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Detailed Implementation about Street Fighter Game using Python

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ABSTRACT- This paper examines the varied cultural meanings of computer game play in competitive and professional computer gaming and live-streaming.

A fighting game is a genre of video game that involves combat between two or more characters. Fighting game combat often features mechanics such as blocking, grappling, counter-attacking, and chaining attacks together into "combos". Characters generally engage in battle using hand-to-hand combat—often some form of martial arts. The fighting game genre is related to, but distinct from, the beat 'em up genre, which pits large numbers of computer-controlled enemies against one or more player characters.

The controls for Final Fight consist of an eight-way joystick and two buttons for attacking and jumping respectively. Pressing the attack button repeatedly when attacking an enemy

Pressing the attack and jump buttons simultaneously allows the player to perform a special attack that strikes all surrounding enemies, but will drain a small portion of the player's health.

Enemies can be grabbed simply by walking into one of them. When an enemy is grabbed, the player can perform a grab attack by pressing the attack button or perform a throw by tilting the joystick left or right. A thrown enemy can be tossed at another for additional damage. Items such as weapons, health recovery items, and items awarding extra points can be picked up by standing over one and pressing the attack button. Weapons have limited uses and will disappear if the player is disarmed by an enemy too much or when the player moves to a new area.

I. INTRODUCTION

Street Fighter" is a legendary video game that has left an indelible mark on the world of gaming. This iconic series, first introduced in the late 1980s, revolutionized the fighting game genre and quickly became a global phenomenon. With its memorable characters, intricate fighting mechanics, and competitive spirit, Street Fighter has captured the hearts of gamers for generations, making it a cornerstone of video game history. In this introduction, we'll explore the origins, evolution, and enduring popularity of this influential game franchise.

Street Fighter is a very popular video game series made by Capcom. It has sold a lot of copies, with 52 million sold as of June 2023. It's the most successful fighting game series ever, making a lot of money, around $12.2 billion, including sales of 500,000 arcade machines.

As the brainchild of Capcom, Street Fighter introduced players to a cast of diverse and unique characters, each with their own distinct fighting styles and special moves. The game's groundbreaking one-on-one combat system allowed players to go head-to-head in thrilling battles, combining strategy, reflexes, and precision

The well-liked arcade game led to a whole new kind of fighting games and created many new versions and related games.An arcade video game works by taking the player's actions through its buttons and joysticks, processing them using electronics or computers, and showing the results on a screen.

Street Fighter became unique because, back in the 1980s, most arcade game makers were making fighting and shooting games, so Street Fighter stood out.The original Street Fighter was a game where you moved from left to right and kicked and punched like in games such as Double Dragon or Final Fight. The main character you played as was Ryu, and a friend could play as K en to fight enemies with martial arts moves.

Over the years, Street Fighter evolved and expanded, spawning numerous sequels and spin-offs, with each iteration bringing new features, characters, and gameplay mechanics. The franchise's enduring appeal can be attributed to its dedicated fanbase, competitive esports scene, and the iconic characters like Ryu, Chun-Li, and Guile

Let's dig deeper into Street Fighter. We'll check out how it affected culture, created a competitive gaming community, and still influences modern games. Come along as we explore the history and changes in Street Fighter, a game that not only entertained but also played a big role in shaping today's gaming world.

Join us on this journey to uncover how Street Fighter impacted culture, fostering a global community of passionate gamers.

Discover how this iconic game has stood the test of time, leaving a lasting imprint on the ever-evolving landscape of modern gaming.

