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(54) **GAME DEVELOPMENT VIA GENERATIVE AI**

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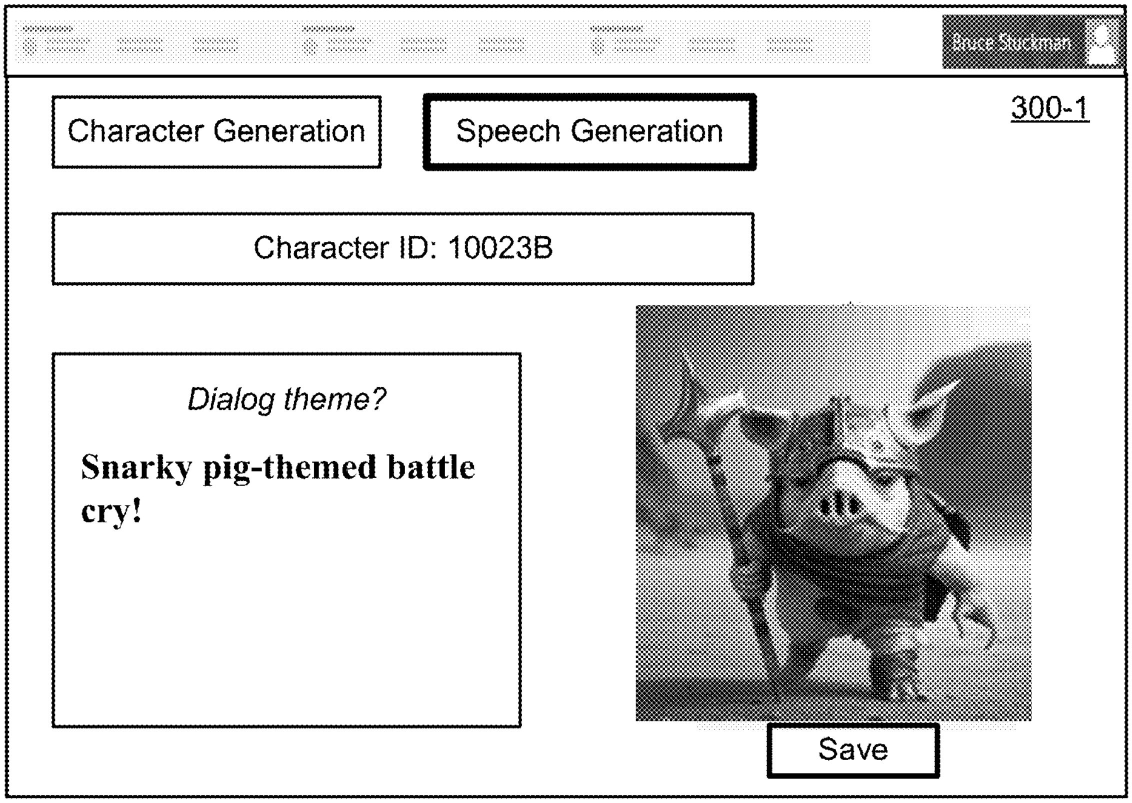
CPC ***A63F 13/67*** (2014.09); ***G06T 11/00*** (2013.01); *G06T 2200/24* (2013.01)

(57) **ABSTRACT**

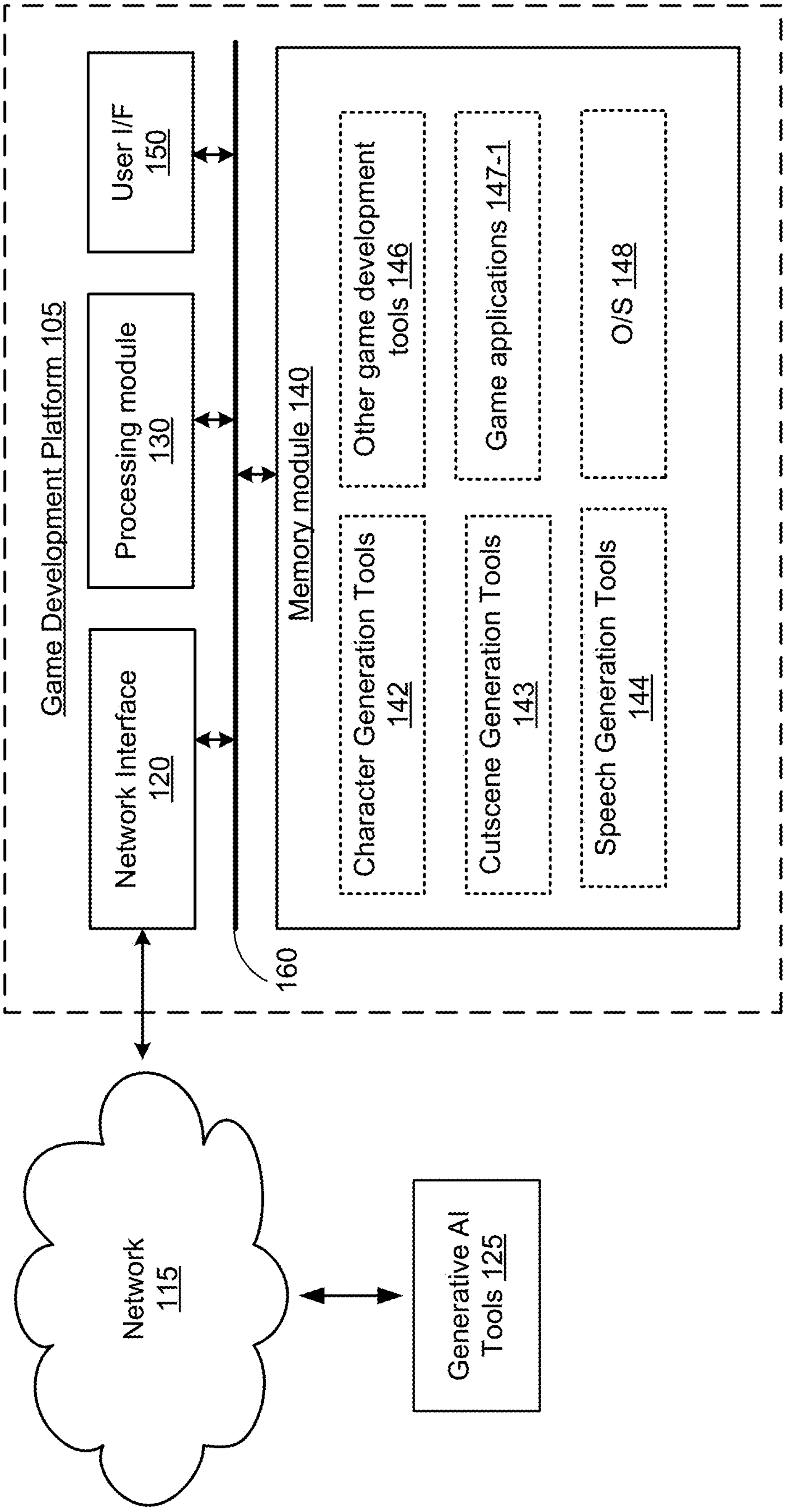
A game development platform operates by: receiving, via a user interface, first natural language text that includes a character description to be associated with a character of a game under development; generating, based on the first natural language text and via a generative AI model trained on a library of images and natural language descriptions, image data corresponding to the character of the game under development; receiving, via the user interface, second natural language text that includes an updated character description to be associated with the character of the game under development; generating, via the generative AI model and based on the second natural language text, updated image data corresponding to the character of the game under development; receiving, via the user interface, an indication that the updated image data is accepted; and generating the game under development to include the updated image data corresponding to the character.



Character ID: 10023B

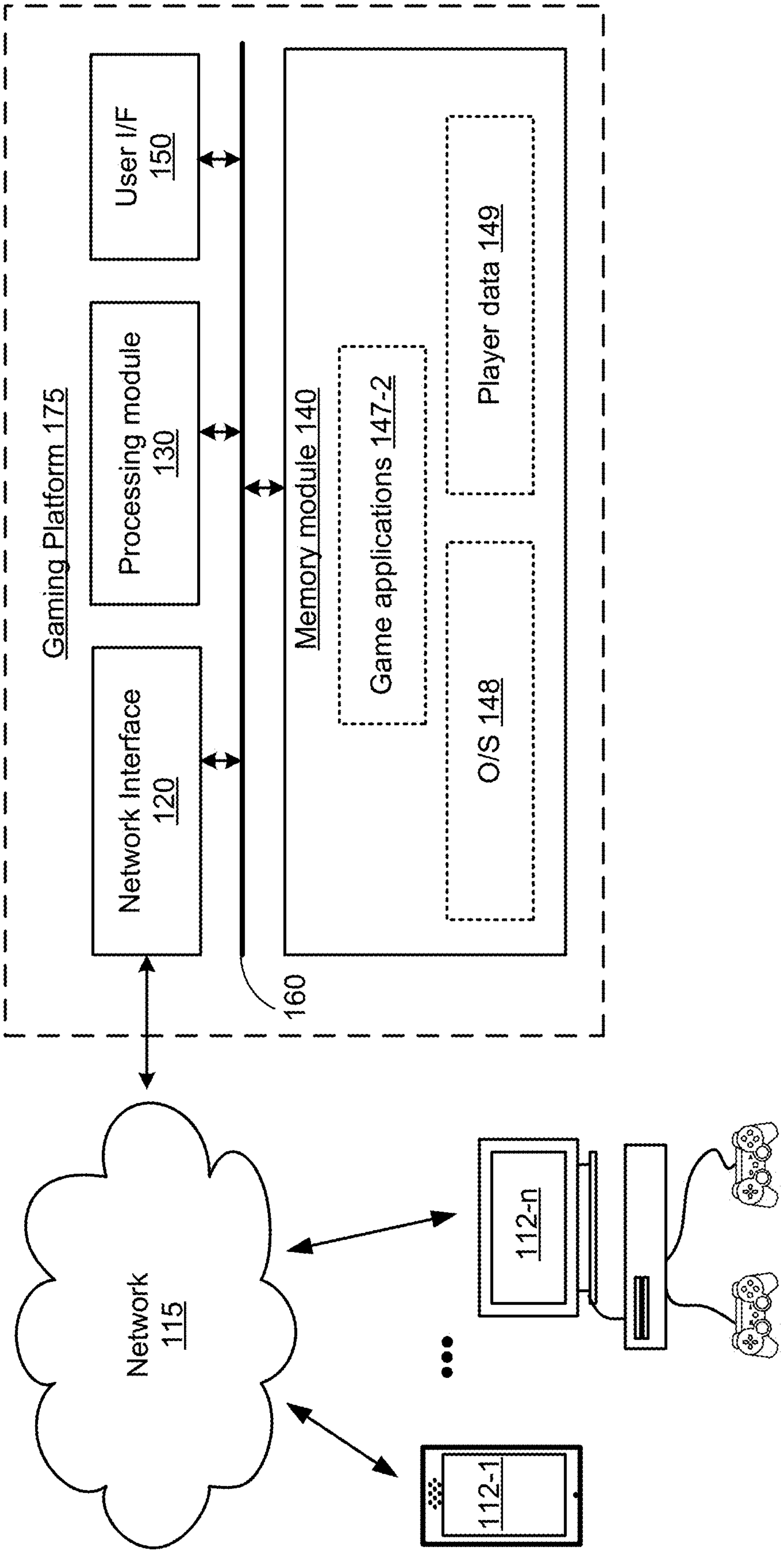
Dialog theme?

Snarky pig-themed battle cry!


