

# Towards an Augmented Reality Game for Learning about Ivan Vazov's Literary Works

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**Abstract.** This paper presents a concept for a serious game based on an augmented reality representation of a mural artwork located in the National Library “Ivan Vazov” in Plovdiv, Bulgaria. The mural features the renowned Bulgarian author Ivan Vazov in the center, surrounded by characters from his literary works. By using a head-mounted display in front of the mural, the players would see movement of the characters and will be able to interact with them in a gamified augmented reality environment. The serious game proposed in this paper offers a solution to the engagement of players with literature and textual heritage within a broader cultural context.

**Keywords:** Serious Games, Plovdiv, Cultural Heritage, Ivan Vazov, Augmented Reality.

## 1 Introduction

Serious games (SGs) are defined as “games that do not have entertainment, enjoyment, or fun as their primary purpose” (Michael & Chen, 2006) and are often applied as a tool for engaging in game-based learning – a particular employment of SGs aimed at achieving knowledge acquisition. Games for cultural heritage contain an educational purpose but also aim to promote awareness and appreciation of the tangible and intangible cultural heritage and to support its preservation and reproduction (Laamarti & Eid, 2014).

Augmented reality (AR) is defined as a system that “enables an enriched perspective of the real or physical world by superimposing virtual digital objects in real time” (Casella & Coelho, 2013). Augmented reality enhances a user's perception of and interaction with the real world. The data displayed by the virtual objects is not readily available in the reality layer and the user cannot perceive it with his/her physical senses (Azuma, 1997).

The scope of this paper is to present the concept of an Ivan Vazov-themed AR serious game (ARSG), which includes a description of the ideas and goals of the game, cultural domain-specific information, and identification of its core audience and design details and constraints.

## 2 Objectives of the Creation of the AR Serious Game and Expected Impact

In the building of the National Library “Ivan Vazov” (NLIV) in Plovdiv, Bulgaria is located a large mural (Fig.1), painted by three renowned artists-monumentalists: Yoan Leviev, Georgi “The Elephant” Bozhilov and Hristo Stefanov. The mural depicts the literary author Ivan Vazov, often called “the patriarch of Bulgarian literature” (Terziev & Vasileva, 2023), together with characters from five of his works: “Uncles”, “Under the Yoke”, “Ivan Alexander”, “Careerists” and “The Epic of the Forgotten”.



Fig. 1. Mural triptych at the National Library “Ivan Vazov”.

By using the mural as the basis of an Ivan Vazov-themed ARSG, there is a potential to engage players and impart knowledge in several areas:

- Literary – Ivan Vazov’s works and his biography.
- Historical – the chosen works by Vazov take place in a wide historical range spanning from the Middle Ages, through the Bulgarian National Revival and the fight for liberation from Ottoman rule, to the post-liberation period.
- Artistic – appreciation of mural art and its value, a very prominent but often neglected feature of the city of Plovdiv (Chulova-Markova, 2007). The work of the Plovdiv muralists in the city is considered to be a new step in the development of contemporary Bulgarian monumental and decorative painting (Stefanov, 1986). The proposed ARSG will inform players of the value of mural art in Plovdiv and encourage active participation in its preservation.
- Intangible cultural heritage – the language used by Vazov in his works is predominantly Old Bulgarian adhering to spoken dialects. There is also ample opportunity to involve other manifestations of intangible cultural heritage in the proposed game, such as crafts and folklore traditions, music and dance.

The ARSG’s educational purpose will be combined with promotion of the resources offered by the library. Its digital collections will be involved in the game – a chance to raise the usage and popularity of these resources. For instance, the digitized first editions of Ivan Vazov’s works uploaded in the NLIV’s Digital Library (NLIV, n.d.) will be incorporated in the ARSG.

Furthermore, by getting a better understanding of the mural, library visitors will further familiarize themselves and connect with the library space. Overcoming “library

anxiety” is one of the reasons for bringing SGs into libraries – to create a more approachable environment (Walsh, 2014).

The literature review concerning AR-based serious games revealed that the application of this technology for gamification in the field of literary cultural heritage is scarce. An example of a realization in this field is Bram Stoker’s Vampires (Haahr, 2015) – a location-based outdoor AR serious game, which showcases the life and literary works of the famous author of Dracula.

### **3 Game Characteristics and Player Interaction. Design Constraints**

The ARSG would use the mural in the library’s second floor lobby (Fig. 1), which features the renowned Bulgarian author Ivan Vazov in the center, surrounded by characters from his literary works. By using a mobile device such as a smartphone or a tablet, or by wearing a head-mounted display (HMD) which incorporates video see-through coupled with handheld controllers, the players standing at a certain distance in front of the mural would see movement of the characters and will be able to interact with them. An enlivening of the depicted scenes from Vazov’s literary works will occur.

The artistic style of the mural is modern, laconic, featuring flat colors and simplified shapes, which will be transferred to the game as a 2D approach to the graphics.