II. DESIGN

In the realm of 2D street fighter game development, the character design process embarked on a whimsical journey. Initially, planning documents imposed a constraint on punch length, capped at 128 pixels. However, the creative team, in the iterative spirit of game design, gradually extended this limit during character reviews. This playful experimentation eventually led to uproarious laughter when the characters' arms stretched unexpectedly long—a moment of realization that the unconventional deviation was not only acceptable but added a humorous charm to the game

Delving into the intricacies of controls and inputs, the game's mechanics are finely tuned to offer a diverse range of actions. The "Move" operation stands as a specialized tool for executing precise updates, displacing the game object based on angle and speed expressed through arithmetic equations. Correspondingly, the "Rotate" action mirrors Move but exclusively caters to angular adjustments, incorporating a designated pivot point and speed specified as arithmetic expressions. Departing from these positional updates, the "Push" action introduces a physics-driven dimension. This dynamic alternative applies force to the game object at a specified angle,

utilizing the inherent physics component to not only alter the object's position but also infuse momentum and responsiveness, enhancing the overall gaming experience with diverse interaction possibilities

The animation and fluidity within the game are elevated to an art form. Characters seamlessly transition between stances, strikes, and evasive maneuvers, creating a visually captivating spectacle. Beyond mere visual appeal, fluidity influences control responsiveness, ensuring that player inputs translate into graceful and immediate on-screen actions. Impactful special moves add dynamism, punctuating the smooth rhythm of combat. Whether executing acrobatic flips or unleashing powerful finishing moves, the meticulous attention to animation intricacies immerses players in a captivating ballet of skill and style

The testing and iteration process is the backbone of crafting a flawless gaming experience. Iterative design, a systematic approach involving small changes with each software version, ensures a desirable final product. User needs are identified through research, ideas are generated, prototypes are developed, and extensive testing is conducted until perfection is achieved. In the realm of testing, the 2D fighter game undergoes rigorous examination by quality assurance teams. Every animation frame is scrutinized, ensuring movements are free of glitches or inconsistencie

Rigorous playtesting evaluates both the fluidity of character animations and the responsiveness of controls, fine-tuning the delicate balance between challenge and accessibility

Basic Components

Character Design : In the actual planning documents, we set a limit on punches, that they couldn't extend further than 128 pixels. But in that process of reviewing the characters, we decided to extend it a little further, then a little further, then a little further more… until one day we saw how long his arms came out and everyone cracked up. That was the moment we knew it was good.

Controls and Inputs :Within the intricacies of the game's mechanics, each action serves a unique purpose. The "Move" operation undergoes specialization, executing updates that precisely displace the game object based on angle and speed expressed through arithmetic equations. Correspondingly, the "Rotate" action mimics the Move functionality, but exclusively for angular adjustments, dictated by a designated pivot point and speed, both specified as arithmetic expressions.In a departure from these positional updates, the "Push" action introduces a physics-driven dimension. Here, a force is applied to the game object at a specified angle, leveraging the inherent physics component of the object. This dynamic alternative to traditional Moves not only alters the object's position but also introduces an element of momentum and responsiveness, enriching the overall gaming experience with diverse interaction possibilities. Animation and fluidity : The animation in this 2D fighter game is a masterpiece of motion, where characters seamlessly transition between stances, strikes, and evasive maneuvers. Fluidity extend beyond mere visual appeal, influencing the responsiveness of controls, ensuring that every player input translates into a graceful and immediate on-screen action. Impactful special moves unleash a burst of dynamic energy, punctuating the smooth rhythm of combat. Whether executing acrobatic flips or unleashing powerful finishing moves, the game's attention to animation intricacies elevates the moves, the game's attention to animation intricacies elevates the moves, the game's attention to animation intricacies elevates the entire fighting experience, immersing players in a captivating ballet of skill and style.

Testing and iteration : An iterative design is a systematic approach to repeating certain steps in game development. It aims to achieve a desirable final product by implementing small changes every time it produces a new software version.

Each iteration is tested until the product is perfect. It entails identifying user needs through research, generating ideas to meet those needs, developing a prototype, and testing it to see if it effectively addresses them.Just like software, game designs usually undergo multiple iterations or versions until the final product is ready for release.

In the realm of testing, the 2D fighter game undergoes rigorous examination to ensure a flawless player experience. Quality assurance teams meticulously assess each animation frame, scrutinizing movements for any glitches or inconsistencies. Rigorous playtesting not only evaluates the fluidity of character animations but also delves into the responsiveness of controls, fine-tuning the balance between challenge and accessibility.