Game Development Platform 105
Network Interface 120
Processing module 130
User I/F 150
Memory module 140
Character Generation Tools 142
Cutscene Generation Tools 143
Speech Generation Tools 144
Other game development tools 146
Game applications 147-1
O/S 148
160
Network 115
Generative AI Tools 125

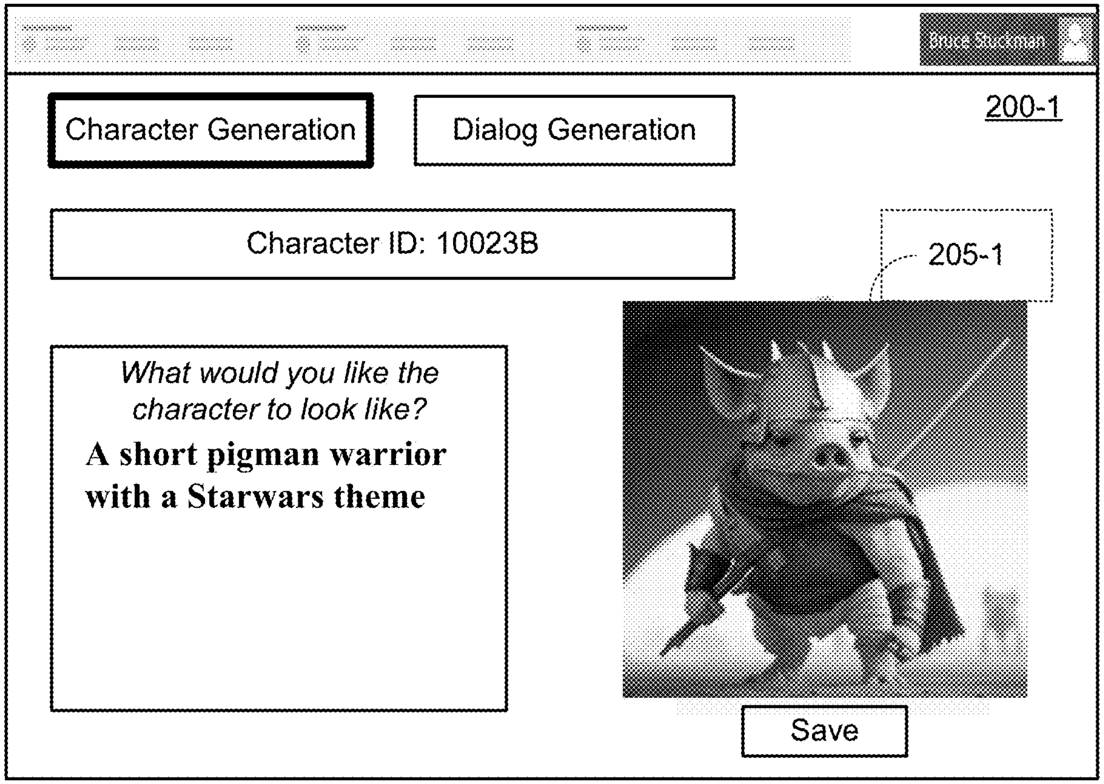
100-1

FIG. 1A


Gaming Platform 175
Network Interface 120
Processing module 130
User I/F 150
Memory module 140
Game applications 147-2
Player data 149
O/S 148
160
Network 115
112-n
112-1

100-2

FIG. 1B

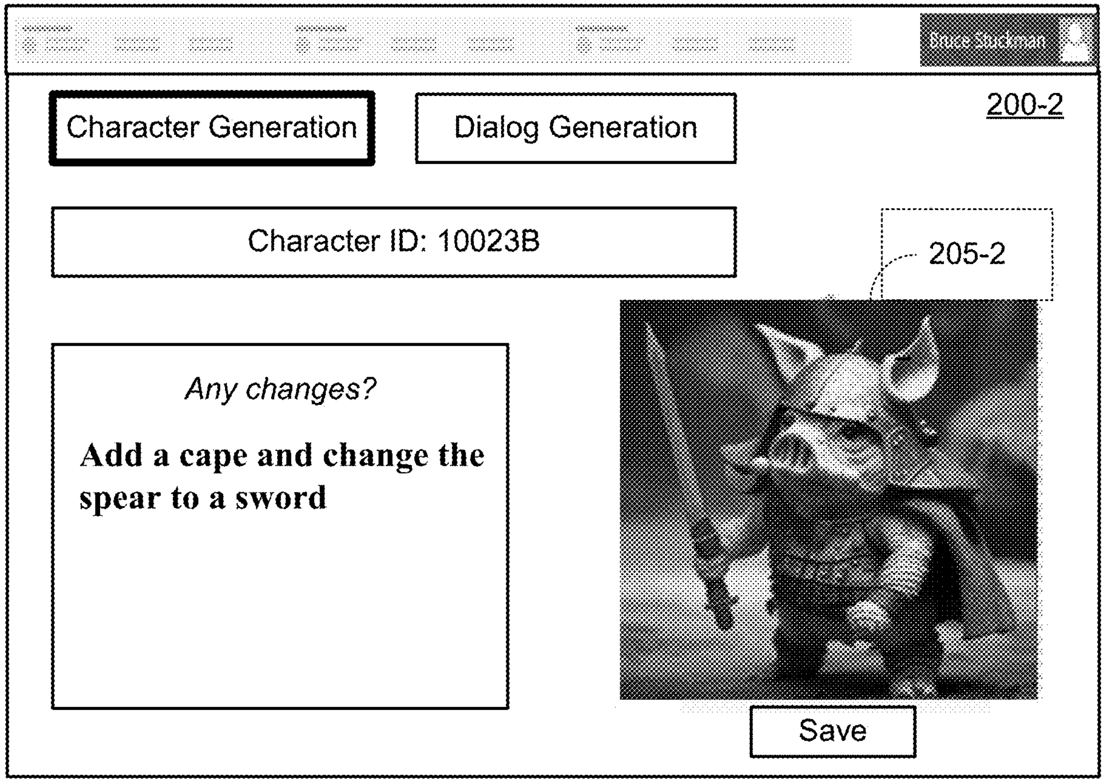


Character ID: 10023B

What would you like the character to look like?

A short pigman warrior with a Starwars theme

FIG. 2A

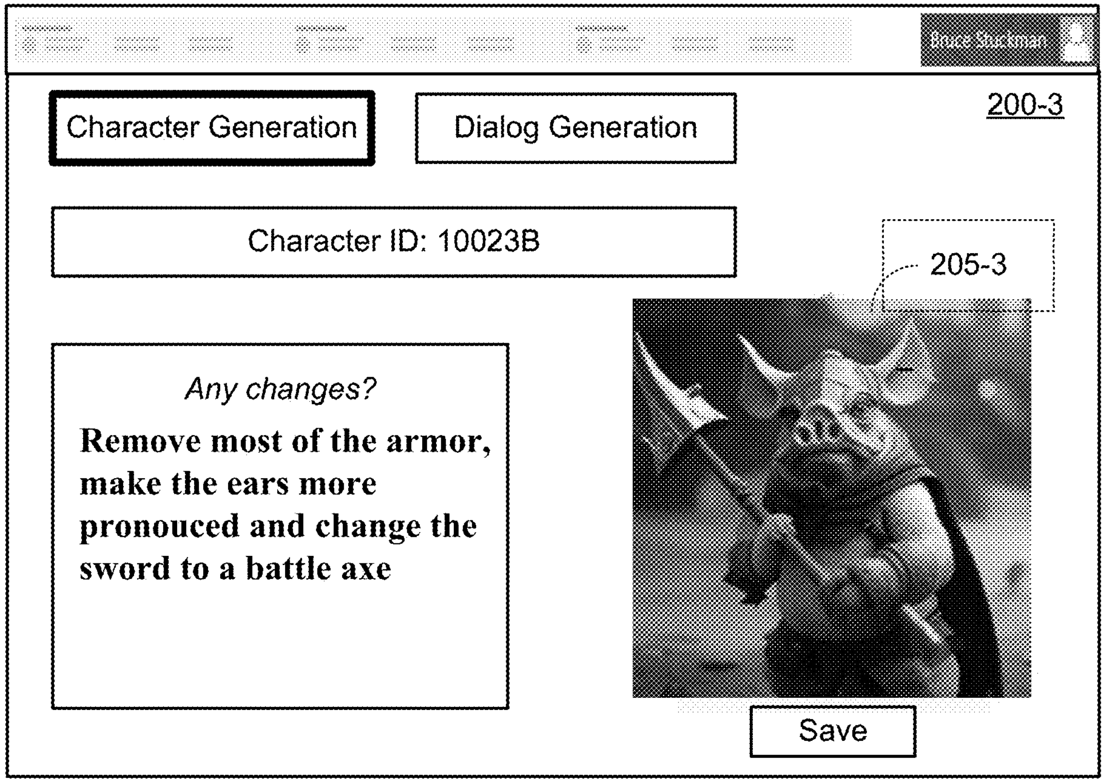


Character ID: 10023B

Any changes?

Add a cape and change the spear to a sword

FIG. 2B

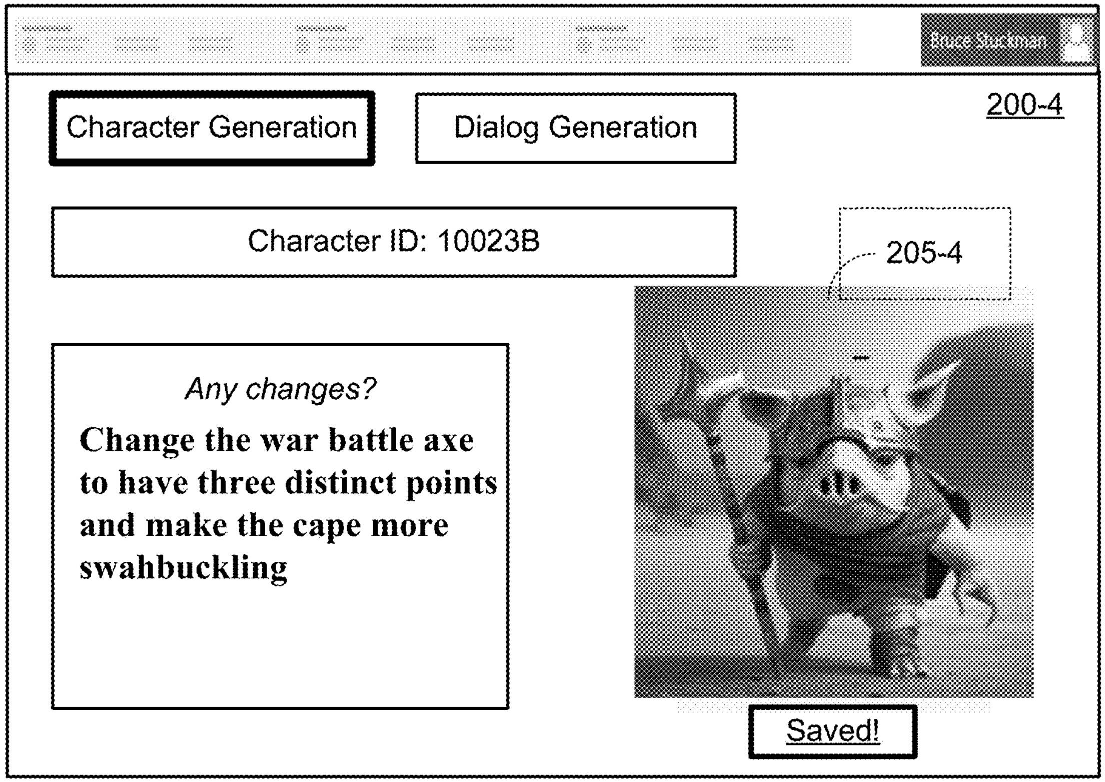


Character ID: 10023B

Any changes?

Remove most of the armor, make the ears more pronouced and change the sword to a battle axe

FIG. 2C



Character ID: 10023B

Any changes?

Change the war battle axe to have three distinct points and make the cape more swahbuckling

