Elemental Planets: Exploring Adaptive Gameplay and Elemental Mechanics in a Roguelike RPG

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Abstract—This report presents the development of *Elemental Planets*, a roguelike RPG with puzzle elements. The game features Dr. Bumi Wan, a scientist mastering elemental bending across four unique planets—Earth, Water, Fire, and Air. Each planet offers distinct mechanics that integrate adaptive gameplay, procedural content generation, and strategic challenges. The project covers early game design, unique mechanics, and adaptive features, aiming to create an immersive player experience.

I. INTRODUCTION

A. Literature Survey

A survey of related games and literature on procedural generation and adaptive gameplay highlights the unique aspects *Elemental Planets* seeks to bring to the RPG genre. Games like *Hades* and the *Legend of Zelda* series provide engaging exploration and combat mechanics; however, they often rely on static environments or limited adaptability to player choices. Procedural generation research suggests that introducing algorithmically generated environments can greatly enhance replayability by creating fresh and diverse gameplay experiences each time [1]. Shaker et al. (2016) emphasize that procedural generation is particularly effective in maintaining player interest by offering unexpected challenges and varied layouts [2]. *Elemental Planets* applies these insights by creating unique elemental-themed worlds, each with distinct environmental conditions and procedural puzzles that require players to adapt their strategies.

Adaptive AI plays a significant role in *Elemental Planets*, where enemies respond to the player's bending abilities and tactics. Research by Yannakakis and Togelius (2018) shows that adaptive AI can heighten engagement by creating a personalized difficulty curve that adjusts to the player's skill level [3]. This ensures a balanced challenge across different stages, which aligns with Houlette's findings on player modeling, where adaptive responses keep players immersed and challenged [4]. Unlike traditional RPGs that may rely on linear combat systems, *Elemental Planets* uses adaptive AI to create varied encounters, forcing players to think strategically as they explore each elemental planet.

The game also incorporates puzzle mechanics inspired by the Mechanics-Dynamics-Aesthetics (MDA) framework, which highlights how mechanics and player interactions create a cohesive gameplay experience [5]. Each elemental planet introduces puzzles that align with its theme, such as water manipulation on the Water planet or gravity-based challenges on the Air planet. These puzzles enhance the player's immersion by requiring creative problem-solving aligned with each element's physical characteristics. This approach draws on Smith and Mateas's (2011) research on

procedural puzzle generation, where variations in puzzle design can engage players and add depth to gameplay through environment-driven mechanics [6].

In addition to these core gameplay elements, *Elemental Planets* draws narrative inspiration from *Avatar: The Last Airbender*, where each element is tied to a specific skill and culture. This connection between character abilities and world-building allows players to explore different cultures within the game, creating a more immersive experience as they unlock each elemental power [7]. By integrating cultural and elemental themes, *Elemental Planets* aims to provide players with a character-driven narrative that evolves alongside their gameplay skills, resulting in a more personalized and meaningful journey.

B. Idea

Elemental Planets is an RPG that immerses players in the role of Dr. Bumi Wan, a scientist and earth-bender who embarks on a journey to master elemental abilities across four unique planets—Earth, Water, Fire, and Air. The concept of elemental bending is inspired by the acclaimed series *Avatar: The Last Airbender*, where characters harness elemental powers that shape their world and interactions. Just as the series explores the versatility of elemental control in combat and everyday life, *Elemental Planets* integrates these themes to offer players a diverse range of abilities to tackle puzzles, engage in strategic combat, and navigate environments creatively.

The game expands on the traditional RPG framework by integrating adaptive AI and procedurally generated content, enabling players to experience dynamic and varied gameplay. Unlike conventional RPGs that may feature static environments and predictable enemy behaviors, *Elemental Planets* challenges players to adapt their strategies based on the unique physical conditions and adaptive enemy AI of each elemental world [1],[2]. This design choice aligns with the principles outlined in the Mechanics-Dynamics-Aesthetics (MDA) Framework, emphasizing a blend of engaging mechanics and interactive elements that deepen player immersion [3].