III. IMPLEMENTATION

In the implementation section of your thesis for a 2D Street Fighter video game based on Python, you can cover various aspects. Here are some key points you might want to include

1. Game Architecture:
We describe the overall architecture of our game, including the design patterns and principles we applied. Discussed how the game is structured, mentioning key components like game loops, rendering, and input handling.

2. Programming Language and Libraries:
we Specified why we chose Python as the programming language and outline the key libraries or frameworks utilized (e.g., Pygame). Explain how these tools contribute to the development of the game.

3. Character and Animation System:
We give detail the implementation of characters, their attributes, and the animation system. Explained how character movements, attacks, and interactions are programmed.

4. Collision Detection and Physics:
We discuss how our implemented collision detection for characters and objects within the game world. Explain any physics simulations applied to enhance realism or gameplay.

5. User Interface (UI):
Describe the design and implementation of the user interface, including menus, health bars, and other on-screen elements. Discuss how player input interacts with the UI.

6.Gameplay Mechanics:
Explain the implementation of core gameplay mechanics, such as character controls, special moves, combos, and the overall fighting system. Highlight any innovative features or mechanics unique to your game.

7. AI (Artificial Intelligence):
It would be applicable, detail the AI system responsible for controlling computer-controlled opponents. Discuss how the AI responds to player actions and simulates realistic opponent behavior.

8. Networking (if applicable):
If your game includes multiplayer features, discuss how you implemented networking to enable online play. Explain synchronization methods and any challenges faced.

9. Testing and Debugging:
Provide insights into your testing procedures, including unit testing, integration testing, and how you debugged issues throughout the development process.

10. Optimizations and Performance:
We Discuss any optimizations you applied to enhance the game's performance, such as efficient rendering techniques, memory management, or code optimizations.

IV. USED TECHNOLOGIES

Python Language

In Python, Pygame is like a toolkit for making cool 2D games, especially for folks who love 2D fighting games. It's friendly for beginners but has the muscle for complex projects. Once you've got the basic setup, it's time to make things exciting. You add movements to characters, so they look alive and ready to brawl. Handling user input ensures the game responds when players throw punches. Collision detection makes sure those punches connect, bringing intensity to the fights. The rules of the game, like how strong a punch is, give it strategy. Once you've got the basic setup, it's time to make things exciting. You add movements to characters, so they look alive and ready to brawl. Handling user input ensures the game responds when players throw punches. Collision detection makes sure those punches connect, bringing intensity to the fights. The rules of the game, like how strong a punch is, give it strategy. For extra help and ideas, Pygames docs and the community are gold mines. They teach cool tricks, making Pygame a powerful tool for building awesome 2D fighting games, whether you're just starting or aiming for game development greatness.

Game Mechanism

Designing 2D fighting game mechanics in Python involves implementing key gameplay elements to create an engaging player experience. Here's a breakdown of essential mechanics:

1 . Character Controls:

- Define intuitive controls for character movement, including walking, jumping, crouching, and dashing.
- Implement responsive commands for basic attacks, special moves, and blocking.

2.Character Animation:

- Integrate animated sequences for character movements, attacks, and reactions to create a visually dynamic experience.
- Ensure smooth transitions between different animations, contributing to the overall fluidity of the game.

3.Collision Detection:

- Develop a robust collision detection system to identify when characters interact.
- Determine hitboxes and hurtboxes for attacks, ensuring accurate contact detection.

4.Health and Damage System:

- Establish a health system for each character with a visible representation, such as health bars.
- Define damage values for different attacks and implement consequences for losing health, like knockbacks or stun states.

5.Combo System:

- Create a combo system that rewards players for chaining together well-timed and varied attacks.
- Implement combo counters and scaling to balance high-damage combos.

6 Blocking and Parrying:

- Incorporate defensive maneuvers, such as blocking and parrying, to add strategic depth to gameplay.
- Balance the effectiveness of defensive actions to encourage a mix of offensive and defensive playstyles.

7.Special Moves and Super Moves:

- Introduce special moves unique to each character, activated by specific input commands.
- Implement powerful super moves that consume a resource or have specific conditions for activation.

