Simfonia Silentio: The Impact of the Exclusively Auditory Game in Creating Equality and Innovation in the Gaming Universe

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ABSTRACT

Our paper focuses on the development and influence of a game, named "Simfonia Silentio", meant for visually impaired people, and illustrates the ways in which auditory games can be used as tools for promoting equality and innovation within the video game industry through increased accessibility and a new way of experiencing games. The current context in which digital accessibility and inclusion are becoming increasingly relevant is what makes this project important. "Simfonia Silentio" goes beyond by being a novel approach to assisting people with visual impairment; it also demonstrates how technology can be used for providing fair and innovative gaming experiences. Moreover, we proved the positive impact of auditory games on visually impaired users through the evaluation and testing of an accessible game, suggesting a new direction in designing video games. By bringing out both problems and solutions faced during project development, we give suggestions on similar future projects and stress out the importance of incorporating accessibility when designing video games. This way, "Simfonia Silentio" represents an essential step towards accessible games that embrace equality and inventiveness.

Author Keywords

Auditory games; accessibility; sound design; user experience; web technologies; game engine; immersive experience; inclusive gaming; innovation in games.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., USI): Miscellaneous.

DOI: 10.37789/ icusi.2024.12

INTRODUCTION

Video games have merged with the entertainment industry, and fully immersed in it. However, for people with visual problems making them accessible is an uphill task. Hence, this initiative creates a sound-based game that ensures all gamers can participate.

This project focuses on building a game using JavaScript language aiming to make it more inclusive. The game seeks to change the view about video games by eliminating some elements and focusing on sound and interaction.

- Create an auditory game suitable for players with visual impairments.
- Build a strong and flexible gaming engine based on modern web technologies.
- Generate captivating experience through creating immersive sound library.
- Develop an intuitive user interface optimized for audio interaction

Modularly structured, every part of the game has its own function assigned to it. A general structure will consist of three main components- a game engine, sound library, as well as user interface.

Game logic, interactions with players and their progress are managed by this JavaScript built game engine; hence providing flexibility and giving high performance. Game states and transitions are managed using object-oriented programming paradigms [6, 7].

The audio library is very important to the acoustic game, it involves several sound effects and background music for a total immersion.

Simplicity in design of the user interface makes it easy to use even without any visual elements. It provides clear audio instructions and continuous feedback for players.

This was achieved via an English narrator who worked free of charge therefore, every sound is distinct and clear for the player while trying to navigate through or interact with the game's environment.

During the navigation test, this facility went through rigorous testing to ensure intuitive movement. Audible feedback was also made more responsive so that players could know exactly what to do in a short time span.

Throughout development, we constantly adjusted our solution based on users' comments and performance tests. This involved optimizations such as refining sounds, improving game logic, and tweaking interface elements to maximize experience quality.
These games are called auditory because they rely purely on

sound for both feedback and interaction. They have come a long way since their inception due to advancements in technology as well as increased recognition concerning accessibility.

Gaming industry still faces major challenges of accessibility. That is why this project explores different ways of making games accessible.

The project seeks to promote equal opportunities and equal treatment of all players through a groundbreaking experience. This game is an alternative means of communication that eliminates visual elements in favor of sound.

To develop the audio game, many technologies are employed such as HTML, CSS and JavaScript which are used for the structure and logic of the game whereas sound editing tools are employed to create the sound library [3, 4, 5, 15].

The player starts at the edge of an enigmatic forest. Any decision made by the player, even the most trivial one creates new routes and storylines leading them from one place to another. Every choice determines how they progress and what their end will be like.

Game functions include auditory navigation, environmental interaction by voice command or keyboard while its usage scenarios cover different situations and choices offered in the course of playing.

This is a modular game with each component responsible for its own part. The JavaScript script manages transitions between states, controls overall gameplay logic, and handles user input. Key features include auditory navigation (throughout), environment interaction (throughout), and auditive feedback (to receive) [6, 7].

