Stella Vee: An Isometric Action-Adventure Video Game Raising Awareness of Issues Surrounding Intellectual Property and Copyright

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Abstract—The surge in the digital arts industry has brought forth critical challenges related to intellectual property (IP) and copyright protection. This paper introduces "Stella Vee," an innovative isometric action-adventure video game developed to illuminate these pressing issues. Stella Vee immerses players in scenarios that mirror the trials faced by artists grappling with intricate IP dilemmas. This project not only presents Stella Vee but also extracts instrumental theoretical, practical, and technical insights cultivated from its evaluation. First, theoretical insights delve into player engagement and the role of visual aesthetics in gaming. Then, practical recommendations guide game developers in enhancing visual design as well as refining user interface (UI) and control mechanisms. Finally, on a technical level, implications extend to UI development and input method refinement. Within the confines of this game project, we aim to provide insights into the development of captivating, instructive, and user-centric video games poised to confront the paramount challenges surrounding IP and copyright preservation in our burgeoning digital epoch.

Keywords—Intellectual Property, Copyright Protection, Digital Arts, Video Game, Educational Game, Game Development

I. INTRODUCTION

In the present digital landscape, there has been a remarkable growth in individuals venturing into the digital arts industry [1]. This surge can be attributed to several factors that contributed to its advantages. One significant reason is the democratization of digital platforms, which have made it easier for aspiring artists and creators to express themselves and reach a global audience [2]. The digital arts industry also offers unique advantages, such as the potential for unlimited creativity and the ability to quickly disseminate and share one's work with a vast online community [3-5]. However, amidst this proliferation of digital works, artists are confronted with distinct challenges related to safeguarding their intellectual property (IP) from unauthorized replication and imitation. Among these challenges, one of the most formidable difficulties they encounter is the threat of brand and copyright infringement [5, 6]. This obstacle becomes pronounced when it comes to establishing and preserving ownership rights over their creative output in the digital sphere [7]. Beyond the anticipation of infringement, artists also grapple with issues surrounding the substantiation of ownership as well as the maintenance of proper documentation. In the digital age, where creative works can be easily disseminated and shared across various online platforms, proving ownership becomes a crucial concern. Additionally, the intricacies of steering the digital landscape, where unauthorized use of works can proliferate at an alarming pace, add another layer of complexity to the challenges faced by artists [8].

Serving as the primary safeguard, IP protection plays a vital role in shielding creative assets and ideas as well as protecting artists from any injustice. When these intellectual treasures are wrongfully appropriated without consent, the consequences can be profound, with creators bearing the brunt of others profiting from their hard work and innovative ideas. Characterized by exponential growth in the creative industry, the significance of safeguarding IP has soared to unprecedented levels. The specter of IP theft looms large, driven by a myriad of motivations. Some individuals or entities may perceive their counterparts as direct competitors, leading them to seize the opportunity to exploit pilfered IP for financial gain, all the while undermining the original creators' livelihoods. The process of proving such a theft is a complex endeavor, requiring the establishment of striking resemblances between the stolen work and the original intellectual property. Additionally, it entails demonstrating the absence of consent, affirming the creator's exclusive rights, and substantiating that the theft has either conferred unwarranted benefits upon the perpetrator or inflicted harm upon the original creator. From a macro perspective, IP protection is the cornerstone of preserving the integrity and rights of creators in an increasingly interconnected digital landscape.

In the technology-driven world, it becomes paramount for both the artists and innovators steering the course of digital creations and the consumers of such artistic works to cultivate a profound and nuanced understanding of IP rights and the available protective mechanisms. The realm of digital art, often interchangeably referred to as new media art [9], constitutes a versatile genre characterized by a myriad of creative expressions intricately entwined with digital technology. This encompassing domain spans a diverse spectrum of art forms, encompassing 2D and 3D computer graphics, digital photography, computer-generated animations, pixel art, digital literature, and avant-garde digital installations [10-14]. Despite the increasing recognition of the pivotal role that IP awareness plays in safeguarding the rights and interests of individuals within this and other fields [15-17], there is a conspicuous research void pertaining to effective strategies for disseminating IP knowledge and protection strategies to artists, creators, and users of digital art. While it is duly acknowledged that IP is a cornerstone in the preservation of rights and interests within this domain, the development of engaging and educational tools, notably digital games, tailored explicitly to bolster IP awareness, remains a significantly underexplored avenue. This research gap underscores the pressing necessity for innovative approaches that bridge the gap, thereby empowering digital artists and users to adeptly navigate the intricate landscape of IP, copyright protection, and the ramifications of unauthorized usage within the digital art sphere. By addressing this critical gap, the study aspires to contribute to the creation of an efficacious educational game, poised to heighten awareness and inculcate a profound comprehension of IP and copyright issues within the digital arts community. Such endeavors not only serve to empower and educate stakeholders but also perpetuate the ethical and legal standards underpinning the digital arts arena.