FIG. 2D

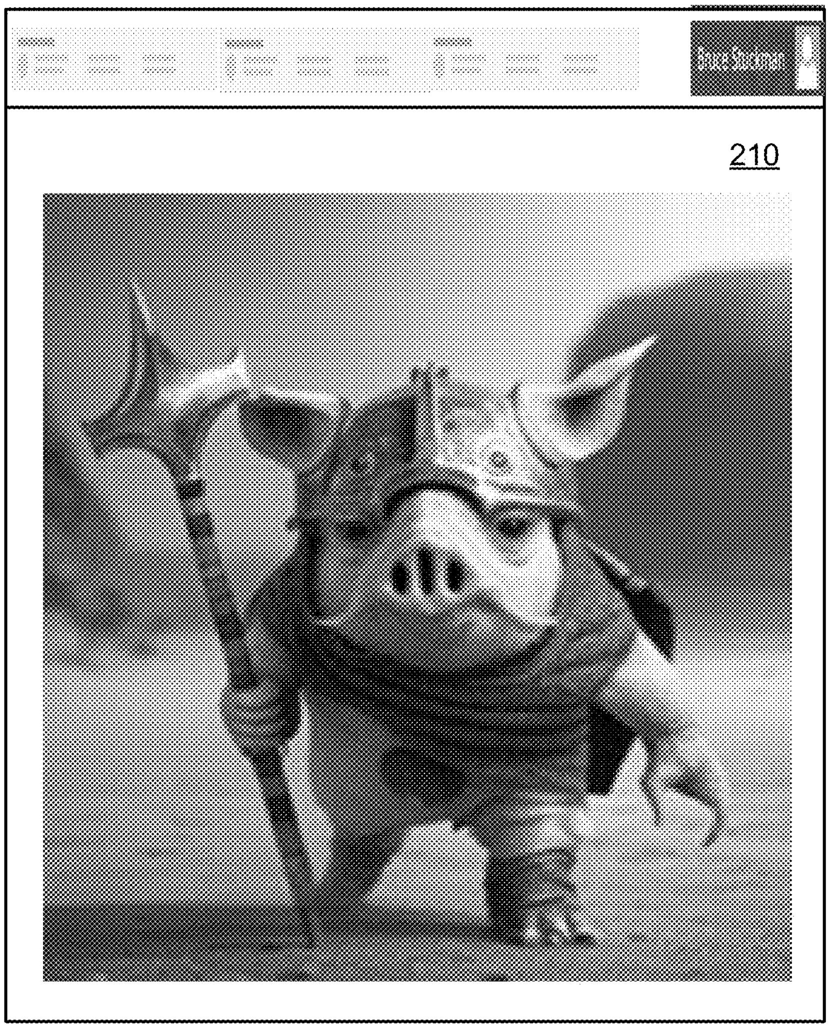
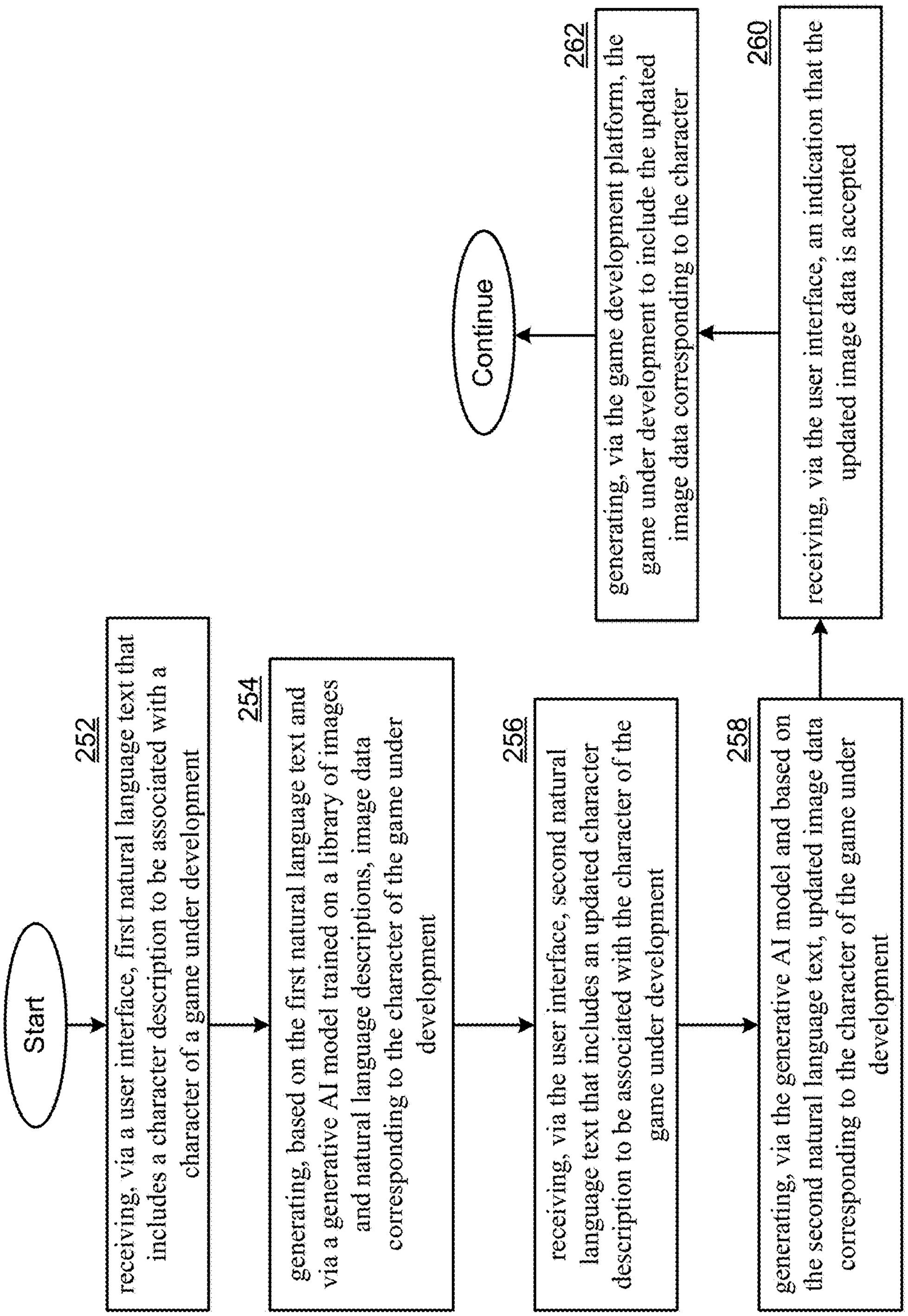
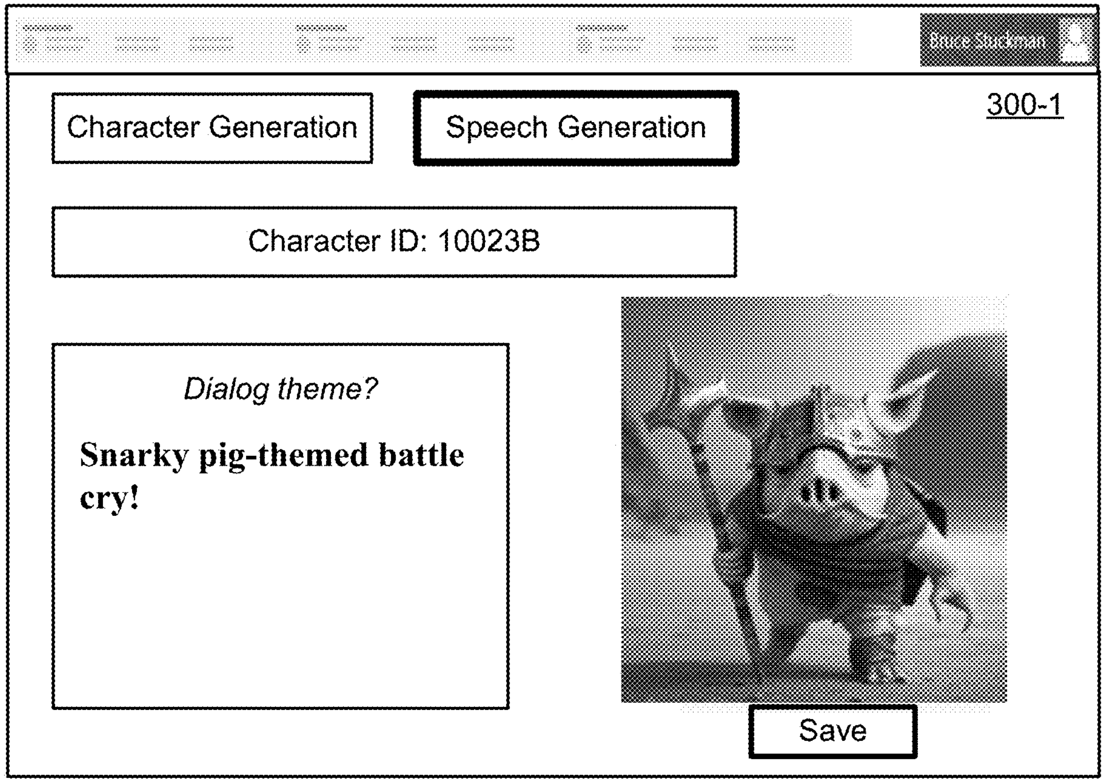


FIG. 2E


Start
252
receiving, via a user interface, first natural language text that includes a character description to be associated with a character of a game under development
254
generating, based on the first natural language text and via a generative AI model trained on a library of images and natural language descriptions, image data corresponding to the character of the game under development
256
receiving, via the user interface, second natural language text that includes an updated character description to be associated with the character of the game under development
258
generating, via the generative AI model and based on the second natural language text, updated image data corresponding to the character of the game under development
260
receiving, via the user interface, an indication that the updated image data is accepted
262
generating, via the game development platform, the game under development to include the updated image data corresponding to the character
Continue

250

FIG. 2F

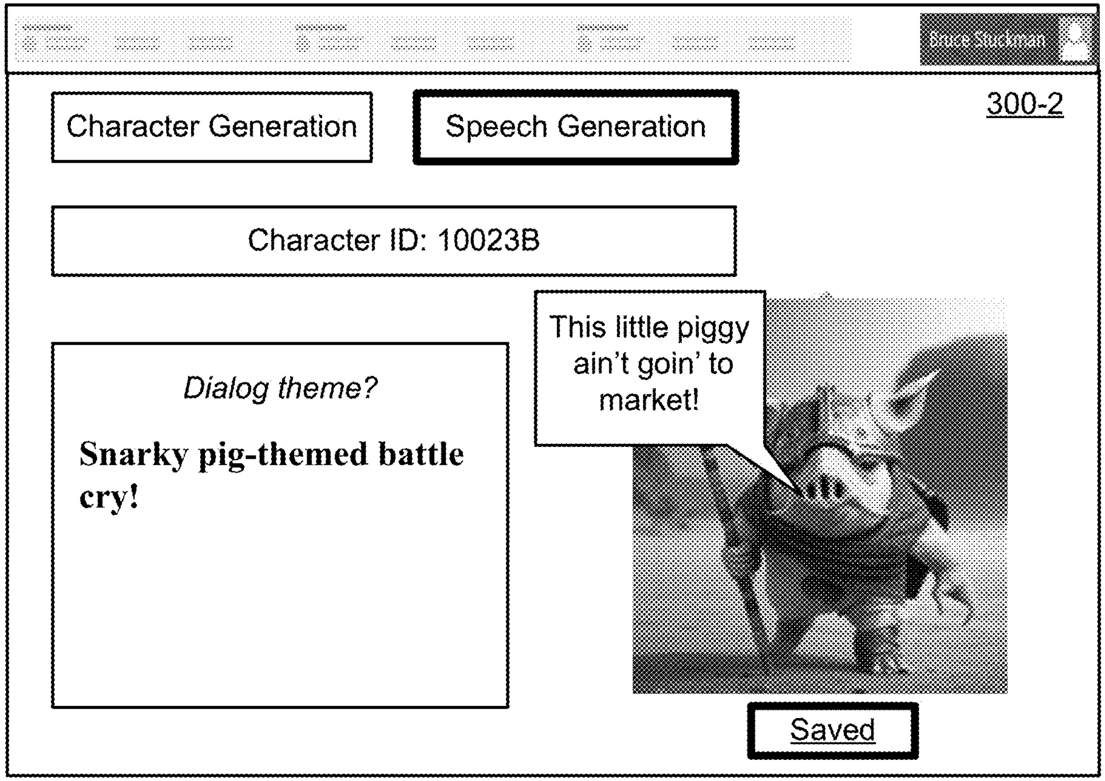


Character ID: 10023B

Dialog theme?

Snarky pig-themed battle cry!

FIG. 3A



Character ID: 10023B

Dialog theme?

Snarky pig-themed battle cry!

This little piggy ain't goin' to market!