The reason behind this script is because it is made to be comprehensible and uncomplicated by using functions and objects to handle different pieces as well as logics of the game. Every part of the script has comments that make it easier for maintenance purposes and future expansion.

The concept behind the logic of the game was for its players to make decisions that will move from a state to another, hence forming a narrative. The flow of the game should be simple, easy to follow so that players can enjoy it without any difficulty.

The initial idea was about an auditory game which could be enjoyed equally by visually impaired individuals.

After planning each component of the game in detail, there followed development and testing of them while at last implementation focused on providing robust functionality and immersive experience.

The creation of the game used different technologies and software tools such as, text editing programs like JavaScript. The game was made using a variety of softwares including audio editing tools. JavaScript is the commonly used language for building web applications; it is a very robust programming language.
The game also utilizes some javascript functionalities such as manipulating DOM (Document Object Model), managing events and controlling operations so that the user can have a smooth experiencing [6, 7].

In auditory games sound serves pivotal roles, offering essential feedbacks on players' actions in order to facilitate success. A creatively designed sound library greatly enriches user experience.

Auditory games are meant for full immersion via sounds which provide continuous feedback necessary for navigation and interaction with the game by the player.

The user interface is created in such a way that it is possible for players to figure out how to use it intuitively and navigate through the game easily using voice commands as well as auditory feedback. It was designed to be simple and accessible, which means that anyone can play this game without any problems.

Functionalities, interface, and game logic are explained in detail, showing the innovativeness and ease of access featured by the audio-guided game. The game's source code is open for scrutiny and evaluation that delves into technical implementation features alongside other aspects of its gameplay [10].

The proposal "Simfonia Silenţio": The Impact of an Exclusively Auditory Game in Creating Equality and Innovation in the Gaming Universe" illustrates how auditory games provide enjoyable experiences that are accessible by all people. In this case, focusing on sound as well as modern web technologies enabled the creators of this gaming piece create a boundless gaming environment free from visual obstacles. Thus project highlights the importance of making games universally available encouraging new inclusive gaming experiences for all gamers.

THEORETICAL AND CONCEPTUAL FOUNDATIONS

A kind of computer games that uses sound as the main element in play is auditory games. Sound is used for guiding players, communicating information and establishing a captivating atmosphere in such games. To understand them, it is important to know how sound is part of the game mechanics and design so as to give an enjoyable and exciting experience of hearing [8, 11].

Sound is what drives interaction and advancement through the game in auditory games. It can be about using sounds to navigate the player through different levels, show where enemies can be found or even provide a response to player's

activities. These incorporate such things like dialogues, music and sound effects which are vital for creating an all-encompassing and mesmerizing audio experience in audio games [8].

The start of the auditory gaming era dates back to when video games began being developed. Since then, electronic gaming has been improved by use of sound. The very first audio games were developed during 1970s-1980s with the introduction of audio capabilities into home computers as well as gaming consoles.
Auditory games are established as a unique video game category of video games with best-sellers that ingeniously convey the gaming experience through sound. Sounds are an integral part of the design and gameplay element seems to be present in all games from puzzle, adventure genre through action Games till strategy ones.

ACCESSIBILITY IN GAMES: CHALLENGES AND SOLUTIONS

The challenge of ensuring that games are playable to people with diverse disabilities is an important part of game development. There has been substantial progress in recent years in making games more accessible, but many hurdles still have to be traversed. In this manner, we will consider these very issues and provide solutions for making games more playable by all people.

The challenge for game accessibility is to develop mechanisms that provide similar experiences to players with disabilities so they do not suffer from imbalances. For people who are blind or have low eyesight, a lack of visual information can make it difficult to navigate and interact with the virtual world of a video game. As good as the graphics may be, there still will be a user who cannot see. Similarly, games that rely on visual components, e.g., graphics, indicators, or visual puzzles, or games that require minimum eye–hand coordination, will be limited to people who are visually impaired. Also, it is essential that customization options are implemented into games so that they meet the unique needs of an individual. Features such as difficulty sliders, control plugs, or just the option to maneuver buttons as per your liking could help in making it exclusive to all.