8.Game Flow and Rounds:

- Structure the game into rounds with clear win/lose conditions.
- Implement round transitions, victory animations, and a scoring system to determine the winner.

9. Input Handling**:**

- Manage user input effectively, considering keyboard, gamepad, or other input devices.
- Allow customization of controls to accommodate player preferences.

By combining these elements, you can create a dynamic and enjoyable 2D fighting game in Python. Leveraging Pygame or other suitable frameworks, you can implement these mechanics and continually refine them to achieve the desired balance and feel for your game

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Game Development Framework

One popular 2D fighting game framework based on Python is Pygame. Pygame is an open-source library that builds on the Simple DirectMedia Layer (SDL), providing tools for game development. It's known for its simplicity and accessibility, making it a great choice for beginners and smaller projects.

Animation

In a 2D fighting game, character animations play a pivotal role in conveying intensity and fluidity. From basic movements like walking and jumping to intricate combat sequences, each frame is meticulously crafted. Punches and kicks are animated with attention to detail, ensuring realistic and impactful blows. Combo animations seamlessly link a series of attacks, enhancing player engagement. Special moves are brought to life through dynamic visual effects, intensifying the gaming experience. Victory and defeat animations express the outcome of a match, contributing to the narrative. Overall, the animation in a 2D fighter game is a choreographed dance that immerses players in the thrill of virtual combat.

Game Sound and Music

In a 2D fighting game developed with Python, incorporating sound and music is crucial to enhancing the overall gaming experience. Here's how you can approach sound design and music integration:

1.Effect

Implement a variety of impactful sound effects for actions like punches, kicks, and special moves.

Match the SFX to the intensity of the corresponding action, making each move feel dynamic and satisfying.

2.Hit Confirmations

Design distinct sounds for successful hits and blocking, providing immediate audio feedback to players.

Use different SFX for normal attacks, critical hits, and special move connections to convey the impact of each action.

3.Background Ambience

Integrate ambient sounds that complement the game's setting, such as crowd cheers, arena ambiance, or environmental sounds.

These background sounds add depth to the gaming environment and immerse players in the virtual world.

Compose or select music tracks that match the game's theme and intensity levels.

Dynamically adjust music based on the gameplay situation, such as entering
a critical phase or during special move activations.

4.Round Announcements:

Include voiceovers or announcer sounds for round beginnings, victories, and other significant events.

These elements contribute to the game's narrative and help signal key moments during matches.

5.Menu and Interface Sounds:

Design sound effects for navigating menus, selecting options, and confirming choices.

Ensure that interface sounds are consistent with the overall audio aesthetic of the game.

6.Dynamic Audio Mixing

Implement dynamic audio mixing to balance different sound elements based on the intensity of the gameplay.

Adjust volume levels dynamically to emphasize critical moments or maintain a balanced audio experience.

7.Implementation in Code:

Utilize Python libraries like Pygame's mixer module for handling sound and music in your game.

Code events triggering specific sounds, such as playing victory music upon winning a round or initiating character voice lines during key actions.

By thoughtfully integrating sound and music elements into your 2D fighting game, you can elevate the player experience, creating a more immersive
and engaging atmosphere.

Experimenting with different audio assets and fine-tuning the balance will contribute to the overall polish of your game.

BACKGROUND IMAGE:

We used natural backgrounds in games merely as visual elements, but within the context of mountainous landscapes, a deeper theory unfolds. The incorporation of mountain backgrounds in gaming goes beyond aesthetics. We used to believe that nature was a mere backdrop to human existence, but when immersed in the tranquility of mountains, a profound theory emerges. Nature, with its towering peaks and serene valleys, becomes an integral canvas shaping the human experience. The mountainous backdrop symbolizes the resilience of the natural world, echoing a timeless narrative of balance, challenge, and unyielding beauty.