In this paper, we report the development of a PC game titled "Stella Vee," characterized by its cartoon-stylized top-down isometric action-adventure RPG combat style. Following prior educational video game strategies and techniques [18-20], our project transcends mere entertainment and serves as a powerful medium for amplifying awareness on the pivotal significance of IP within the digital arts and gaming industry. To fulfill this overarching objective, we have outlined a set of specific goals. First, our aim is to craft an engaging game concept and storyline that shines a spotlight on the challenges faced by small creators and freelancers in their quest for IP and copyright protection. This narrative will serve as the foundation upon which the entire gaming experience is built. In addition, our video game places considerable emphasis on creating a captivating game world inhabited by a diverse cast of 11 characters. We are dedicated to designing four distinct gameplay levels that will challenge and immerse players, offering them a choice of four unique weapons to enhance their gaming experience. Then, the integration of audio and music within the game will be seamless, contributing significantly to player immersion. Integral to the success of our project is an evaluation of the game across multiple dimensions, including gameplay mechanics, aesthetics, user interface, and sound design. This evaluation will ensure that "Stella Vee" not only raises awareness about IP and copyright protection but also delivers an engaging and enjoyable gaming experience.

Fig. 1. The official game poster of the "Stella Vee" video game

II. GAME DEVELOPMENT

A. Game Overview

The game narrative centers around Stella Vee's determined quest to reclaim her stolen inventions, which have been illicitly seized by a greedy organization. This corporation, driven solely by its own benefits, has shamelessly co-opted Stella's original ideas for its profit. Armed with ingenuity and determination, Stella embarks on an epic journey to thwart the corporation's nefarious machinations. Her path is fraught with adversaries, and she must employ the flawed duplicates of her inventions, ingeniously wielding them to pave her way to the heart of the mass production center. As players progress through the game, they will encounter a diverse array of foes, each dropping distinct weapons that Stella can utilize. These weapons, though potent, come with limited durability, demanding players to tactically adapt their strategies and playstyle to the evolving challenges they face. The game's artistic direction and ambiance will resonate with a contemporary cartoon show sensibility, masterfully blending elements of whimsy with grounded concepts. This aesthetic choice is aimed at engaging a specific yet broad audience of modern cartoon enthusiasts, creating a captivating and inclusive gaming experience that appeals to a wide demographic of players.

B. Game Characters

Stella Vee takes center stage as the game's protagonist, embodying the role of a young, fiercely independent inventor with a singular mission – safeguarding her beloved hometown of Pucci. Her character is a compelling blend of intelligence, friendliness, and an effortlessly cool demeanor. Stella exudes a relaxed aura in her everyday interactions, typically minding her own business and going about her inventive pursuits. Yet, beneath this calm exterior lies a resolute spirit. When provoked or faced with those who have wronged her or her town, she unleashes an unwavering determination to ensure that justice is served. Her resolve knows no bounds, and she is unrelenting in her pursuit of making those who have crossed her path deeply regret their actions. In such moments, Stella's demeanor can transform, and she's known to employ harsh, even trash-talking language to confront her adversaries. What sets Stella apart is her exceptional intellect, which not only fuels her inventiveness but also makes her a formidable combat strategist. Her ability to craft Stellar weapons, melee-focused combat tools of her own creation, highlights her ingenuity and resourcefulness. Stella's journey in the game revolves around her unique blend of intelligence, determination, and combat prowess, making her a captivating and empowering character for players to embody and guide through the challenges of the game's world.