Drawing inspiration from how *Avatar: The Last Airbender* uses elemental mastery to drive inventive action and storytelling, *Elemental Planets* leverages this concept to create an immersive, responsive experience. Each planet's environment is designed to complement its corresponding element—rocky terrains for Earth, fluid dynamics for Water, volcanic hazards for Fire, and gravity-defying platforms for Air—enhancing the player's connection to the game world. This approach also incorporates design insights from games like *Hades* and *The Legend of Zelda*, where player choice and environmental interaction are crucial for progression [4],[5]. However, unlike these games, which may face limitations in adaptability, *Elemental Planets* aims to provide fresh and innovative interactions through its elemental mechanics and adaptive gameplay, ensuring a novel experience at every stage.

The game's focus on procedural generation not only enhances replayability but also ensures that each player's journey is unique. By generating diverse planetary layouts and puzzles that align with the elemental themes, *Elemental Planets*keeps gameplay engaging and unpredictable [6]. This method encourages players to explore different

strategies and fully utilize their bending abilities, fostering a deeper engagement with the game's mechanics and story.

C. Title and Description

a. Title

Elemental Planets

b. Description

Elemental Planets follows Dr. Bumi Wan, a scientist and earth-bender on a quest to master elemental powers across four distinct worlds: Earth, Water, Fire, and Air. Players must harness each element's unique abilities to solve puzzles, adapt to dynamic environments, and confront elemental bosses. With procedurally generated levels and adaptive AI-driven enemies, *Elemental Planets* challenges players to explore, strategize, and use Dr. Bumi's bending skills to restore balance across the elemental planets.

D. Game Summary and Storyline

a. Game Summary

Elemental Planets immerses players in a unique RPG experience where they take on the role of Dr. Bumi Wan, a scientist and earth-bender who discovers a way to teleport between four elemental planets: Earth, Water, Fire, and Air. Each planet presents its own environmental conditions and elemental challenges, pushing players to adapt their strategies using Dr. Bumi's evolving elemental abilities. Players solve complex puzzles, engage in adaptive combat with elemental foes, and explore procedurally generated landscapes, each designed to test their mastery of elemental bending and strategic thinking. *Elemental Planets* offers a blend of exploration, combat, and puzzle-solving, encouraging players to uncover secrets about the elemental imbalance threatening the universe.

b. Storyline
Dr. Bumi Wan, a scientist and earth-bender, is driven by a personal tragedy. A recent elemental disturbance on Earth led to a catastrophic event, claiming the lives of his family. Determined to prevent future disasters, he invents a teleportation device capable of reaching distant elemental planets, each representing a unique element—Earth, Water, Fire, and Air. Convinced that mastering each element will reveal the cause of the imbalance threatening his world, Dr. Bumi sets out on an ambitious quest, hoping to restore harmony across the planets and protect his home.

The Journey Across the Elemental Planets
Dr. Bumi's journey begins on Earth, where he enhances his earth-bending skills.

He learns that each planet has a distinct elemental force in chaos, destabilizing the universe. Using his teleportation device, he ventures to each planet in search of clues, elemental skills, and ancient knowledge. Each planet introduces a unique elemental challenge that requires players to adapt to different physical conditions, puzzles, and enemy tactics:

- **Water Planet**: Here, Dr. Bumi learns water-bending, allowing him to manipulate water currents and heal himself. The Water planet has serene floating islands and rivers, yet it faces droughts and unusual flooding due to the elemental disruption. He assists the water-bending inhabitants by restoring water flows, unlocking pathways, and gaining insight into the origins of the elemental imbalance.
- **Fire Planet**: A volatile, lava-filled environment challenges Dr. Bumi's skills and resilience. The intense heat and active volcanoes demand precise control as he learns fire-bending, giving him the ability to create bursts of fire to clear obstacles and engage in combat. Fire-based enemies and traps test his new skill, while ancient ruins reveal crucial clues about a forgotten conflict that once fractured the elemental balance.
- **Air Planet**: Low gravity and floating rocks define the Air planet, where Dr. Bumi gains air-bending abilities. The inhabitants, affected by weakened wind control, share their stories and help him harness wind to navigate through floating platforms and reach hard-to-access areas. Here, he finds the final clues that connect the planets and hint at a prophecy about the "balancer," someone capable of restoring harmony across all elements.

