.

## **6 Performance and problems of the new generation VR Gal Game**

After the release of VR Kananojo, there was a scarcity of VR side Gal games, and their quality varied greatly. Nevertheless, amidst these works, one can still discover some

exceptional products. For example, the VR game *Teasing Master Takagi-san VR* is an immersive experience based on the popular manga and anime series.

The original work has gained immense popularity, with the manga selling over 8.2 million copies in Japan and being adapted into two anime seasons and a film. Capitalizing on its widespread acclaim, Shogakukan and Kayac have developed two VR games based on the series. In these games, players assume the role of Nishikata, the protagonist from the manga, as they engage in interactive experiences with Takagi-san, the female lead character. In the game, the player will play the role of Nishikata, the manga hero, and interact with the heroine Takagi-san to experience the school life and small love story in the original books.

The first work was released in 2020, followed by the second one in 2021. It has been four years since the release of *VR Kanojo*, during which significant improvements have been made to address model-related issues. This game is suitable for all age groups and ensures that virtual characters engage in appropriate interactions.

Of course, as a VR work aimed at fans, the game's main drawback lies in its brevity of the story flow. Each game can be completed within a matter of minutes. Furthermore, every mini game included in the experience is overly simplistic to engage with.

## 7 Pure Gal Game problem solution

In order to address the issues encountered in VR Gal games like *VR Kanojo*, this paper proposes the following suggestions:

Firstly, developers can incorporate collision models for the player to rectify the problem of clipping. Similar to first-person games played on conventional devices, creating a physical collision volume for the player can effectively alleviate this issue.

Furthermore, improving the Artificial Intelligence (AI) and behavior systems of characters can significantly enhance gameplay in VR Gal games. Developers should prioritize the creation of dynamic and responsive characters that authentically display emotions and reactions. This may involve developing sophisticated dialogue systems that enable players to engage in meaningful conversations with virtual characters or designing intricate decision-making algorithms that adapt based on player choices.

The integration of interactive elements and environmental components has the potential to significantly enhance the level of immersion and interactivity in VR Gal games. By enabling players to manipulate objects or interact with their surroundings through hand gestures or controllers, it effectively amplifies immersion and provides a more captivating gameplay experience.

The smoothness of gameplay in VR Gal games ultimately depends heavily on performance optimization. It is crucial for developers to prioritize the implementation of effective resource management strategies, such as utilizing level-of-detail rendering or occlusion culling techniques. These approaches are essential for maintaining consistently high frame rates, even during demanding scenes.

## 8 “Gal” mode application

While playing the game, it looks like provides a traditional Gal Game experience through the use of a VR device. Takagi-san's actions and positions are limited in the game, with more emphasis on phonetic character representation. The player can engage in voice interactions when initiating or completing various actions. This gaming experience closely resembles interacting with a 3D modeled "character drawing" within a VR device. It is not a favorable experience to have this type of narrative progression as the primary gameplay mechanic. The player-character interaction is severely lacking, and the significant investment in modeling for VR game development significantly hampers the overall gaming process. This misalignment contradicts the attributes of low development difficulty and minimal capital investment typically associated with Gal Game genre itself. Consequently, VR adaptations like VR Kanojo and Teasing Master Takagi-san VR are seems unsuitable for porting to virtual reality devices.

The utilization of this dialogue model to advance the narrative has been employed in other games thus far. For instance, in miHoYo's games Genshin Impact and Honkai Impact 3rd, character models solely execute simplistic actions such as hand gestures, head movements, and expressions of enthusiasm while progressing through non-critical scenarios. In Genshin Impact, there are changes in camera angles; however, the character models still employ uncomplicated motions and sound performances to propel the story forward. These straightforward actions are pre-programmed within the game but can also be triggered by players upon regaining control. By utilizing this game mode to progress the narrative, developers can effectively reduce costs associated with creating cutscenes and streamline development time, while simultaneously providing players with a swift comprehension of the storyline.

Naturally, there are limitations inherent to this game model. Firstly, it is not well-suited for “Western style RPG”, such as The Witcher, which prioritize character authenticity. Implementing this game mode would only result in rigid and robotic game characters. "Western style RPG" necessitate captivating action to drive the narrative forward. Secondly, the dialogue mode of Gal Game should not be excessively lengthy. Similar to reading a book, if a paragraph is too long, it risks losing the reader's interest. Likewise, if the dialogue stretches on for too long in-game, players may simply skim through the text and lose interest.

## 9 Conclusion

By utilizing virtual reality technology, individuals are not only confined to the physical realm but also have a desire to explore the virtual space. Games, as an intermediary between reality and virtual reality, play a crucial role. However, games are more than just mere technical competitions and power struggles; they require stories as the spiritual essence of the game. This paper discusses the drawbacks of VR Gal Games by analyzing both traditional Gal Games and current VR Gal Games. While it may not possess the same level of excitement as action-packed games, for a narrative-focused genre, Gal Games excel in propelling the story forward. Employing this format to



advance the plot not only allows for swift storytelling but also saves project costs. The following will be summarized and projected from two perspectives.

The future development of VR Gal games holds immense potential for the gaming industry. With advancements in virtual reality technology, these games are expected to offer a more immersive and realistic experience for players.

One aspect that could be explored is the integration of AI into VR Gal games. This would enable characters within the game to have more lifelike behaviors and interactions with players, enhancing the overall gameplay experience. AI-powered characters could adapt their responses based on player actions, making each playthrough unique and engaging.

Furthermore, developers can focus on expanding the customization options available to players in VR Gal games. By allowing users to personalize their character's appearance, personality traits, and even voice acting choices, it would create a sense of ownership and deeper connection between players and their virtual companions.

In conclusion, the future development of VR Gal games has vast possibilities waiting to be explored. Besides, incorporating Gal Game mod applications across different ACG game types offers an opportunity for gamers to engage more deeply with characters and storylines while providing developers with a platform for creative experimentation that caters to varied player preferences. As this trend continues evolving, we can expect even more innovative ways for players to emotionally connect with virtual worlds through immersive experiences.

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