In the game, the adversaries, commonly referred to as enemies, play a crucial role in challenging the player's character. These foes exhibit a strategic approach by utilizing modified versions of the weapons available to the player. The enemies are categorized into different tiers, with "Grunts" forming the initial line of opposition. Grunts include the Astellant Hammer, which wields a modified Jammer Hammer, the Astellant Claw, equipped with a modified MewMew Slasher, the Astellant Slinger, employing a modified GoGo YoYo, and the Astellant Gunnar, armed with a formidable Voxel Laser Blaster. Beyond the Grunts, players encounter more formidable adversaries in the form of "Bosses." These Bosses, notably the Omega Astellants, possess heightened statistics and present a greater challenge. The Secretary, another formidable Boss, utilizes Teleporter Tech, piercing attacks, and laser-based weaponry. Meanwhile, "The Wall" relies on brute force, employing heavy and smash attacks to thwart the player's progress. The ultimate test awaits the player in the form of the "Final Boss," Perfect Astella V.33. This formidable opponent possesses the ability to harness all of Stella's unique abilities, making for a truly challenging and intense showdown. In summary, the game's enemies are diverse in their capabilities, offering a range of challenges and strategies for players to overcome as they progress through the game.

In the narrative of our game, several non-player characters (NPCs) emerge, each leaving a distinct imprint on the story while remaining beyond the player's control. One such character is **VeeVee**, an indispensable figure in Stella's journey. Designed by Stella herself, VeeVee serves as her loyal robotic assistant, aiding in the invention process and handling tasks requiring additional manpower. VeeVee's unwavering dedication not only assists in gameplay mechanics but also adds emotional depth to the narrative. Another crucial NPC is Vex S'Avante, a serene and wise former employee of Arkinon. He is a tranquil computer salesman that takes on a fatherly role in Stella's life. His presence stresses the importance of mentorship and connection in Stella's

journey of growth. Lastly, the CEO of Arkinon Industries is an enigmatic figure known simply as "Boss" to his employees. He shrouds his identity in secrecy, creating an aura of intrigue. His actions reverberate through the storyline, playing a pivotal role in shaping the game's events. These NPCs collectively enrich the game's world and infuse it with complexity. Their interactions with Stella intertwine with the overarching narrative, enhancing the emotional and immersive aspects of the game experience.

Fig. 2. Sample gameplay with all the characters.

C. Weapons

The game boasts an intricate and dynamic rogue-style weapon system, adding depth to the player's combat experience through various weapon drops obtained during battles. These weapons include the Jammer Hammer, known for its ability to execute a slow yet devastating Hammer Slam Combo and a charged-up smash attack with a wide area-of-effect burst of damage. The GoGo YoYo offers a medium-paced slinging combo, while its unique 'Walk-The-Dog Attack' continuously deals area-of-effect damage while attracting nearby enemies. For those seeking swiftness, the MewMew Slashers present a quick claw slash combo and a Forward Lunge that deals damage along its path, emphasizing agility in combat. Notably, players can harness the power of Stellar Voxel, a distinctive placeable totem weapon, with four distinct modes. The Vortex mode creates a gravitational pull, drawing enemies towards the Voxel, while the Vanguard mode sends the Voxel charging towards the player's location, inflicting damage along its path and pushing foes aside. The Tether mode establishes a linked connection between the player and the Voxel, delivering ongoing damage to affected enemies while stunning them. Lastly, the Warp mode allows the player to swap positions with the Voxel, generating explosions at both the initial and destination locations. This diverse arsenal of weapons ensures that players have a wide range of tactical choices to adapt to various combat situations, enhancing both the strategy and excitement of the gameplay.

D. Level Designs

Serving as the game's initial backdrop, the Town of Pucci holds the unique distinction of being the protagonist's cherished hometown. This level encapsulates the essence of a peaceful, idyllic community where players embark on their journey. The town's picturesque streets and vibrant atmosphere offer a stark contrast to the challenges lying ahead. Here, players encounter core characters, establish relationships, and uncover the primary storyline threads, setting the stage for the adventures that follow.