Uncovering the Truth

As Dr. Bumi gathers clues from each planet, he pieces together a forgotten history of how the elemental forces were once unified, maintaining a delicate balance that kept the universe stable. The elemental disruption, however, fractured this unity, leading to instability across the worlds. The fragmented elements have gained sentience, manifesting as powerful elemental bosses on each planet. These bosses act as gatekeepers, testing Dr. Bumi's skills and determination. To defeat them, he must use his newly acquired abilities in creative ways, strategically teleporting between planets to exploit elemental advantages.

The Final Confrontation and Legacy

Armed with all four elemental skills, Dr. Bumi returns to Earth, where he faces the manifestation of the elemental imbalance—a powerful entity born from the fractured connection between the elements. In a climactic battle, he combines earth, water, fire, and air-bending abilities to confront and subdue the entity, restoring harmony and stabilizing the elemental forces. With the balance restored, Dr. Bumi completes his journey, honoring his family's legacy and ensuring the safety of the elemental planets.

Aftermath

As the elemental worlds return to peace, Dr. Bumi realizes that his quest has given him a deeper understanding of each element, their interdependence, and his own role as a protector of balance. Though the journey was marked by challenges and loss, he emerges with a sense of purpose, dedicated to preserving the harmony he has fought so hard to achieve.

II.   METHODS

A. Game Overview

- **Genre:** RPG + Puzzle
- **Target Platform:** PC
- **Game Engine:** Unity
- **Target Audience:** Mid-core to Core Players, aged 16 and above, especially fans of fantasy RPGs, strategic gameplay, and story-driven experiences.
- **Game World:** A diverse and interconnected planetary system with four elemental worlds—Earth, Water, Fire, and Air. Each planet presents unique environmental conditions, physical characteristics, and elemental themes, creating immersive atmospheres that respond dynamically to Dr. Bumi Wan's elemental bending abilities.
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B. Characters

- **Main Character (Dr. Bumi Wan):** A scientist and earth-bender driven by the need to understand and control the elemental forces threatening his world. Dr. Bumi invents a teleportation device that allows him to journey across the elemental planets, mastering each element to restore balance. As he gains control over water, fire, and air-bending, Dr. Bumi evolves from a grounded scientist to a powerful protector of balance, motivated by personal tragedy and a determination to prevent further disasters.
- **Elemental Bosses:** Each planet is guarded by a powerful elemental boss that embodies the chaotic force of its respective element. These sentient beings serve as gatekeepers to the knowledge Dr. Bumi seeks. Each boss requires players to strategically use the bending abilities acquired on other planets to expose weaknesses and overcome their defenses.
- **NPCs and Inhabitants:** Throughout his journey, Dr. Bumi encounters various inhabitants native to each planet. These NPCs offer clues, lore, and hints about their elemental worlds, helping Dr. Bumi piece together the mystery of the elemental imbalance. Some NPCs teach him bending techniques, while others guide him to hidden areas and artifacts that aid his quest.
- **Enemies:** Elemental creatures and entities that adapt to Dr. Bumi's abilities, creating dynamic challenges. These enemies vary by planet—fire spirits on the Fire planet, water elementals on the Water planet, etc.—and require the player to use different elemental skills to exploit their vulnerabilities. Each enemy type features unique attack patterns that test players' strategic use of teleportation and bending powers.
- **The Manifestation of Imbalance (Final Boss):** In the climactic battle, Dr. Bumi confronts a powerful entity born from the fractured connection between the elements. This final boss represents the ultimate threat to the planetary system, requiring Dr. Bumi to unite all four elemental skills to overcome it and restore harmony.

C. Storyboard

The storyboard illustrates key gameplay elements and interactions in *Elemental Planets*, highlighting Dr. Bumi Wan's journey across four elemental worlds. Each scene showcases unique bending abilities, adaptive challenges, and environmental interactions that players will encounter as they master elemental powers, solve puzzles, and face formidable enemies. These visuals provide a glimpse into the diverse mechanics and strategic depth that define the gameplay experience

Fire Planet Puzzle Level
A labyrinthine layout filled with lava pools and fire-based puzzles. Players must use fire-bending to navigate through obstacles and activate mechanisms. This image showcases the complex environmental challenges players face, requiring mastery of elemental skills.