In terms of gameplay, Djaouti et al. make a distinction between two broad approaches to its design: ”play-based” – characterized by a greater degree of freedom and creativity with lack of any predetermined rules to define goals; and “game-based”, which incorporates specific goals, established at the stage of the game design and conditions for winning or losing the game (Djaouti, Alvarez, & Jessel, 2011). Regarding the Ivan Vazov-themed ARSG, the "game-based" approach to gameplay is preferable due to the specific time and complexity limits imposed by the game's intended employment in an institutional setting. The development of games meant to be played at home differs from those intended for public venues. Because the player has more time to grasp the game's objectives and mechanics, a game built for home use can be more complicated. A gaming platform located in a fixed location in the institution is likely to have constraints for the duration of a single interaction, and the player should be able to begin the game without the need for extensive instructions in order to avoid waiting (Mortara, Catalano, Bellotti, Fiucci, & Houry-Panchetti, 2014). Taking this into account, and because the ARSG will be played locally in the library building, it should strive for brevity and rule simplicity.

Djaouti et al. distinguish between 10 primary rule patterns concerning the ways in which in-game entity manipulation could be accomplished (Fig. 2). The first three rule patterns are concerned with stating goals, while the others are defining the means and constraints to reach these goals (Djaouti et al., 2011):

When designing the Ivan Vazov-themed ARSG, special consideration must be given to the ethical aspects of gamification, because an important obligation of SGs is to foster the evolution of the player’s virtues. SGs can and ought to use their language and

simulation capacities to create situations that provoke players to engage in moral reflection of history, culture and society (Sicart, 2011). Furthermore, the game would be available to an underage audience and themes such as violence and inappropriate language must be handled with utmost care. Avoiding aggressive activities means that the rule patterns “destroy” and “shoot” (Fig. 2) would be omitted entirely, and if not, they should be given very serious consideration and used in a non-violent way.

A significant design constraint will be the library location, where the ARSG will be employed – the mural is located very close to the largest reading room, and therefore, all audible information should be transmitted in a manner that does not disturb quiet areas. The ideal way to play the game would be with a handheld device or HMD together with headphones for sound perception.

Keeping all the design restrictions in mind, the SG should not diminish the fun factor. Regardless of how serious the game is, it must remain enjoyable; otherwise, the game's serious objective will not be realized, despite the fact that it was developed with the utmost care (Laamarti & Eid, 2014).



Fig. 2. Primary rule patterns.

#### 4 Identification of Potential Audience

The game will be freely available to anyone willing to play, therefore the potential users will be persons who come to the library, such as regular patrons and visiting groups from schools and universities. The expected age range of most of the game's players would be from late childhood to mature age. Therefore, the ARSG's content and difficulty must be adjusted accordingly.

#### 5 Gameplay, Narrative and Domain-Specific Knowledge

The game will be divided into levels, which will correspond to each of Ivan Vazov's literary works depicted in the mural's sections. The levels will follow one after the other with increasing complexity and difficulty. The figure of the writer Vazov will be used as a logical link to bring the narratives together, for instance by giving the player tasks to accomplish in each game section.

The narrative of each level will be based on the corresponding characters and literary works. In the case of Rada Gospozhina from the novel *Under the Yoke*, the player must help her pupils pass their exam despite Kiryak Stefchov's attempts to sabotage them. This scenario would provide an engaging and educational way for players to learn about the history and characters of the novel, while also testing their logical and strategic

thinking and decision-making skills in a context that focuses on leadership and personal growth.

The main game mechanic will be logical tasks such as guessing and rearranging words and sentences, and completing mini-game puzzles with the aim to advance the level's narrative. Other than completing the levels, the player can collect hidden and hard-to-get items, not mandatory for the completion of the game, which will reward the player with additional cultural heritage-related information and interesting trivia.

The game will be developed using the Unity game engine combined with its AR Foundation (Unity Technologies, 2023) package, which has a number of advantages such as "large asset store, wide variety of platforms to which it can port, as well as Unity's simple and inexpensive license" (Bucher, 2017). The entire game will be developed in a 2D environment, consistent with the graphical style of the mural.

Taking into account the design limitations in respect to the duration of engagement with the ARSG, the amount and type of transmitted knowledge should be carefully considered, because the lack of focus and cramming too much information in a short time span is not beneficial. In multimedia learning, the working memory includes limited channels for both visual and auditory processing and there is a threshold to the amount of information that can be processed in each channel at one time (Kiili, 2005).

## 6 Conclusions

Cultural heritage institutions increasingly apply digital technology as virtual and augmented reality SG's have advanced dramatically (Bontchev, 2015). These technological advances give new opportunities to enhance players' understanding of the knowledge presented by the SG and to encourage creativity, reflection and active participation in the learning process.

The proposed ARSG will provide a novel way for library visitors to engage with literature and art, and will be used for the promotion of library resources and cultural heritage. The experience, conclusions and results gained from the Ivan Vazov-themed ARSG may also be applied to the gamification of a variety of instances of art on 2D surfaces, such as paintings or mosaics, and can be expanded to a multi-institutional cultural ecosystem level.

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