Fig. 3.   Town of Pucci Level Design

A soaring futuristic metropolis suspended in the skies, **Voltex City** stands as the technological hub and capital of the game's world. This level highlights a breathtaking skyline filled with advanced architecture and technological marvels. Players traverse intricate, vertigo-inducing pathways, exploring both the heights and depths of this advanced cityscape. In Voltex City, they engage with cutting-edge challenges and adversaries that reflect the pinnacle of technological innovation, making it a visually stunning and stimulating part of the game.
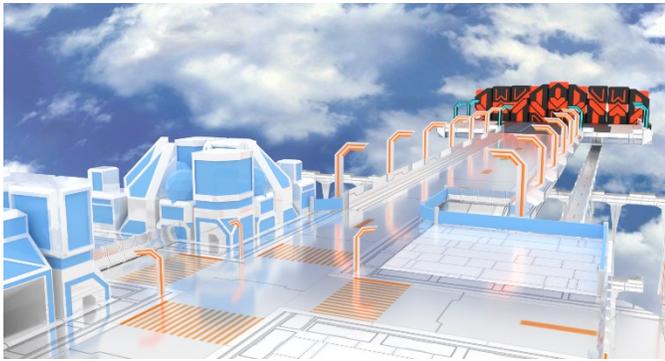

Fig. 4.   Voltex City Level Design

The headquarters of Voltex City's corporate giant, Arkinon Industries, unfolds at a distinctive level. Inside this towering edifice, players navigate the labyrinthine corridors and high-tech offices that house the company's secrets. Intrigue and suspense pervade the atmosphere as players inch closer to uncovering the mysteries surrounding Arkinon Industries. This level combines corporate intrigue with a futuristic aesthetic, offering an intriguing blend of exploration and discovery.
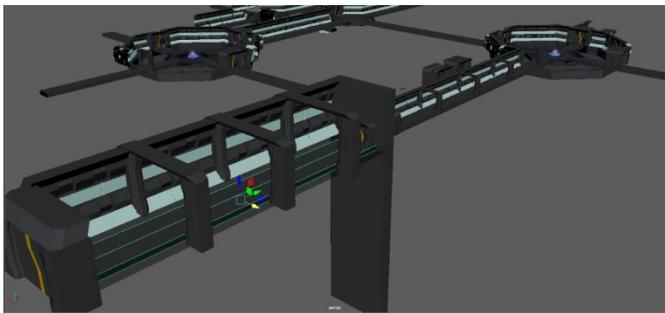

Fig. 5.   Arkinon Industries Level Design

The Arkinon Helicarrier is a battleground suspended in the skies. This imposing aircraft, a creation of Arkinon Industries, introduces a thrilling level that challenges players' combat skills and strategic thinking. As they traverse the deck of this massive airborne fortress, players must contend with formidable foes and environmental hazards, all while uncovering critical plot developments. The Arkinon Helicarrier level provides a dynamic and intense gaming experience, culminating in epic confrontations that propel the storyline towards its climax.

Fig. 6.   Arkinon Helicarrier Level Design

III. GAME EVALUATION AND RECOMMENDATION

In the evaluation section of the game, a structured approach was adopted to gather comprehensive feedback from our target participants. For the pre-game evaluations, a Likert scale was employed to gauge their initial experiences and understanding of intellectual property and copyright concepts before engaging with the game demo. Additionally, open-ended questions were included, allowing participants to provide detailed and descriptive responses, enriching the qualitative aspect of the evaluation. Moving on to the post-game evaluations, a similar Likert scale was utilized to assess the results of the game evaluation papers submitted by the game testers. This scale offered respondents five alternative responses to statements or questions, enabling them to express their level of agreement or sentiment, ranging from positive to negative. Like the pre-game evaluations, the post-game phase also incorporated open-ended questions, aiming to capture qualitative insights and feedback from participants. The collective findings from these evaluation processes demonstrated the capstone project's successful achievement of its intended objectives. This success was evident through both physical and virtual open house events and the subsequent evaluation phase. In total, the project received feedback from 50 participants, underscoring the robustness of the evaluation process and its capacity to provide a well-rounded understanding of the game's impact and effectiveness.