Water Planet Puzzle Level
A water-themed puzzle environment with flowing streams and circular platforms. Players must use water-bending to manipulate currents and solve puzzles, showcasing the interactive nature of the Water planet.

Figure 1. Water planet puzzle level.

Figure 2. Fire planet puzzle level.

General Level Overview
A comprehensive view of the multi-elemental planetary layout, with Earth, Water, Fire, and Air sections interconnected. The HUD displays elemental abilities and cooldowns, emphasizing the strategic element-switching mechanic that is central to gameplay.

Figure 3. General level overview of the game.

Fire Planet Boss Battle
Dr. Bumi Wan confronts a massive fire elemental boss in a fiery volcanic arena. This scene demonstrates the adaptive AI and elemental strategy, where players use water-bending to counter the intense heat and flames, creating a high-stakes combat scenario.

Figure 4. Fire planet boss battle.

Elemental Teleportation Screen

A celestial view of interconnected planets (Earth, Water, Fire, Air) with a teleportation interface. This screen allows players to switch between elemental worlds, taking advantage of each planet's unique conditions for combat and exploration.

Figure 5.Elemental teleportation screen.

Save Crystal

A glowing crystal in a rocky setting, marking a save point where players can restore health and save progress. These crystals provide strategic checkpoints, especially before difficult battles or puzzles, ensuring players have a lifeline throughout their journey.

Figure 6. Save crystal.

Story Completion Journal
An intricately designed journal that logs Dr. Bumi's progress, clues, and elemental knowledge. This feature helps players piece together the story and track their discoveries, enhancing narrative engagement.

Dialogue with NPCs
A serene forest setting where Dr. Bumi Wan interacts with an NPC, receiving hints and journal entries to aid his quest. This interaction highlights the role of NPCs in guiding players through clues and lore, enriching the story while providing valuable gameplay hints.

Figure 7. Story completion Journal.

Figure 8. Dialogue with NPCs.

Inventory Management

Dr. Bumi's inventory screen, showing collected items, potions, and elemental crystals. The inventory allows players to manage resources and upgrade abilities, adding a layer of strategy in preparing for different planetary challenges.

Figure 9. Inventory management.

D. Game Components

- **Physics:**

  - **Elemental Mechanics:** Each planet's elemental conditions affect Dr. Bumi Wan's abilities and movement. For example, reduced gravity on the Air planet allows for high jumps, while intense heat on the Fire planet requires precise timing to avoid damage.
  - **Teleportation Mechanics:** Dr. Bumi's teleportation device enables instant travel between planets, allowing players to exploit elemental advantages during combat and puzzles. This mechanic requires a cooldown, encouraging players to strategize their teleportation.

- **Audio:**

  - **Elemental Soundscapes:** Each planet has a unique atmospheric soundscape, designed to reflect its elemental theme. Water flows on the Water planet, crackling lava on the Fire planet, and gentle winds on the Air planet immerse players in each environment.
  - **Elemental Bending Sounds:** Specific sound effects accompany each bending ability—earth-bending has a deep, rumbling sound, while air-bending is accompanied by a soft whoosh. These sounds help distinguish each ability and enhance immersion.

- **AI:**

  - **Adaptive Enemy Behavior:** Enemy AI adapts to Dr. Bumi's elemental abilities, adjusting tactics based on his actions. Enemies respond dynamically—fire enemies intensify their attacks if Dr. Bumi uses water-bending frequently, requiring players to strategize.
  - **Elemental Bosses:** Each elemental boss uses AI to counter the player's specific bending abilities. Players must use combinations of elemental powers and teleportation to identify and exploit each boss's weaknesses.

- **Inventory Management:**

  - **Collectible Items and Potions:** Players collect items like health potions, elemental crystals, and artifacts from defeated enemies. Managing these items strategically is essential for survival, especially in challenging planetary environments.
  - **Elemental Enhancements:** Collecting elemental crystals allows Dr. Bumi to upgrade his bending abilities, adding layers of strength and complexity to his powers as the game progresses.