FIG. 3B

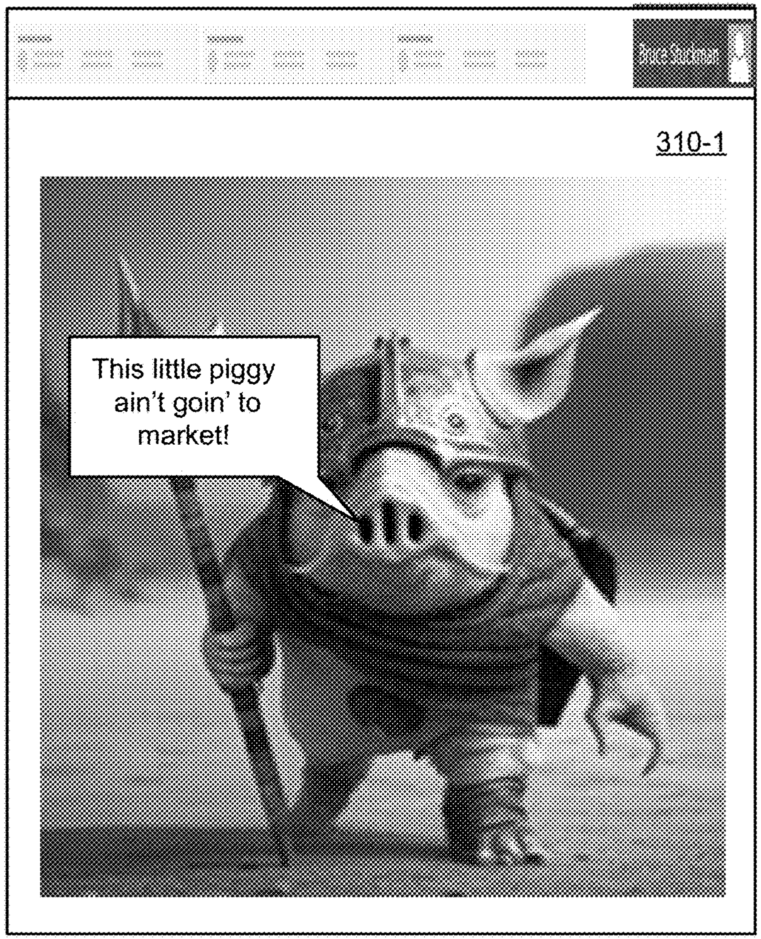


FIG. 3C

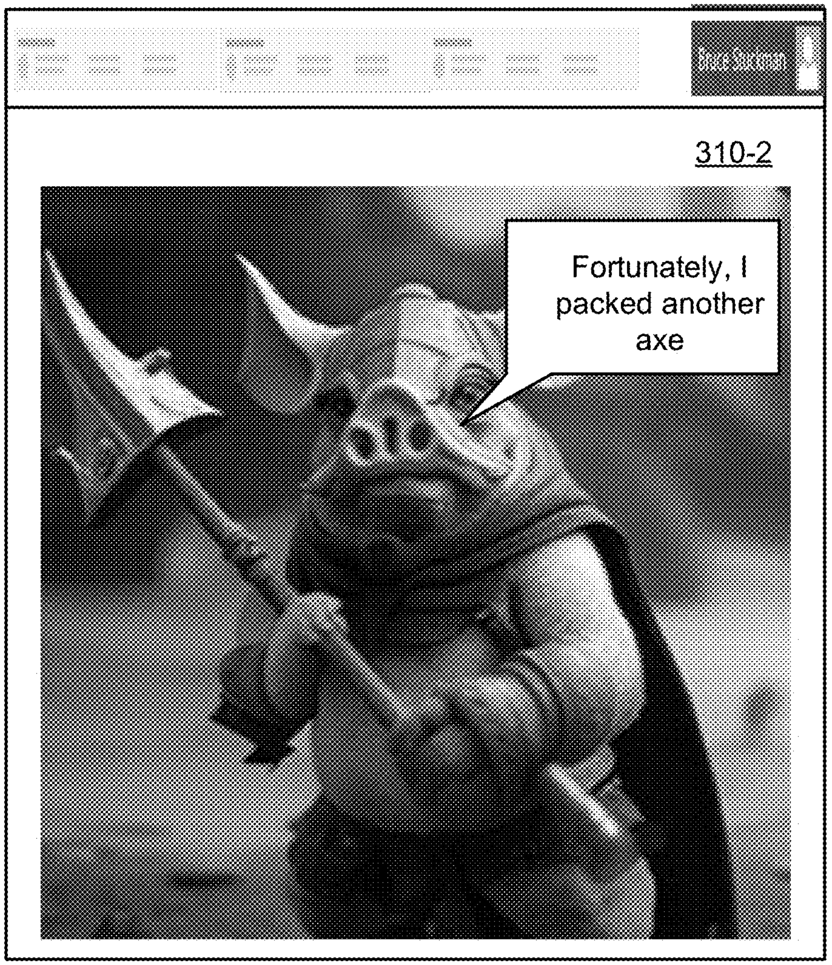
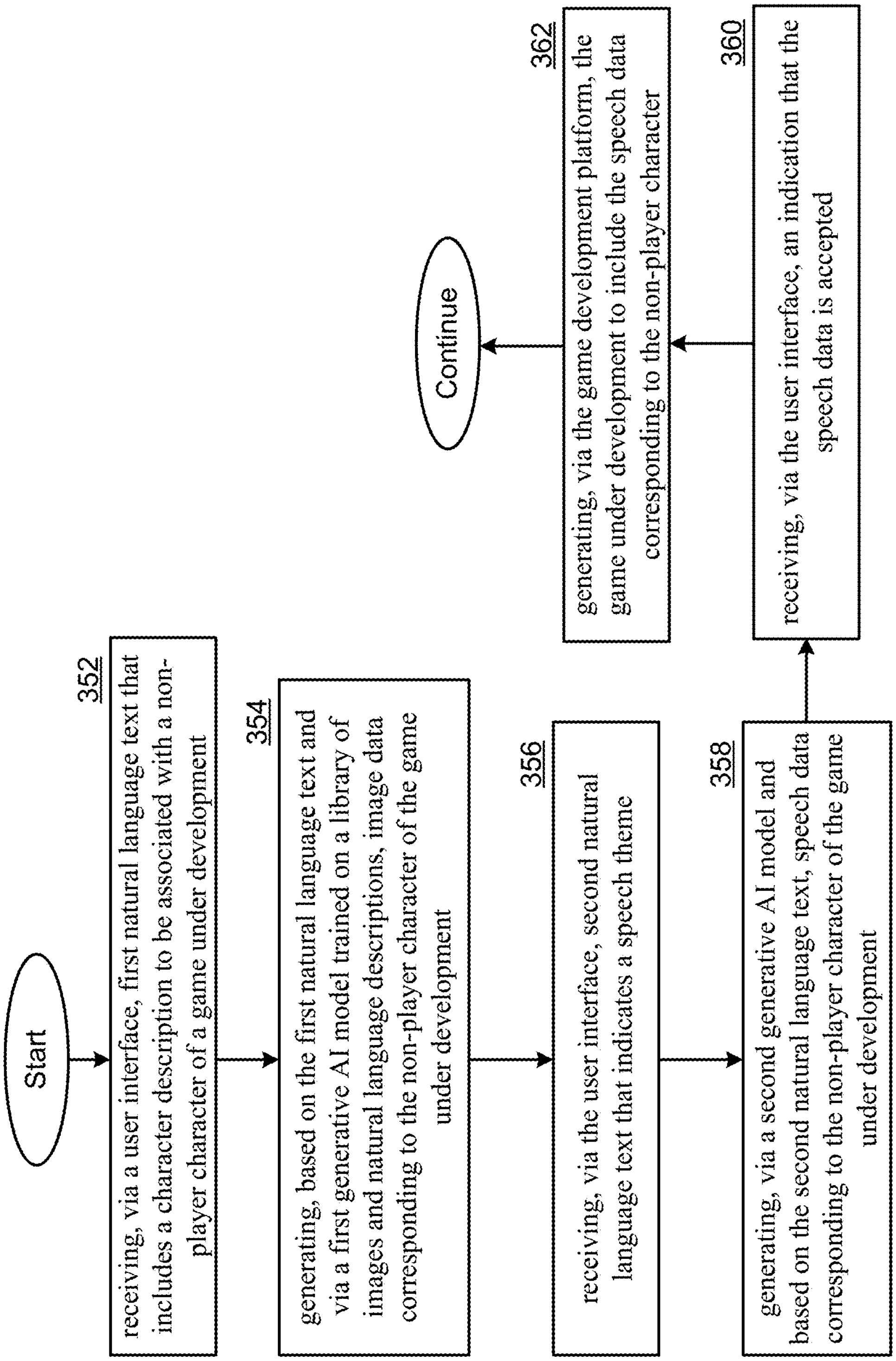
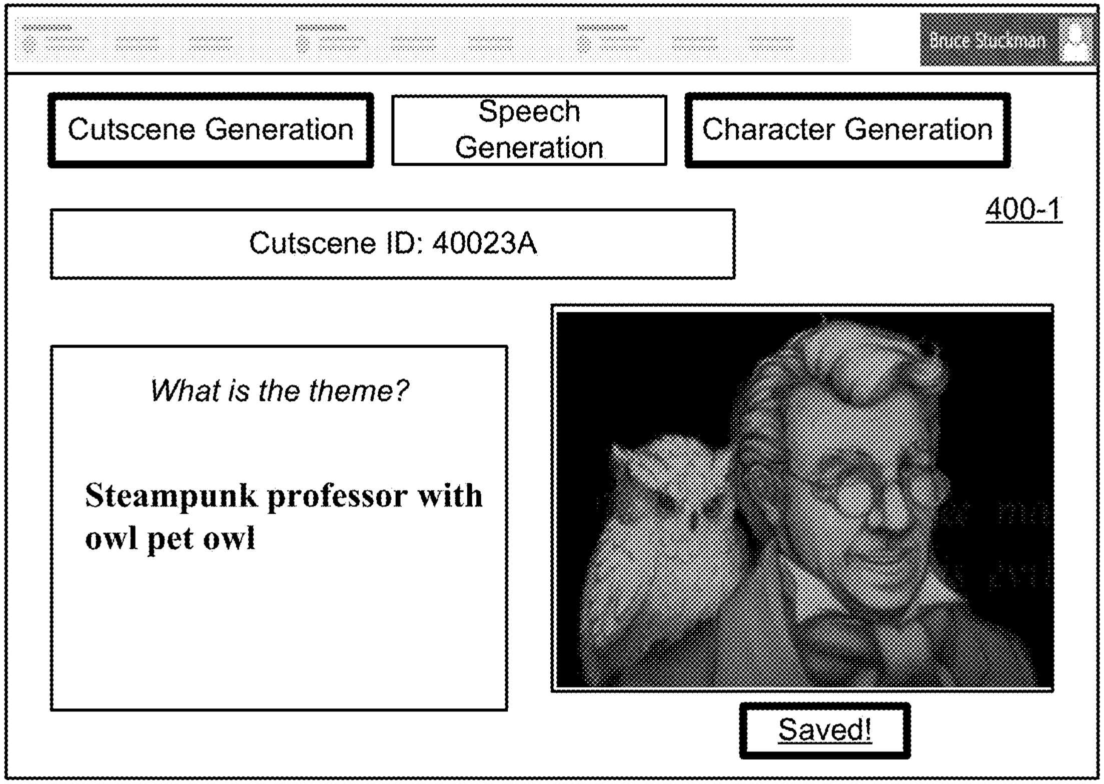


FIG. 3D


Start
352
receiving, via a user interface, first natural language text that includes a character description to be associated with a non-player character of a game under development
354
generating, based on the first natural language text and via a first generative AI model trained on a library of images and natural language descriptions, image data corresponding to the non-player character of the game under development
356
receiving, via the user interface, second natural language text that indicates a speech theme
358
generating, via a second generative AI model and based on the second natural language text, speech data corresponding to the non-player character of the game under development
360
receiving, via the user interface, an indication that the speech data is accepted
362
generating, via the game development platform, the game under development to include the speech data corresponding to the non-player character
Continue

350

FIG. 3E

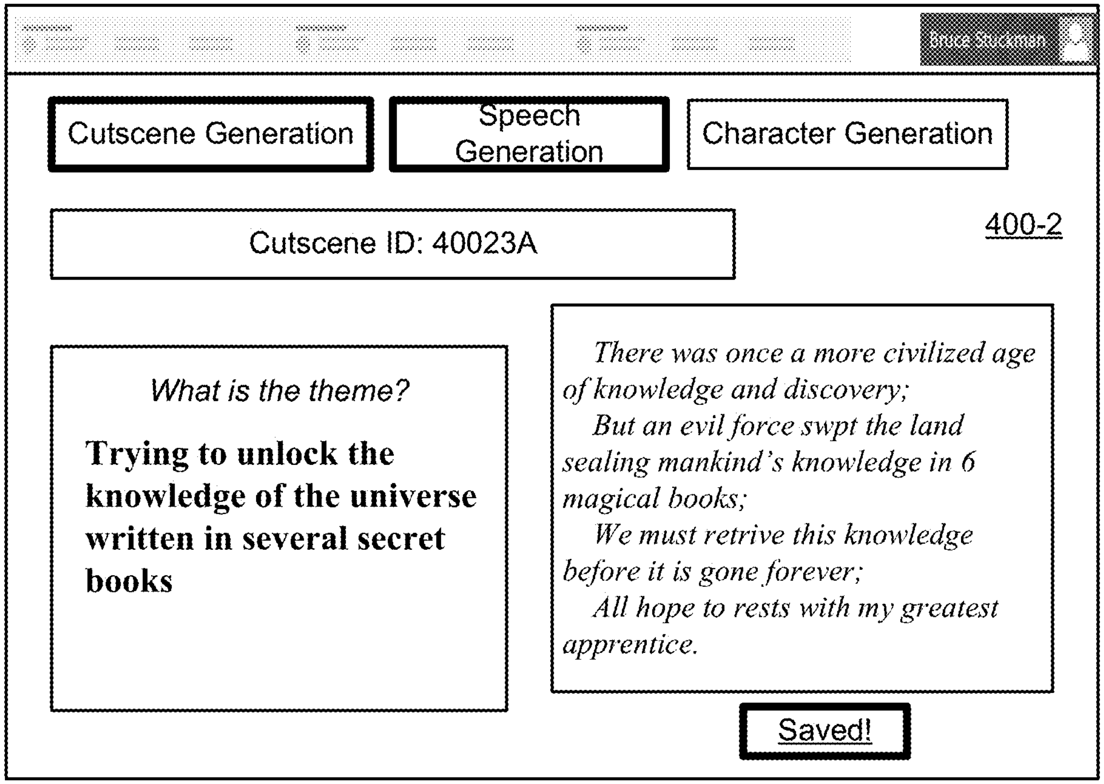


Cutscene ID: 40023A

What is the theme?