TABLE I.   GAME EVALUATION RESULTS

Criteria	Mean	Interpretation
Aesthetics	3.90	Satisfied
Gameplay	3.56	Satisfied
Awareness	3.77	Satisfied
Average	3.74	Satisfied

Table 1 shows that the respondents' overall satisfaction with the game's visual and aesthetic aspects, especially the design of the main character, was quite positive. This indicates that the visual elements and character design were well-received and contributed positively to the gaming experience. However, there is room for improvement in terms of UI (user interface) design, suggesting that adjustments in this aspect may enhance the overall user experience [21, 22]. Furthermore, when it comes to gameplay, respondents expressed a general sense of satisfaction. This finding suggests that the core gaming experience was enjoyable and engaging for the players. Nevertheless, there is a notable need for adjustments in the controls [23], indicating that refining the control mechanisms could further enhance the player experience. One of the game's significant achievements is its success in raising awareness about the challenges faced by small creators and the importance of copyright protection. This educational aspect was well-received by the players, effectively delivering valuable insights on these topics. Overall, the game managed to serve as an educational tool, fulfilling its intended purpose of educating players on these critical subjects.

Fig. 7. In-Game Snapshot of Combat Mechanics

Overall, the evaluation results have considerable theoretical, practical, and technical implications. Theoretical implications include a deeper understanding of player engagement [24], particularly the role of visual aesthetics in gaming. This could lead to further exploration of theoretical frameworks related to player immersion. Additionally, the feedback on UI design and controls opens avenues for theoretical exploration in UI and gameplay theories. From a practical standpoint, these findings offer valuable guidance for game developers [25]. The positive reception of the game's visuals and character design highlights their importance in game development [26, 27]. Developers can prioritize these aspects while working to refine UI design and control mechanisms based on identified areas for improvement. This iterative approach to game design aligns with practical development processes. On a technical level, the implications translate into specific actions. Developers may need to focus on the technical aspects of UI development, employing usability testing and advanced design tools [28]. Addressing control-related issues may involve technical optimizations, including input method refinement and compatibility enhancements across different platforms. Furthermore, the technical implementation of educational elements within games, such as conveying copyright information, demands attention to content delivery mechanisms and interactive tutorials. In conclusion, these implications provide an inclusive framework for future game

development and research endeavors, fostering the creation of more engaging, educational, and user-friendly video games.

The game developers offer a set of insightful recommendations for future game researchers and developers looking to build upon or enhance the foundation established by this capstone project. These recommendations stem from valuable respondent feedback, shedding light on specific areas that stand to benefit from refinement and optimization. Firstly, it's suggested that future iterations prioritize control customization with key rebinding options to address player confusion and enhance accessibility. This empowers players to tailor the controls to their liking, ensuring a more personalized gaming experience. Secondly, optimizing the tutorial system by gradually introducing game concepts throughout the first level can contribute to a smoother learning curve, particularly for newcomers. To enhance usability, incorporating shortcut buttons within the UI is advised, simplifying player interactions, and making it more user-friendly. The refinement of cutscenes and dialogue, with a focus on conciseness, consistency in punctuation, and speech patterns, can lead to a more immersive and coherent narrative experience. In the realm of online presence, a website redesign that organizes information more effectively can improve user engagement and communication of essential details. For combat mechanics, future iterations should explore balancing melee weapon attacks, specifically addressing the GoGo YoYo's end lag to ensure a fluid and responsive combat experience. Lastly, enhancing enemy AI aggression can create a more engaging gameplay environment, promoting strategic gameplay dynamics and greater immersion [19, 29]. These recommendations collectively aim to cultivate a culture of continuous improvement, with the goal of elevating user satisfaction and refining the gaming experience.

IV. CONCLUSION

In conclusion, this game project represents a significant achievement in meeting the primary goal of developing a game concept that educates players about IP and copyright protection issues. This accomplishment is underscored by the game's visually captivating top-down isometric action-adventure RPG style, enriched with dynamic combat mechanics and combo systems that elevate player engagement. Substantial progress has been made in the game's development, resulting in the creation of a fully functional two-level game, with ongoing endeavors to expand and enrich the gaming experience with additional levels. The introduction of a diverse array of characters, including enemies and NPCs, has significantly enhanced the immersive quality of the narrative. Additionally, the game offers players access to four distinct playable weapons, each featuring durability systems, providing an element of strategy and adaptation. The development team has actively sought and incorporated valuable feedback received during the game's evolution, demonstrating a commitment to refining and fine-tuning various aspects of the UI and gameplay to optimize the player experience. While certain areas of the UI and gameplay have generated mixed feedback, the team's dedication to continuous improvement is evident. In closing, the development and execution of "Stella Vee" demonstrate the harmonious fusion of entertainment and education, illustrating the potential for video games to serve as potent tools for raising awareness on critical IP and copyright protection issues.

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