To make games more inclusive, developers are now focusing on embedding various technologies and functionalities into their products to cater to gamers with disabilities. Using alternative technologies such as sound and haptic feedback instead of just visual indicators provides relevant information and cues for the impairing user in the game. Out of all the solutions mentioned, another major one to consider would be the use of alternative technologies like a combination of speech, text, or haptics for all the information and cue delivery in games.

Moreover, creating a customizable gaming experience for everyone is also about creating thoughtful solutions that can be easily paired with other modifications. There is no simple trade-off between making games easier for some and creating options to make them harder; rather, the challenge is to design mechanics that provide a satisfying experience while also allowing players to choose how much they want to be challenged. These solutions often have multiple different options within them for you to choose from as well.

In addition, making game development teams and communities more aware and knowledgeable of game accessibility supports both creation and growth of this aspect of creating video games. Developers tend to follow their own preferences and sometimes don't reach for solutions that take a little more time to implement because they don't know how to do them. Both developers and players must contribute to build a culture filled with inclusion and a diversity of games.

EQUALITY AND INNOVATION IN GAMES

Intertwined this subsection asks what sorts of equality does our industry most need, and how might we innovate for these ends? Both principles have been critical to game design and mechanics, as well their impact on the larger gaming community [11].

When we talk about equality in gaming, it is all about developing a game from such standpoint which offers the same opportunities to every player playing your games for enjoying their time as well emphasizing their individual skill sets within fair conditions. This includes making games available to all players, irrespective of age, sex and origin as well as physical or cognitive limitations (GAAD). Furthermore, the fairness of games comprises eradicating prejudice and destructive labels as they correlate to in-game accounts / people.

The Video Game Industry: Innovation As An Engine Of Development For Games This includes the creation and use of fresh ideas in designing, making games more complex than ever before. Innovating can come in various forms such as new genres for games to be introduced, diving into the possibilities of using emerging technologies and introducing fresh perspectives or stories that are able transcend through what is a traditional setting [2, 11].

Equality and game developer creativity are interrelated. Fostering a level playing field in games fosters innovation, as it widens the scope of experience and ideas. Inversely, with games innovation can also support equal recognition by introducing features and technologies that make sure everyone has access to playing the game for every kind of player from no background therefore everyone is on a level playing field [2].

The game "Symphony of Silence" is a concrete example of how auditory games can contribute to promoting equality and innovation in the video game industry. By focusing on the auditory experience and providing an accessible gaming platform for visually impaired individuals, this game demonstrates the potential to shift traditional paradigms in game design. Equality and innovation are two fundamental

values that "Simfonia Silentio" incorporates and promotes, thereby contributing to the diversity and evolution of the video game industry.

DESIGNING THE GAME

This section concerns with design process of the game called “Simfonia Silentio” which is designed especially for the audience with auditory impairment only. They address the principles of constructing a game, design patterns, the manner of ensuring safe communication between services, game use cases, among others. Understandably, including each of the aforementioned aspects into the process as a detail would be tedious and impractical, yet, breaking it down in this chapter offers a depth of understanding of ‘Simfonia Silentio’ design and evolution to create an engaging and accessible game for the blind [11, 12, 13, 14].

The author attempts at defining and describing what Simfonia Silentio is, and the principles on which activity is grounded. It also helps to reveal the essence of the game, the goals which it sets as well as the themes that is implements.

Central to the concept that is used in the social/serious game “Simfonia Silentio” it is possible to name the principle that is based on the exclusivity of the gaming experience provided through auditory senses solely. The major concept belongs to the notion known as sound-play which prescribes the use of sound as the main communication channel of the game as opposed to sight.

Thus the objectives of the game are well defined and form a part of the framing of the gaming structures.Thus, “Simfonia Silentio” intends to create a game that is enjoyable and functional for at least some percent of blind people since sound is the only method of interacting with the game environment. It is also about equality and a chance to change the video game industry forever and open new paths in the creation of games.