Steampunk professor with owl pet owl

FIG. 4A



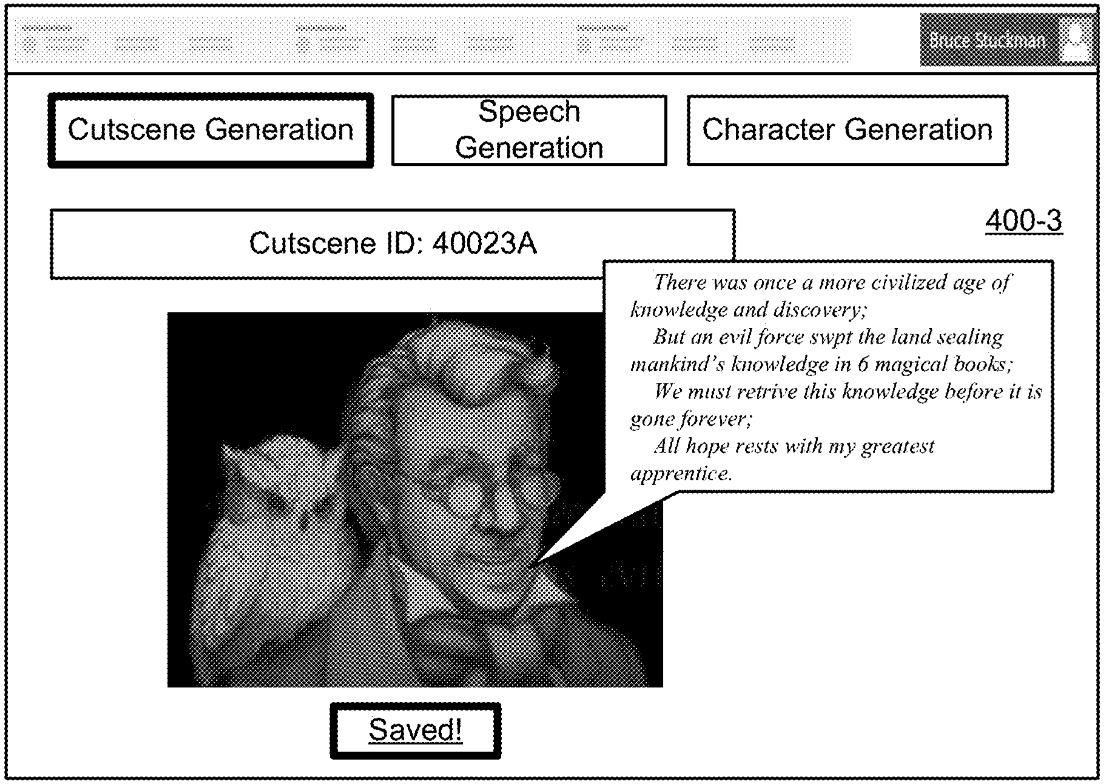
Cutscene ID: 40023A

What is the theme?

Trying to unlock the knowledge of the universe written in several secret books

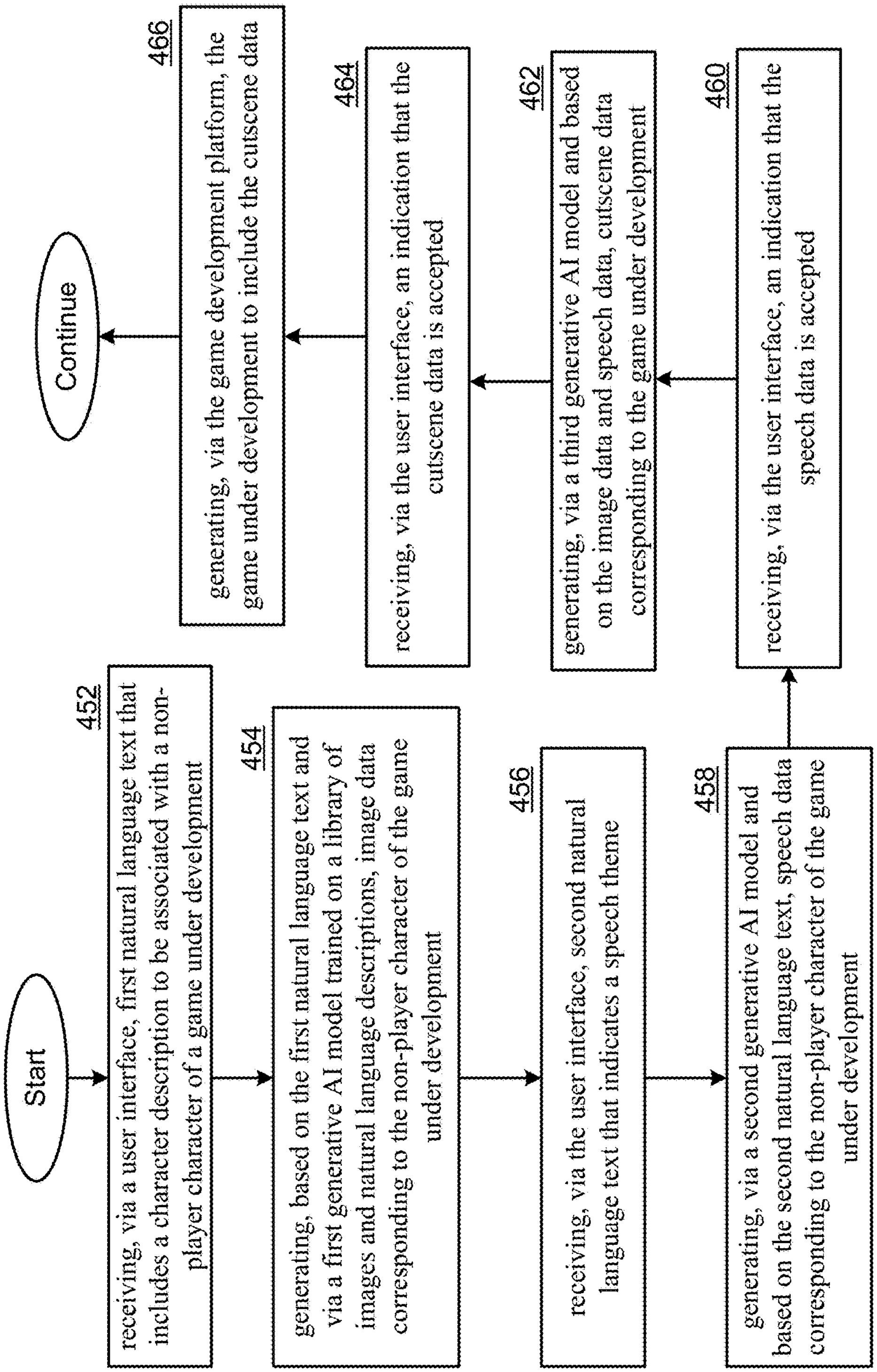
There was once a more civilized age of knowledge and discovery;
But an evil force swpt the land sealing mankind's knowledge in 6 magical books;
We must retrive this knowledge before it is gone forever;
All hope to rests with my greatest apprentice.

FIG. 4B



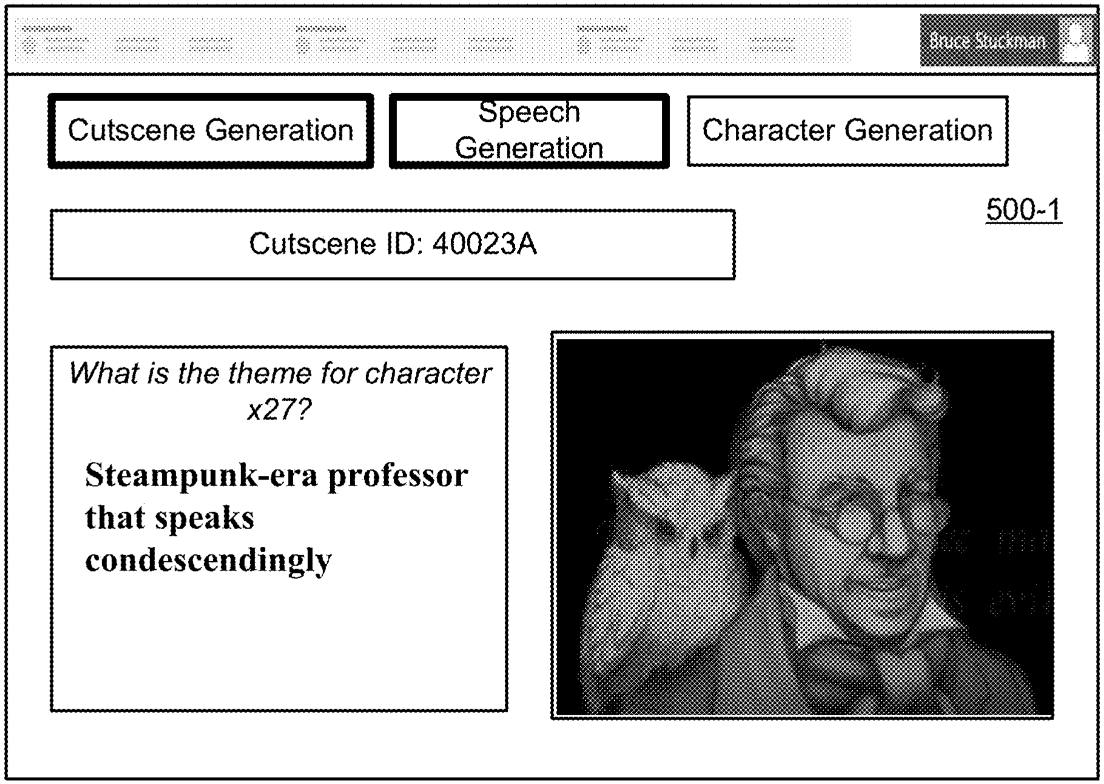
There was once a more civilized age of knowledge and discovery;
But an evil force swpt the land sealing mankind's knowledge in 6 magical books;
We must retrive this knowledge before it is gone forever;
All hope rests with my greatest apprentice.

FIG. 4C


Start
452
receiving, via a user interface, first natural language text that includes a character description to be associated with a non-player character of a game under development
454
generating, based on the first natural language text and via a first generative AI model trained on a library of images and natural language descriptions, image data corresponding to the non-player character of the game under development
456
receiving, via the user interface, second natural language text that indicates a speech theme
458
generating, via a second generative AI model and based on the second natural language text, speech data corresponding to the non-player character of the game under development
460
receiving, via the user interface, an indication that the speech data is accepted
462
generating, via a third generative AI model and based on the image data and speech data, cutscene data corresponding to the game under development
464
receiving, via the user interface, an indication that the cutscene data is accepted
466
generating, via the game development platform, the game under development to include the cutscene data
Continue

450

FIG. 4D

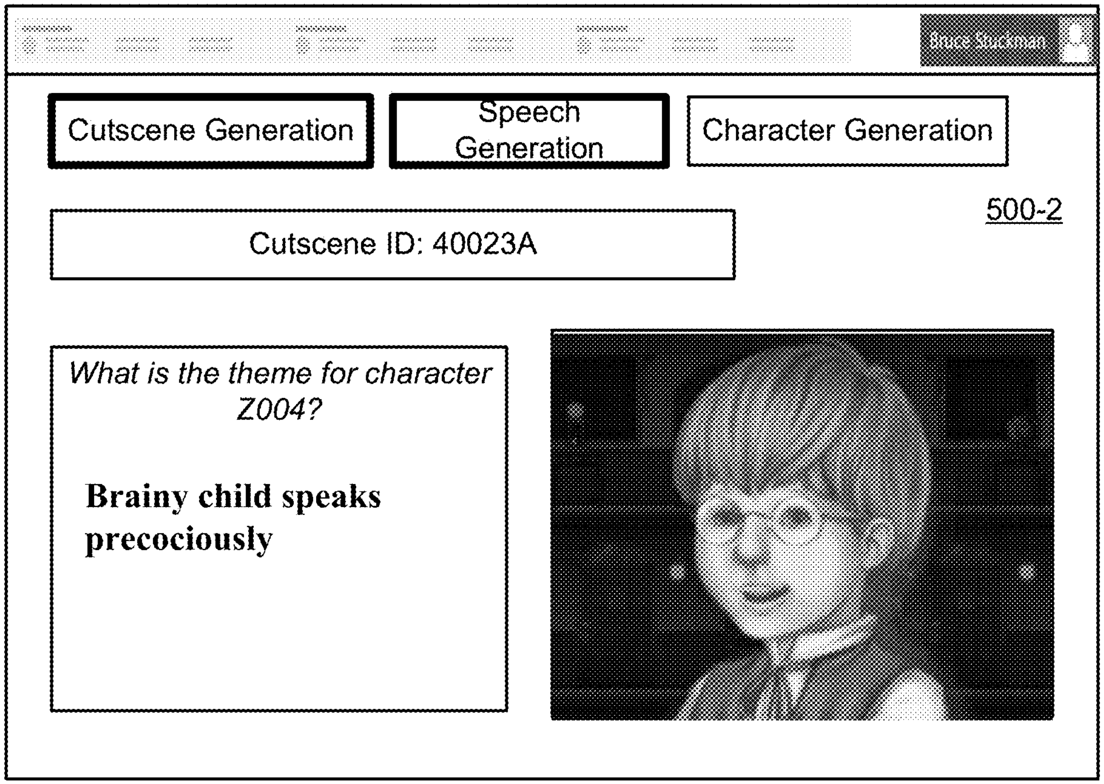


Cutscene ID: 40023A

What is the theme for character x27?