Story Completion Journal:

- Tracks clues and pieces of lore gathered from each planet, helping players piece together the storyline as they progress.
- Acts as a guide, allowing players to revisit past discoviries and stay engaged with the main story.

- **Save Mechanic with Crystals:**

  - **Crystal Save Points:** Crystals placed throughout each level act as save points, restoring health and abilities. This mechanic allows players to save progress at strategic points, encouraging exploration while providing a fallback during difficult sections.

- **Skill and Teleportation Cooldowns:**

  - **Elemental Skills:** Each bending skill has a cooldown, encouraging players to carefully time their abilities in combat and puzzle-solving. Teleportation also has a cooldown, adding a layer of strategy when switching between planets.

- **Puzzles and Procedural Generation:**

  - **Planet-Specific Puzzles:** Each planet features puzzles tied to its elemental properties, such as water manipulation, earth-moving obstacles, and air-based

gravity puzzles. These puzzles are procedurally generated, providing unique challenges on each playthrough.

- **Environmental Interactions:** Dr. Bumi's bending abilities allow him to manipulate the environment, whether by moving rocks on Earth or creating fire paths on the Fire planet, offering multiple ways to approach and solve each puzzle.

III. RESULTS

A. Anticipated Gameplay Mechanics Feedback

In the design phase, Elemental Planets' unique mechanics are anticipated to engage players by providing an immersive, strategic RPG experience. The elemental bending abilities are expected to offer players versatile tools for both combat and puzzle-solving, enhancing their connection to the game's environment and challenges. Each element serves a dual purpose in exploration and combat—players use water-bending to manipulate currents, earth-bending to clear obstacles, fire-bending to create light or damage enemies, and air-bending for agility on low-gravity platforms. This integration of elemental abilities is expected to deepen gameplay, encouraging players to approach challenges from multiple angles and strategize based on the planetary conditions.
The adaptive AI and procedural generation are also anticipated to enhance replayability. Adaptive AI adjusts enemy tactics in response to the player's actions, adding an evolving challenge that keeps gameplay fresh. Procedurally generated environments introduce variety to each planet's layout and puzzles, ensuring that players experience unique scenarios on each playthrough. Together, these features are designed to maintain engagement by challenging players with dynamic encounters and varied environments.

B. Areas for Potential Improvement

While the planned mechanics introduce engaging features, certain areas may require refinement during development to ensure optimal player experience:

- **AI Behavior and Difficulty Balance:** Balancing adaptive AI to match the player's skill level without overwhelming or under-challenging them will be crucial. Enemy AI needs to respond effectively to Dr. Bumi's elemental abilities, especially in planetary environments with unique elemental effects. Early testing and iteration will be essential to maintain fair yet challenging encounters that adapt to the player's bending skills.
- **Environmental and Level Design:** Each planet's environment should fully utilize the corresponding elemental mechanics without overwhelming players. For instance, water puzzles should be challenging but intuitive, allowing players to feel rewarded as they unlock paths and manipulate currents. Similarly, fire-bending challenges should test combat skills without excessive complexity. Ensuring that each level encourages players to use bending abilities creatively, while also offering accessible difficulty, will be key.
- **Save and Cooldown Mechanics:** The crystal save points and skill cooldowns are critical in managing player progress and pacing. Ensuring that save points are

placed strategically to support players during difficult encounters or puzzles will help maintain engagement. Additionally, balancing the cooldown duration for bending abilities and teleportation will require careful adjustment to avoid frustration and keep gameplay flow smooth.

C. Expected Player Reception to Planetary Transitions and Elemental Strategy

The teleportation mechanic, which allows players to switch between planets with similar layouts but different elemental conditions, is expected to add depth to exploration and combat. This feature encourages players to think strategically, leveraging the elemental advantages of each planet to solve puzzles and defeat enemies. For instance, players may teleport from a fire-filled area to the Water planet to use water-bending for an advantage. Early playtesting will focus on ensuring that this planetary transition mechanic is intuitive and enhances the overall gameplay experience by adding strategic complexity without confusion.