Fig : Background image of street fighter game

As we gaze upon these majestic landscapes, we realize that our connection with nature runs far deeper than mere observation—it's a harmonious dance between humanity and the mountains, a symphony of existence that transcends the ordinary

CHARACTER:

We created 2D street fighter game characters with a deliberate fusion of artistry and functionality. In this pixelated realm, every character design is a meticulous dance between visual appeal and gameplay dynamics. The flat planes and vibrant sprites aren't just a stylistic choice; they serve as the canvas for a kinetic ballet of moves and reactions. The deliberate simplicity of the 2D design allows players to focus on the raw essence of combat, transcending visual complexities. Each pixel is a strategic stroke, contributing to a symphony of actions that defines the character's identity. In the 2D street fighter universe, the characters are not just graphical entities; they are dynamic, interactive expressions of martial prowess and design ingenuity

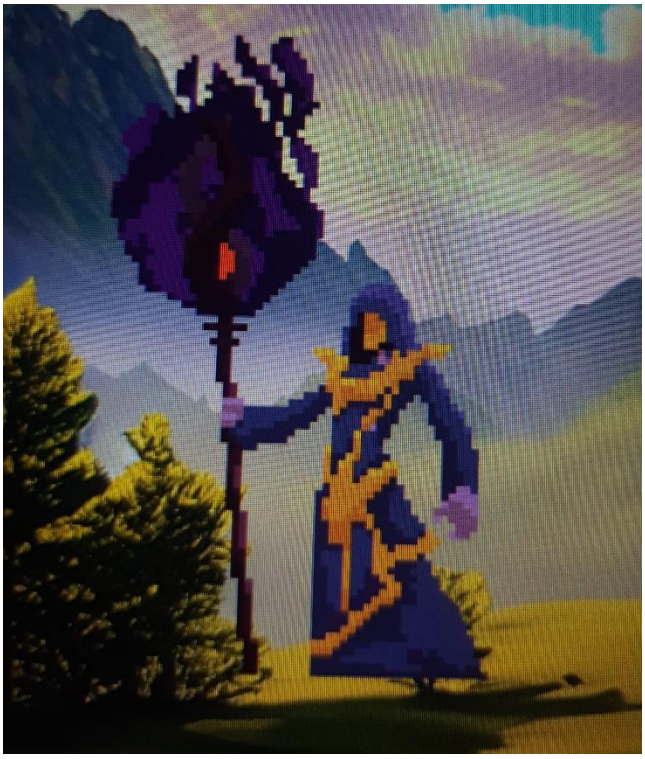

Fig: Character 1

We created 2D street fighter game characters 1 with a deliberate fusion of artistry and functionality. has very fast and agile moves, such as the Hyakuretsu Kyaku, a rapid kick that can hit multiple times, and the Spinning Bird Kick, a spinning kick that can hit enemies in the air.

Fig: Health bar character 1

Fig: Character 2

we made 2D street fighter game characters 2 that look good and work well. In this game, the characters are flat and colorful. He has mastered many techniques that surpass the limits of human strength. He is obsessed with finding worthy opponents to fight and kill.

Fig: Health bar character 2

HEALTH BAR:

We give health bars to street fight characters not merely as a visual representation of their vitality, but as a symbolic embodiment of resilience within the gaming narrative. The health bar becomes a dynamic storytelling tool, reflecting the ebb and flow of battles, the endurance of the character, and the strategic decisions made by the player. It transforms the virtual combat experience into a tangible journey, where each hit and recovery mirrors the character's tenacity and the player's skill. The health bar is not just a graphical element; it becomes the pulse of the fight, a heartbeat that resonates with the essence of struggle and triumph within the digital streets. Basically the health bar is more than a number; it is a story of the fight. It shows how the character and the player face the challenge and survive. It is the heartbeat of the game, a sign of struggle and victory.

The health bar is also a measure of skill; it is a test of the fight. It tells how the character and the player use their moves and tactics. It is the brain of the game, a guide of strategy and action.The health bar is finally a reward of thrill; it is a joy of the fight. It gives the character and the player a sense of accomplishment and satisfaction. It is the soul of the game, a source of fun and excitement.