Steampunk-era professor that speaks condescendingly

FIG. 5A

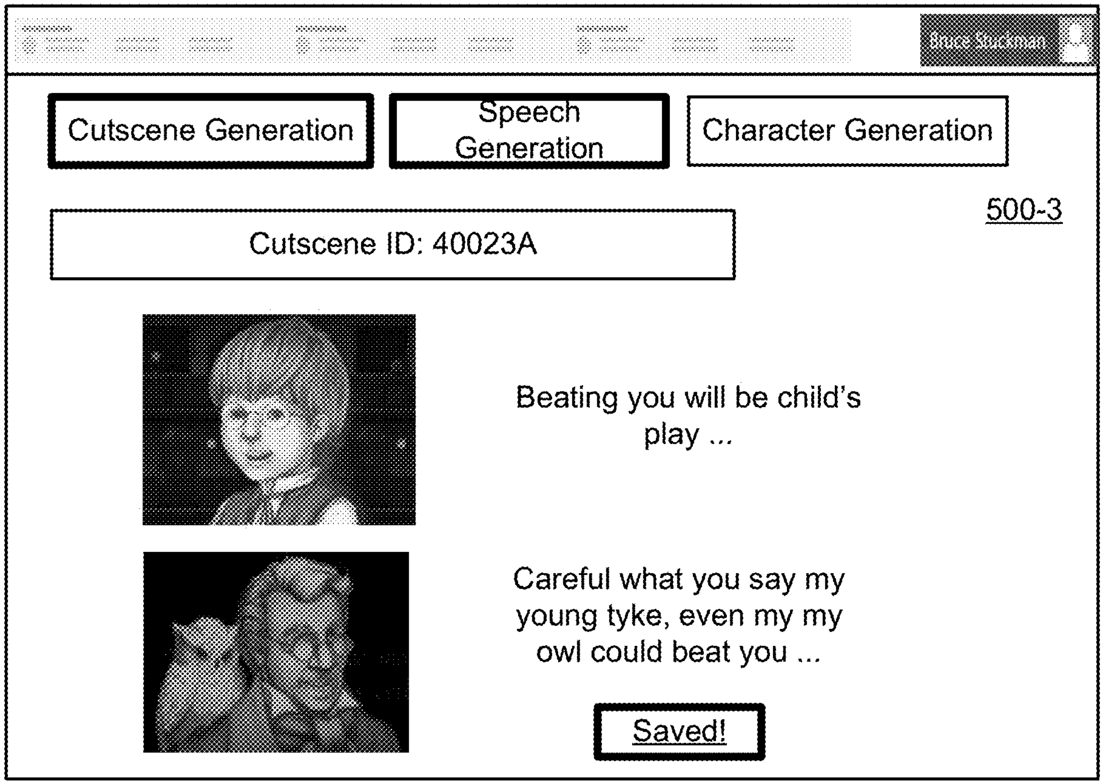


Cutscene ID: 40023A

What is the theme for character Z004?

Brainy child speaks precociously

FIG. 5B

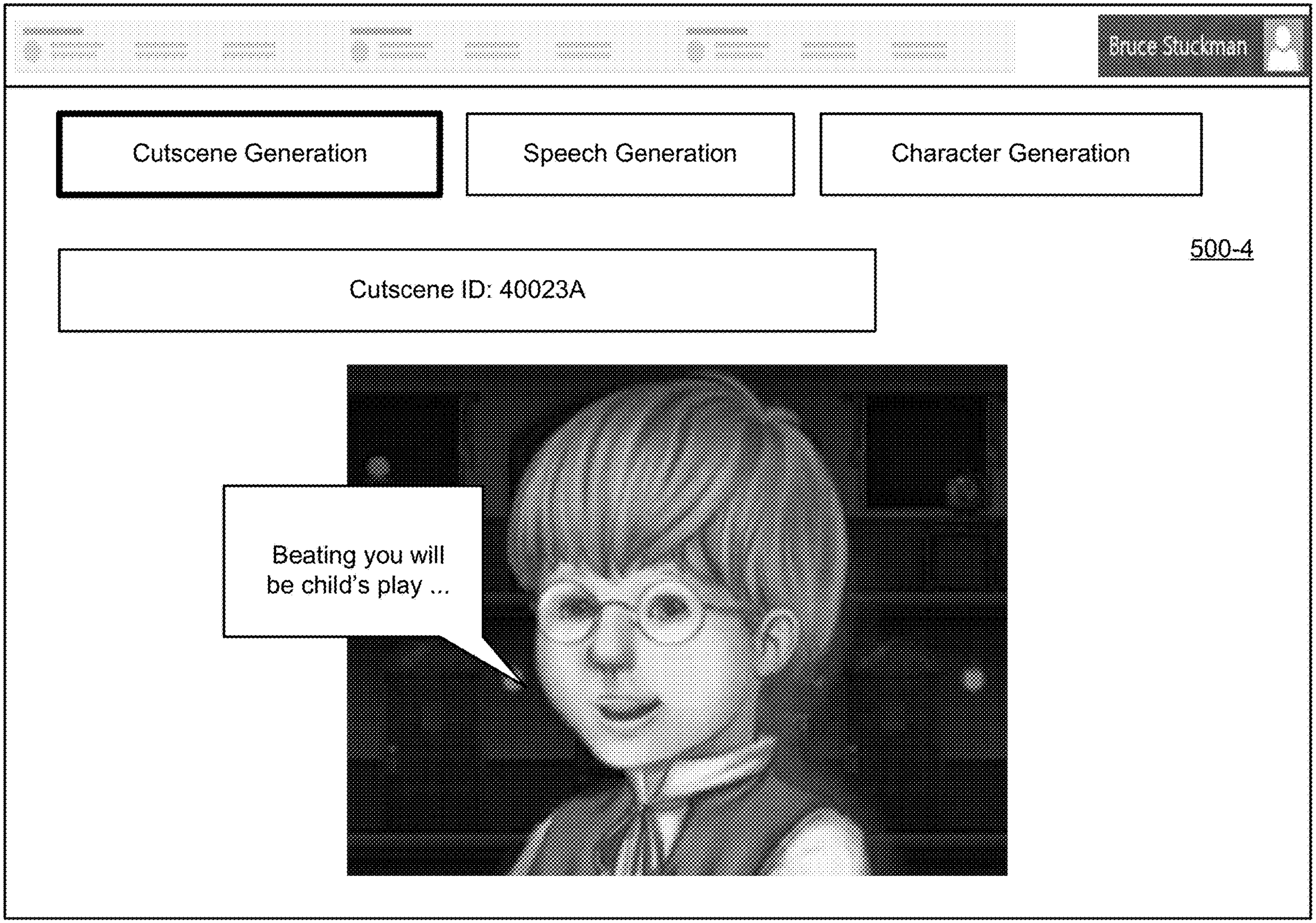


Cutscene ID: 40023A

Beating you will be child's play ...

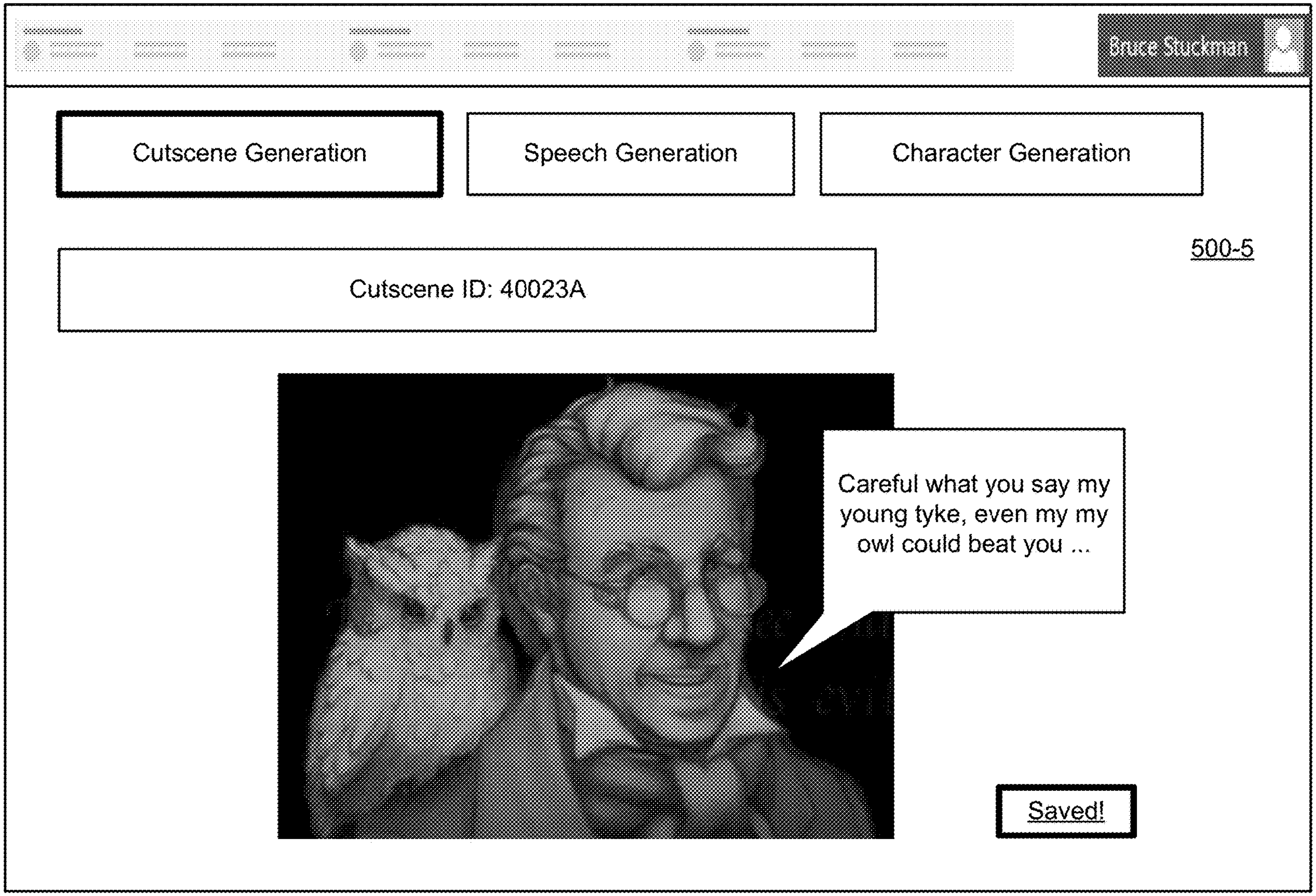
Careful what you say my young tyke, even my my owl could beat you ...