IV.   DISCUSSION OF RESULTS

A. Gameplay Innovation and Strategic Depth

The mechanics in *Elemental Planets* offer a fresh approach to RPGs by integrating elemental bending abilities, adaptive AI, and procedural puzzles. Each element not only serves a purpose in combat but also plays a critical role in exploration and puzzle-solving, encouraging players to think strategically about how to approach challenges on each planet. The adaptive gameplay allows players to teleport between planets and leverage different elemental advantages, creating a layered and dynamic experience. By combining these mechanics with procedurally generated environments, *Elemental Planets* promotes replayability and offers players a unique opportunity to engage with the environment in varied, meaningful ways [1].

B. Anticipated AI and Difficulty Balancing

Balancing adaptive AI to respond dynamically to Dr. Bumi's elemental abilities is central to the gameplay experience. The AI must be carefully tuned to challenge players without overwhelming them, especially as they acquire new bending skills. Additionally, the elemental bosses require thoughtful AI design to adapt to the player's choices and tactics, providing a balanced challenge that evolves with each encounter. Iterative testing and difficulty adjustments will be essential to ensure that the adaptive AI remains fair and engaging, maintaining a consistent level of challenge that aligns with each player's skill progression [2].

C. Design Adaptability and Iteration for Smooth Gameplay Flow

As development progresses, flexibility in design will be crucial for refining gameplay flow and ensuring an intuitive player experience. Each level and planetary

environment will undergo testing to ensure that elemental mechanics and puzzles integrate seamlessly with the game's progression. Procedurally generated puzzles must be carefully structured to prevent repetition and maintain freshness across playthroughs. The save mechanic, teleportation cooldowns, and strategic placement of crystals will also require iteration to maintain balanced pacing and support a smooth transition between exploration, combat, and puzzle-solving. This adaptability in design is key to achieving an immersive and enjoyable gameplay experience.

D. Projected Reception and Engagement

The innovative mechanics in *Elemental Planets* are expected to resonate with players who enjoy strategic RPGs and story-driven exploration. The combination of adaptive AI, elemental puzzles, and a multi-planetary setting aligns with the interests of mid-core to core players, particularly those who value replayability and dynamic gameplay experiences. By focusing on elements that encourage experimentation and strategy, *Elemental Planets* aims to stand out within the RPG genre. Future phases will focus on optimizing these mechanics to ensure they remain accessible yet challenging, appealing to players seeking an immersive and innovative experience [3].

V. Conclusions and recommendations

A. Summary of Findings

Phase 1 of *Elemental Planets* development has established a solid foundation for a unique RPG experience centered on elemental bending abilities, adaptive AI, and procedurally generated environments. These mechanics add strategic depth and encourage players to engage with each planet's environment, utilizing elemental powers creatively. The adaptive AI and teleportation mechanics introduce a layer of replayability and strategy, setting *Elemental Planets* apart within the RPG genre by providing players with a dynamic, multi-layered experience across varied worlds.

B. Recommendations for Development

To build on the groundwork laid in Phase 1, the following areas should be prioritized:

- **AI Behavior and Difficulty Balancing**: Refining adaptive AI to respond dynamically to Dr. Bumi's bending abilities will be essential for creating balanced and engaging encounters. Future development should focus on enhancing enemy responses that align with the player's skills and elemental powers, ensuring that each combat scenario offers a fair yet challenging experience.
- **Iterative Testing for Puzzle and Environmental Integration**: Frequent playtesting will be critical to assess the complexity and engagement of elemental puzzles and level layouts. This iterative approach will help maintain balance and ensure that puzzles and environmental interactions fully leverage Dr. Bumi's abilities without overwhelming players, supporting a smooth and satisfying gameplay flow.

- **Enhanced Environmental Interaction and Procedural Variation**: Expanding interactions within each planet's unique environment will allow players to fully utilize bending mechanics in exploration and puzzle-solving. Further refinement of procedural generation will enhance replayability by introducing new variations in level layouts and puzzles, keeping the gameplay fresh and engaging for players.

By focusing on these recommendations, *Elemental Planets* can evolve into a cohesive and compelling experience, achieving its creative and gameplay objectives in future development phases. This approach will ensure that the game resonates with its target audience, providing a rewarding and immersive journey through the elemental worlds.

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