Main idea of the game “Simfonia Silentio” revolves around the exploration and the discovery, set up in the sound context. Players are welcome to visit incredible worlds and complete various tasks and quests relying on the sense of hearing only. Overall, the message of the game is rather liberal and diverse, as it was aimed at promoting game accessibility for all the people irrespective of their abilities.

Thus, the idea of “Simfonia Silentio” may actually redesign our vision of video games and introduce new opportunities within the gaming world. Through its concentration on the specifics of the sound and accessibility this idea becomes capable to shape further trends in the games design and reception, thus, bringing certain positive impact to the diversification and creativity rise of the video games market [11, 12, 13, 14].

The use of sound in games and the impact on the user experience

Audio is a critical component in the utilization of video games as it determines the sensations of the player as well as the manner in which they engage with the game. In this subsection, we pay particular attention to the aspect of audio in games as well as its effect on the user [9].

Audio complements the main visual appeal of the video game which indeed helps in achieving a greater sense of engagement. Sound in game: starting from realistic sound effects that provide the game with the necessary environment up to background music and dialogues of the heroes are one of the game design components. It assists in relaying crucial information, informs the players, and it many times emphasizes emotions and tension during a game [9, 10].

Audible components in video games are able to have a certain impact upon the general mood of the game. Non- violent BGS, for instance, the whistle of wind or the sound of the waves in the background can make the environment in the games related to nature much more quiet. On the other hand, loud and unpleasant sounds might increase tension and dangers in horrifying or action video games [9].

Sound is a very important part of the experience when playing games and affects a user greatly. Properly applied sound improves the experience of players and their focus on the events within the game setting. Also, sound may offer valuable information to players, enabling them to make better decisions concerning themselves and their surroundings.

As with creativity in general, there are several strategies and instruments that are used by developers to apply sound in games. It aims to involve aspects such as the game’s audio engine, specific libraries, audio editors, as well as the mixing and mastering standards. Sound also needs to be properly integrated as its contribution can make or break the overall feeling that the game gives with regards to the user experience [9, 10].

We have come to realise that sound that has been well designed and strategically integrated in games contribute immensely to the experience of the user. They can help to build an engaging and stimulating environment which ultimately benefits the gamers and makes the game more entertaining. However, the same sound can change the perception or interaction with the game world, thus affects the results and popularity of the game.

Audio game design is such an important aspect in the modern incorporation of video games. Audio not only adds to environment and realism in games but also plays a large role in the versatility of game play as well as the overall perception by the user. A lot of attention in respect to the implementation of sounds should be given to ensure that it enhances the game; this is crucial in determining the success of the game through popularity [10].

Game Source Code

Our solution inplements a state-machine, `states`, as an

```
let states = {
"q0": {···
    },
    "q1": {
        "state": "q1",
        "name": "The River",
        "nextState": "q3,q4",
        "soundUrl": "/sounds1/q1.mp3",
        "progress": "10%",
        "story": "You take the left path and
```

object that controls different states of the game (see Figure 1).

Figure 1. Data structure.

In brief, each state depicts one or another point or scene of a game's plot. Such as, `q0` is the initial points that the game starts with, where the player is faced with a choice of two roads in a dark forest. The `states` object may have attributes like `state`, `name`, `nextState`, `soundUrl`, `progress`, and `story` where `state` gives identification of the state, `name` provides the display name to the state, `nextState` gives possible states on the basis of decision of the player, `soundUrl` provides URL of the sound file associated with the state, `progress` gives the module percentage of state, `story` gives the narrative of the situation. It is in these states that the basic interactions with the storyline, as well as direction of the player's actions, takes place [16, 17].

Whenever a state is played (when `playQ()` is called – see Figure 2), all currently playing audio is stopped and reset. It then generates a new Audio object with the URL of the current state then plays the audio, sets the `currentQ` for the current state and in parallel updates the HTML to display the name of the current state (`currentQ`) the `name` and the progress bar of the `progress`. The last one, the 'ended' event listener, is code that stops the audio playback after the track finishes [3, 4, 5, 8, 10].