FIG. 5C



Cutscene ID: 40023A

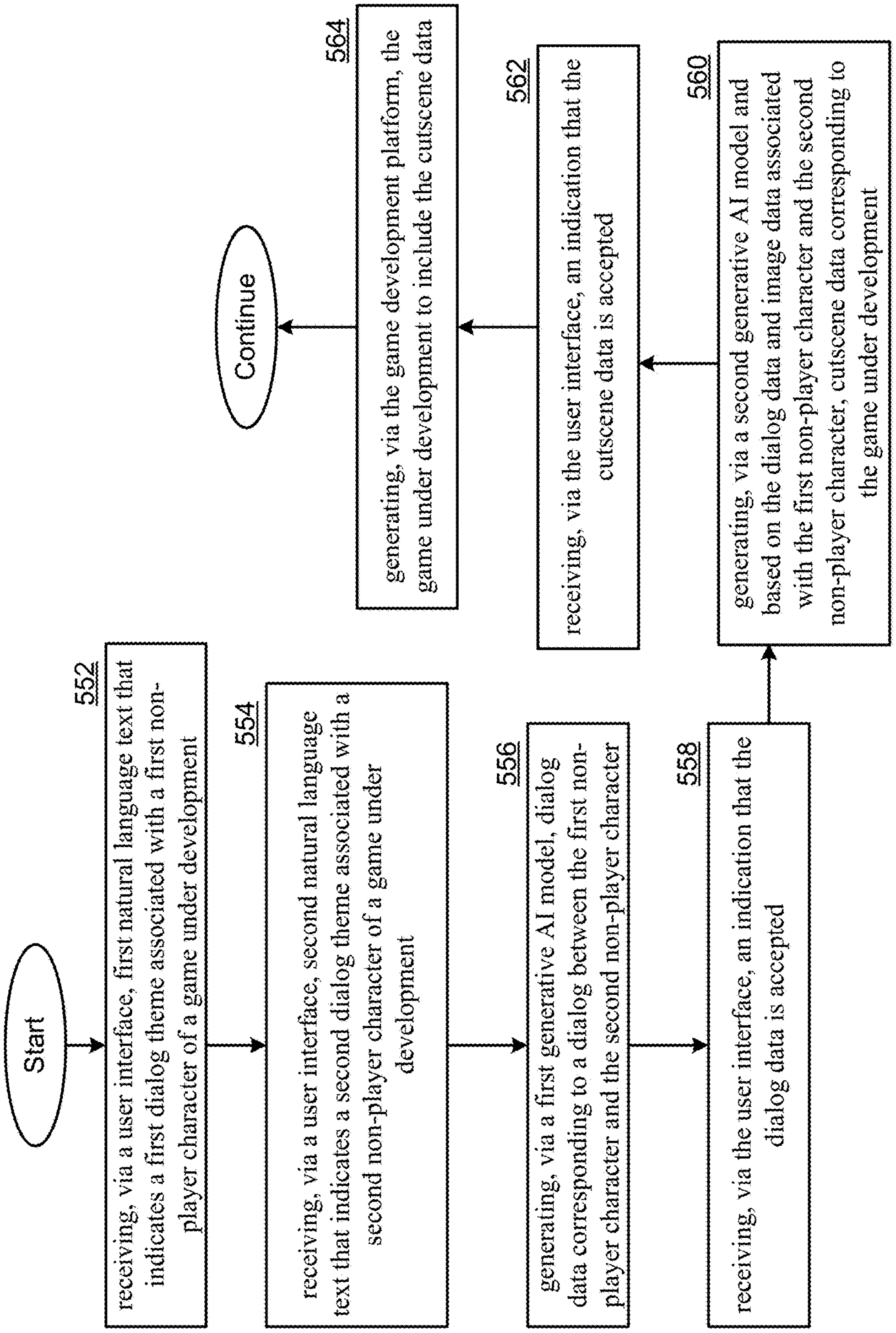
FIG. 5D



Cutscene ID: 40023A

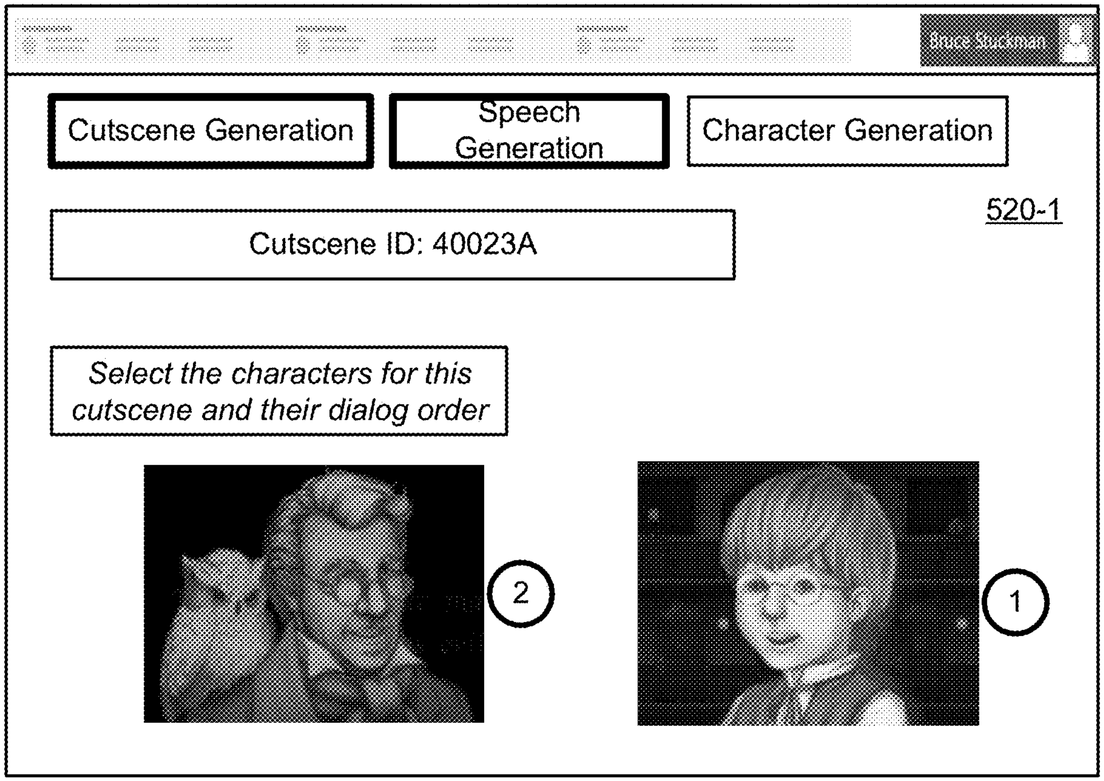
Careful what you say my young tyke, even my my owl could beat you ...

FIG. 5E


Start
552
receiving, via a user interface, first natural language text that indicates a first dialog theme associated with a first non-player character of a game under development
554
receiving, via a user interface, second natural language text that indicates a second dialog theme associated with a second non-player character of a game under development
556
generating, via a first generative AI model, dialog data corresponding to a dialog between the first non-player character and the second non-player character
558
receiving, via the user interface, an indication that the dialog data is accepted
560
generating, via a second generative AI model and based on the dialog data and image data associated with the first non-player character and the second non-player character, cutscene data corresponding to the game under development
562
receiving, via the user interface, an indication that the cutscene data is accepted
564
generating, via the game development platform, the game under development to include the cutscene data
Continue

550

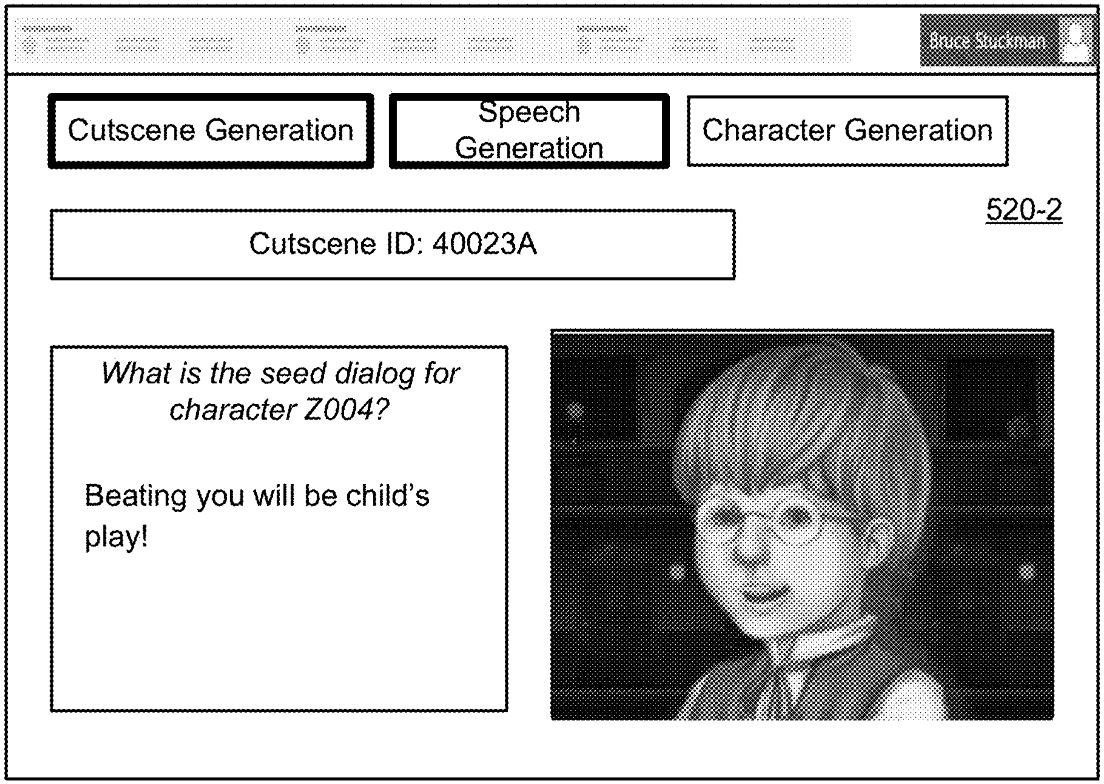
FIG. 5F



Cutscene ID: 40023A

Select the characters for this cutscene and their dialog order

FIG. 5G

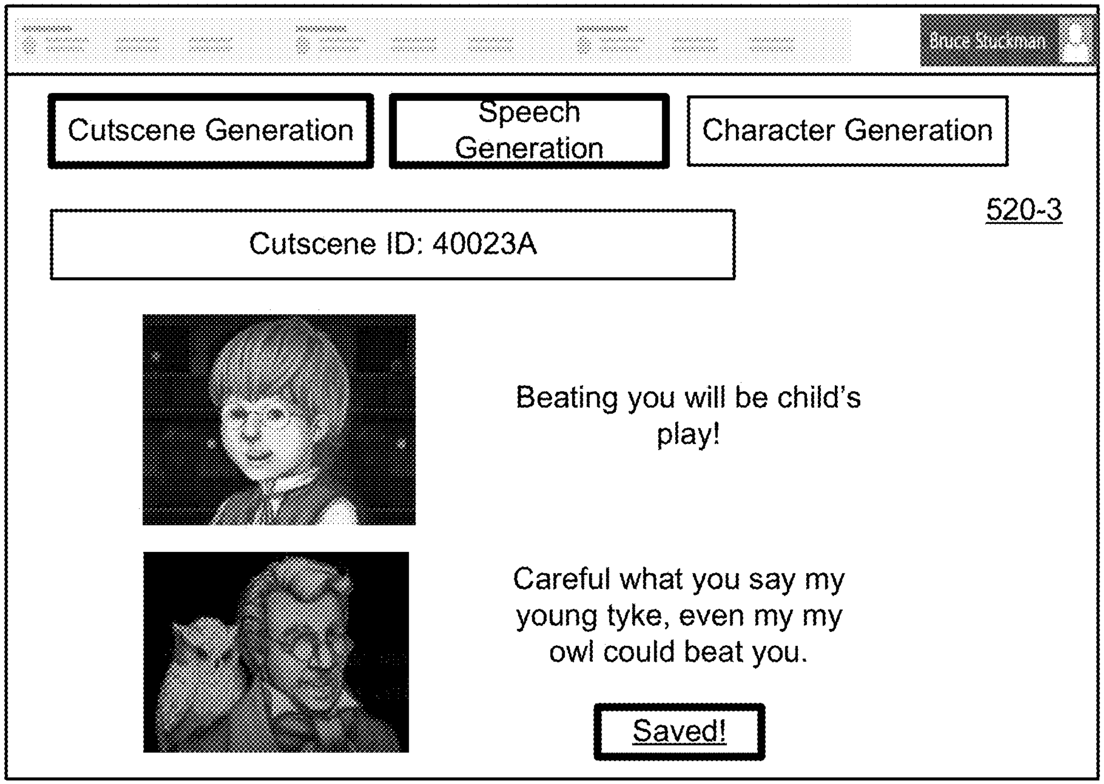


Cutscene ID: 40023A

What is the seed dialog for character Z004?

Beating you will be child's play!

FIG. 5H

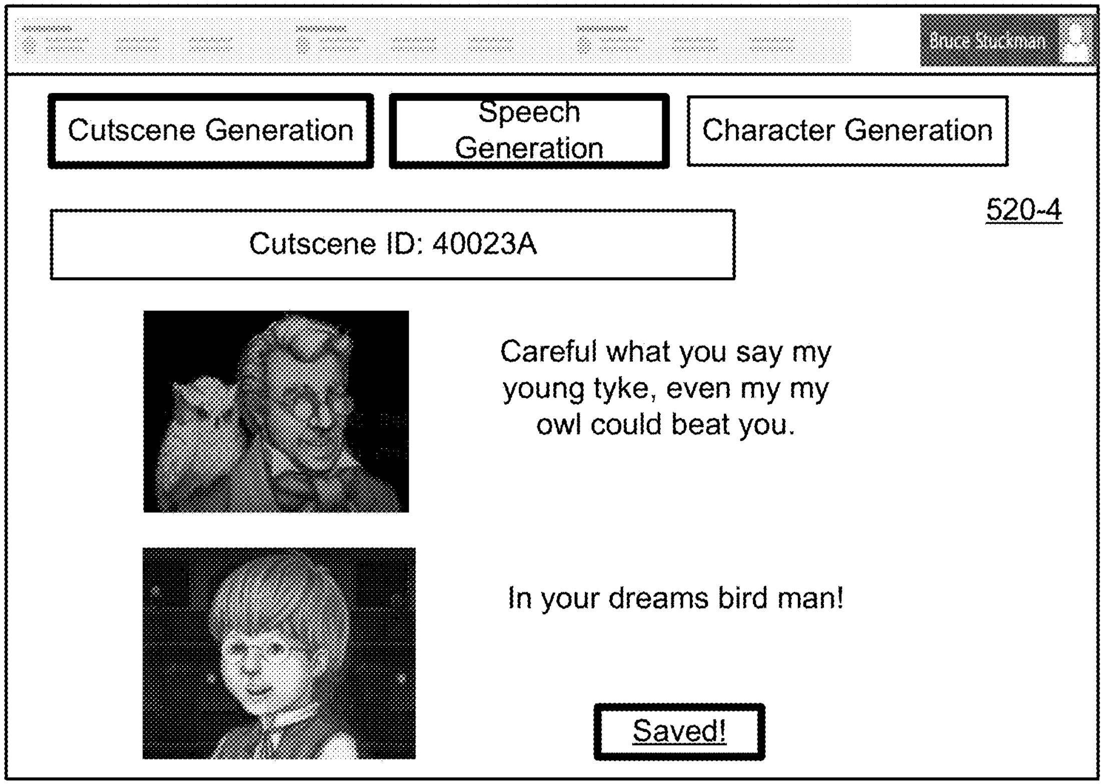


Cutscene ID: 40023A

Beating you will be child's play!