VI. Working

To start playing the game, first, use WinRAR to extract the "brawler" file. Once extracted, you'll find a folder named "brawler." Open this folder, and you'll see an application called "main.exe." Double-click on it to launch the game. Upon entering, you'll be greeted by a visually appealing 2D street fighter game featuring two tactical characters. The backdrop is adorned with a beautiful image, and each player's health bars and earned points are prominently displayed after every round. If you decide to control character 1 and assign character 2 to your partner, the controls for character 1 are straightforward: W for jumping, A for left movement, D for right movement, R for attack 1, and T for attack 2. For player 2, using character 2, the controls are equally intuitive: the up arrow for jumping, left arrow for left movement, right arrow for right movement, 1 on the numpad for attack 1, and 2 on the numpad for attack 2. After selecting characters and controls, a 3-second countdown initiates the game. Players engage in battles, executing movements and attacks. When one character depletes their health bar entirely, the opponent gains a win point, and a triumphant "VICTORY" message appears. This process repeats for a minimum of 20 rounds. The winner is determined by the total points earned after all rounds. Points are accumulated each time a player secures a victory. The player with the higher point tally at the end of the 20 rounds is declared the overall winner. This game design combines simplicity and excitement, with clear controls and a visually engaging environment. The emphasis on points and rounds adds a competitive edge, ensuring players stay engaged throughout the gameplay. Whether executing precise movements or unleashing powerful attacks, the 2D street fighter game offers an immersive experience with a straightforward objective: emerge victorious after an intense series of dynamic battles. As you delve into the gameplay, you'll find that the characters are not just pixels on the screen; they are dynamic representations of martial prowess and strategic choices. The simplicity of the 2D design doesn't just serve aesthetic purposes; it enhances the focus on the raw essence of combat. Each pixel contributes to a visually appealing and strategically rich experience. The tactical choices extend beyond character selection, as players must decide when to jump, move left or right, and which attack to unleash. The intuitive controls provide a seamless connection between the player's intentions and the on-screen action, allowing for fluid and responsive gameplay. The countdown before each round builds anticipation, creating a moment of suspense before the clash of characters begins. The 3-second countdown not only sets the stage for the impending battle but also adds an element of strategy, as players can use this time to plan their initial moves. The inclusion of a win point system adds a

layer of competition. It's not just about surviving; it's about strategically outmaneuvering your opponent to secure victories. The "VICTORY" message serves as both a reward for the successful player and a momentary pause before the next round begins. The continuous cycle of rounds ensures that no single victory or defeat overly influences the overall outcome. With a minimum of 20 rounds, the game offers a substantial playing time, allowing players to adapt, learn, and evolve their strategies. The element of unpredictability keeps each round exciting, as players must be vigilant and responsive to their opponent's tactics. In the end, the accumulation of points over multiple rounds determines the ultimate winner. This format not only rewards individual skill but also resilience and adaptability, making the game accessible to players of varying skill levels. Whether you're a seasoned gamer or a casual player, the 2D street fighter game provides an engaging and competitive experience within its visually captivating world of strategic combat.

VII CONCLUSION

In conclusion, the development and realization of this street fighter game mark a significant milestone in the realm of gaming and interactive entertainment. Through a combination of creativity, technical expertise, and unwavering dedication, we've brought to life a captivating and engaging gaming experience.

This game harnesses cutting-edge technology and innovative game design to deliver a thrilling and immersive gameplay adventure. It has been crafted with the utmost care and precision, aiming to provide players with an unforgettable and action-packed journey. As we move forward, the future of this street fighter game holds the promise of continuous improvement and expansion. There are still challenges to overcome, including refining gameplay mechanics, enhancing graphics and sound, and addressing any community feedback and bug fixes. The commitment to excellence in game development remains steadfastAs we look ahead, the potential for growth and innovation in the field of gaming is limitless. With your support and enthusiasm, we are confident that this street fighter game will continue to play a pivotal role in shaping the future of gaming, creating memorable moments and thrilling challenges for all who embark on this adventure.

Thank you for being a part of this exciting journey.

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