On `window.onload`, the game launches and proceeds to the first state, `q0` (see Figure 3). A keyup event listener is attached to the 'document' object to listen to any key press (ArrowLeft, ArrowRight, Space) from the user. Depending on that, it goes to the next state in accordance with the players decision (`nextQ()` function connected with left and right arrows) or remains in the same state in case with Spacebar [6, 7].

The `nextQ()` function is responsible to identify the next state according to the player's decision indicated by argument decision. It first looks at the `isPlaying` flag to see if there is already an audio playing and returns early if it is true to avoid playing audio at the same time. It then gets the possible subsequent states from the current state (`currentQ`) and then gets the correct subsequent state (`futureState`) for the decision of the player. The selected state is then played using

```
function playQ(q) {
    if (currentAudio) {
        currentAudio.pause();   // Stop the current audio
        currentAudio.currentTime = 0;  // Reset the current audio
    }
    isPlaying = true;  // Set playing flag to true
    currentAudio = new Audio(q.soundUrl);

    currentAudio.play();
    currentQ = states[q.state];

    document.getElementById('currentQ').innerHTML = q.name;
    document.getElementById('progress').innerHTML = q.progress;

    // When the audio ends, set playing flag to false
    currentAudio.addEventListener('ended', () => {
        isPlaying = false;
    });
}
```

the `playQ()` function.creed abilities; it can be seen from the above discussion that the preprocessing of the given narration wholly deploys the proposed creed abilities

```
function nextQ(decision) {
    if (isPlaying) return;  // Exit the function if a sound i

    let nextStates = currentQ.nextState.split(',');
    if (nextStates.length == 1) {
        decision = 0;
    }
    let futureState = nextStates[decision];
    let temp_states = states[futureState];
    playQ(temp_states);
}

window.onload = function() {
    playQ(states['q0']);
    document.addEventListener('keyup', (e) => {
        if (!currentQ) {
            initGame();
            intervalId = setInterval(initialLoop, 5000); // 5
        } else {
            if (e.code === "ArrowLeft")         nextQ(0);
            else if (e.code === "ArrowRight")   nextQ(1);
            else if (e.code === 'Space') playQ(currentQ);
        }
    });
};
```

[6, 7].

Figure 2. Audio Handling.

Figure 3. User Interaction.

The end game states (`end1` to `end8`) are stored in the states object and this is the end result of the different story arcs or the ending of the game depending on the actions of the players. Just like other states, each end state has properties but it often does not have the `nextState` property because it marks the end of the game.

These states complete the player's progression and contain congratulating messages of the player's accomplishments and the choices they make throughout the game. In the scenario of executing the `playQ()` function, the `currentQ` and

`progress` parameters change their values in the HTML document to the `name` of the current state and the percentage of the conditions' completion. It also guarantees that the players are aware of their position in the story and the game's process in case of shifting states and decisions [3, 4, 5, 6, 7].

The `window.onload` is an event listener that starts the game by calling the `playQ(states['q0'])`, thus beginning the game at the first state (`q0`). It also creates the keyup event listener for capturing the player input for progressing the game's narrative (`nextQ()` function) or replaying the audio (`playQ()` function) according to the pressed keys (Arrow keys and Spacebar) [6, 7].

"`q`" represents the stage in which the player is, he can make the decision in which direction he will go during the game, having a free choice, a choice that will lead to a different ending, with each choice made (see Figure 4). "`E`" represents the end in which the player reached after the choices made. We highlighted a route used to reach one of the 8 endings of the game.

The game isn't too hard but has enough going on because you need to make a lot of choices as you go (see Figure 5). Each choice changes how the tale unfolds and decides which end

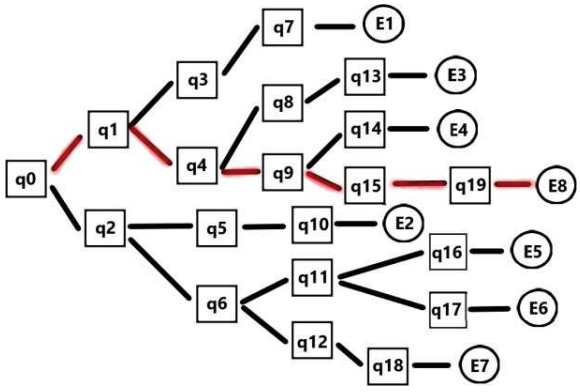

Figure 4. The Game Plan.

you'll see. Picking between various paths and talking with the people and spots you meet makes the game more fun and deep. Plus, the part where you have to find hidden stuff and clues in the woods makes it even more of an adventure and adds a touch of mystery.

There are a total of 8 different endings in the game - each ending concludes your journey through this mysterious forest.

- Ending 1 (E1): After a night's rest, you return home with wisdom gained and precious memories.
- Ending 2 (E2): You've completed your journey, feeling refreshed and ready for new adventures.
- Ending 3 (E3): You discover the secrets of the forest and return home feeling deeply connected to nature. glows with warmth.

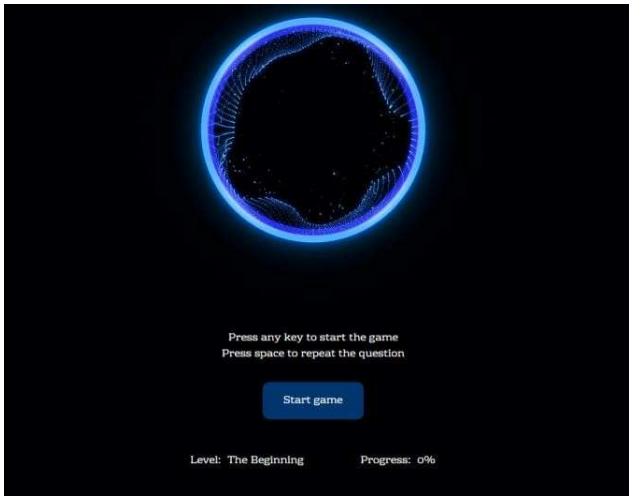

Figure 5. The Game Design Page.

- Ending 4 (E4): You've found peace by a serene lake, and now it's time to go home
- Ending 5 (E5): You have found a mysterious treasure and return home with a precious stone that
- Ending 6 (E6): You have explored the forest and discovered more of its beauty and secrets, returning home with unforgettable memories.
- Ending 7 (E7): You have found peace with the deer and completed your journey, ready to return home.
- Ending 8 (E8): You discovered a hidden relic and finished the adventure with a deep sense of accomplishment.

CONCLUSION

The concept of 'Simfonia Silentio' stands as innovation in the domain of video games as it is centered solely around the categories of sight and sound. Here, much attention was paid to various aspects of this work, focusing on the positive and negative effect of this project in terms of equality and innovation in the sphere of gaming. While auditory games have been often disregarded in favor of visual games, which are dominating nowadays, the great potential of such a game was proven by "Simfonia Silentio". The novelties of the approach in studying sound and realizing sound-centered gameplay elements expand the horizons of creativity in the industry.

The fact that the sound is the only element that points the directions for the progression and the interactions with the game makes it highly enjoyable. Players fully experience the environment impact and respond to individual sounds relating to the various states and actions.

Hence, along with the significant opportunity for visually impaired gamers, Simfonia Silentio represents an example of the diversity in the options of games design. Thus, it promotes the creation of games that are not strictly based on the visual aspect, as well as draws attention to the games that are

different from this format.

Altogether, “Simfonia Silentio” is not only a game but also a signal of the great possibilities of auditory games for the changes for equality and innovations in the gaming industry. This project aims at providing useful recommendations that will help improve the future implementations in game designing with particular emphasis o dealing with a more dynamic and interesting experience for all gamers.

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