Careful what you say my young tyke, even my my owl could beat you.

FIG. 5I

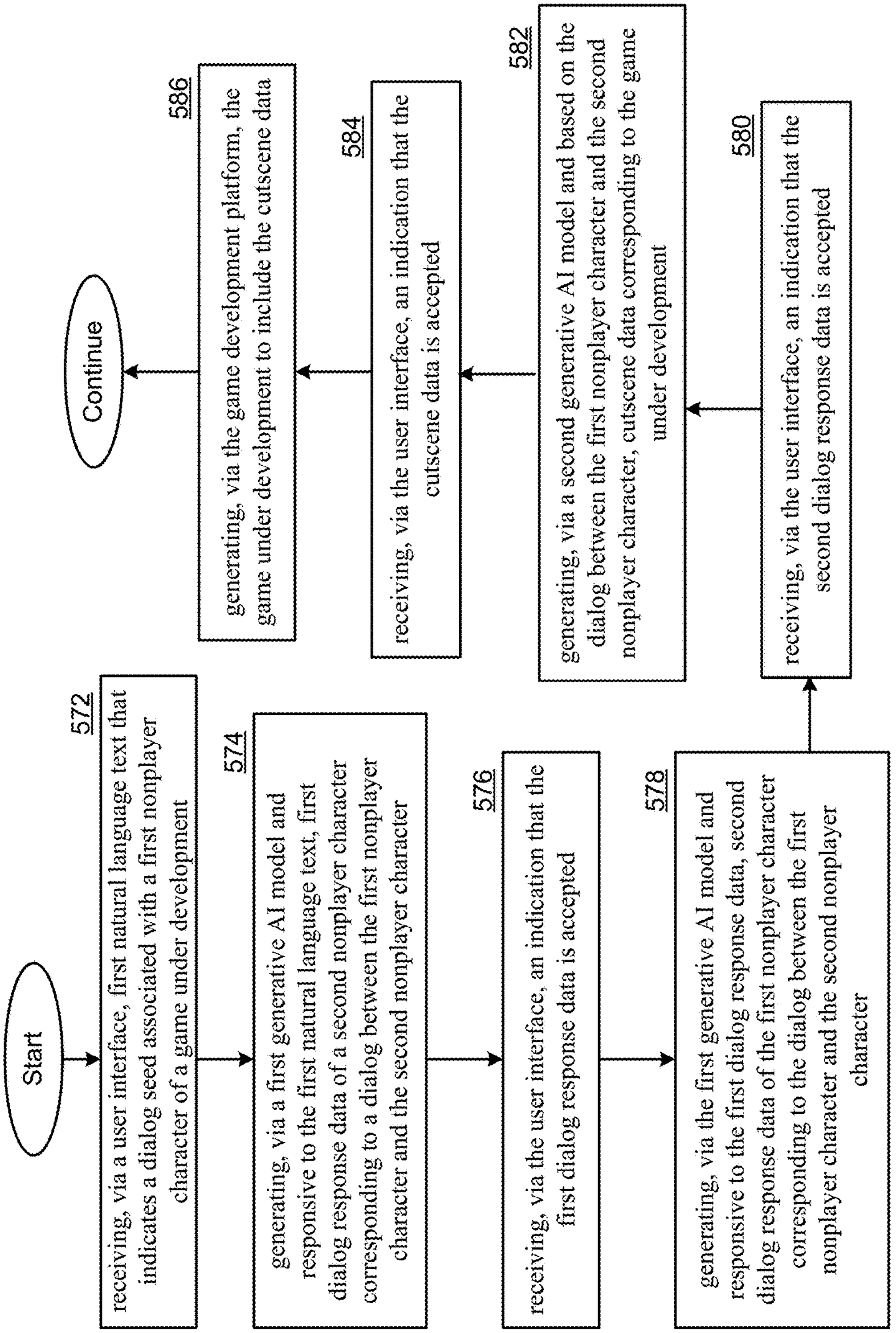


Cutscene ID: 40023A

Careful what you say my young tyke, even my my owl could beat you.

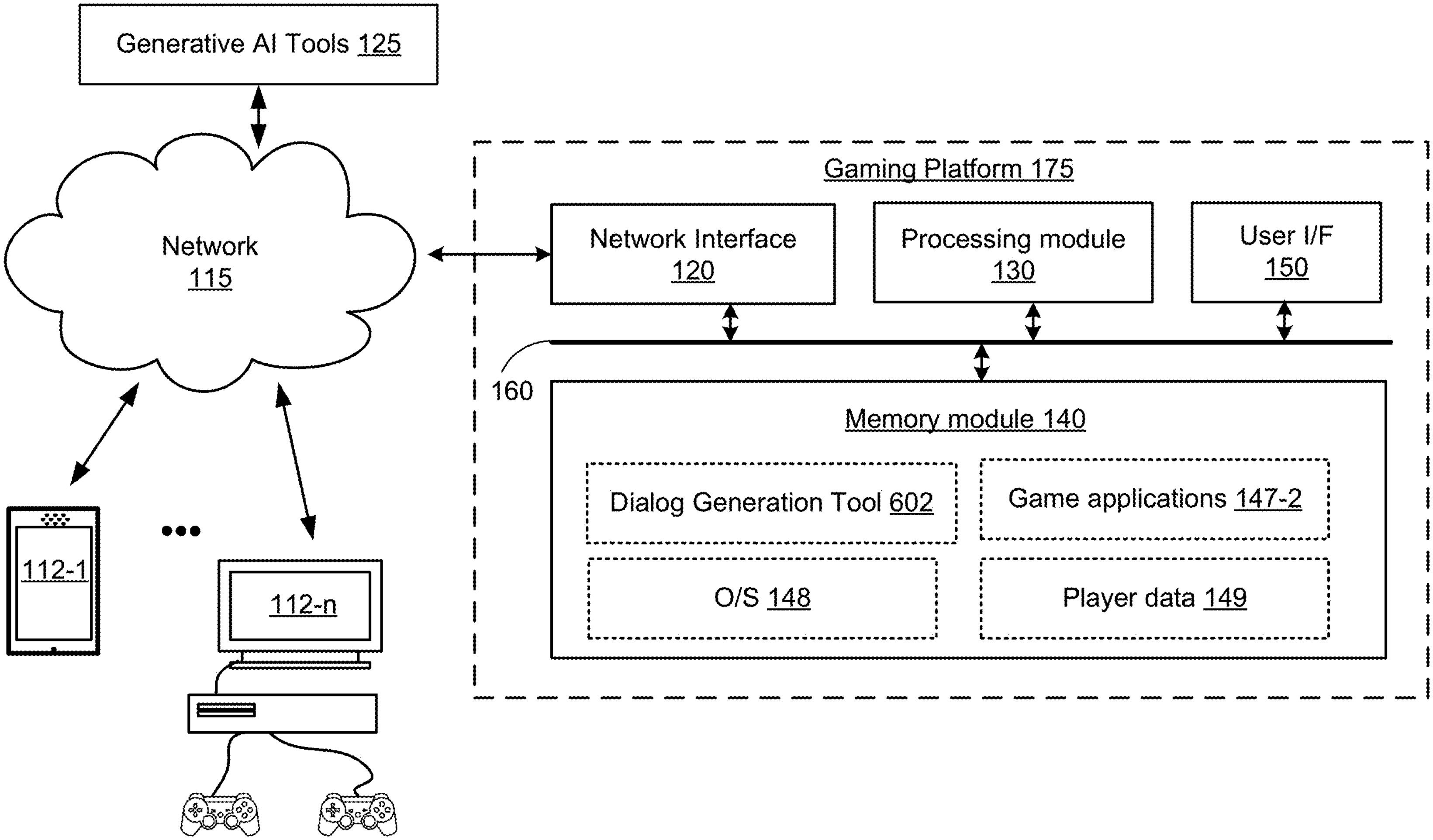
In your dreams bird man!

FIG. 5J


Start
572
receiving, via a user interface, first natural language text that indicates a dialog seed associated with a first nonplayer character of a game under development
574
generating, via a first generative AI model and responsive to the first natural language text, first dialog response data of a second nonplayer character corresponding to a dialog between the first nonplayer character and the second nonplayer character
576
receiving, via the user interface, an indication that the first dialog response data is accepted
578
generating, via the first generative AI model and responsive to the first dialog response data, second dialog response data of the first nonplayer character corresponding to the dialog between the first nonplayer character and the second nonplayer character
580
receiving, via the user interface, an indication that the second dialog response data is accepted
582
generating, via a second generative AI model and based on the dialog between the first nonplayer character and the second nonplayer character, cutscene data corresponding to the game under development
584
receiving, via the user interface, an indication that the cutscene data is accepted
586
generating, via the game development platform, the game under development to include the cutscene data
Continue

570

FIG. 5K


Generative AI Tools 125
Network
115
Gaming Platform 175
Network Interface
120
Processing module
130
User I/F
150
160
Memory module 140
Dialog Generation Tool 602
Game applications 147-2
O/S 148
Player data 149
112-1
112-n

600-1

FIG. 6A

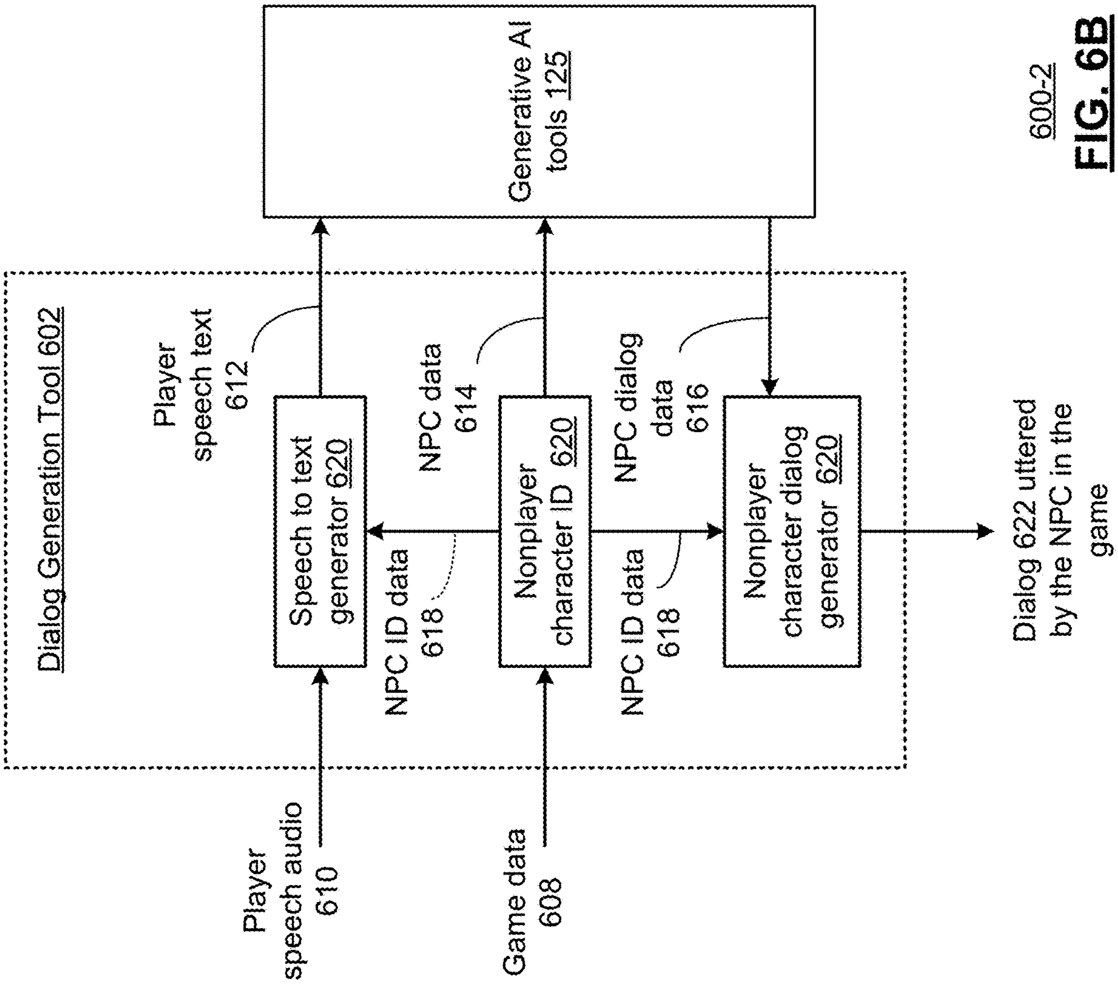

Dialog Generation Tool 602
Player speech audio 610
Game data 608
Speech to text generator 620
Nonplayer character ID 620
Nonplayer character dialog generator 620
Player speech text 612
NPC data 614
NPC dialog data 616
NPC ID data 618
NPC ID data 618
Generative AI tools 125
Dialog 622 uttered by the NPC in the game
600-2

FIG. 6B

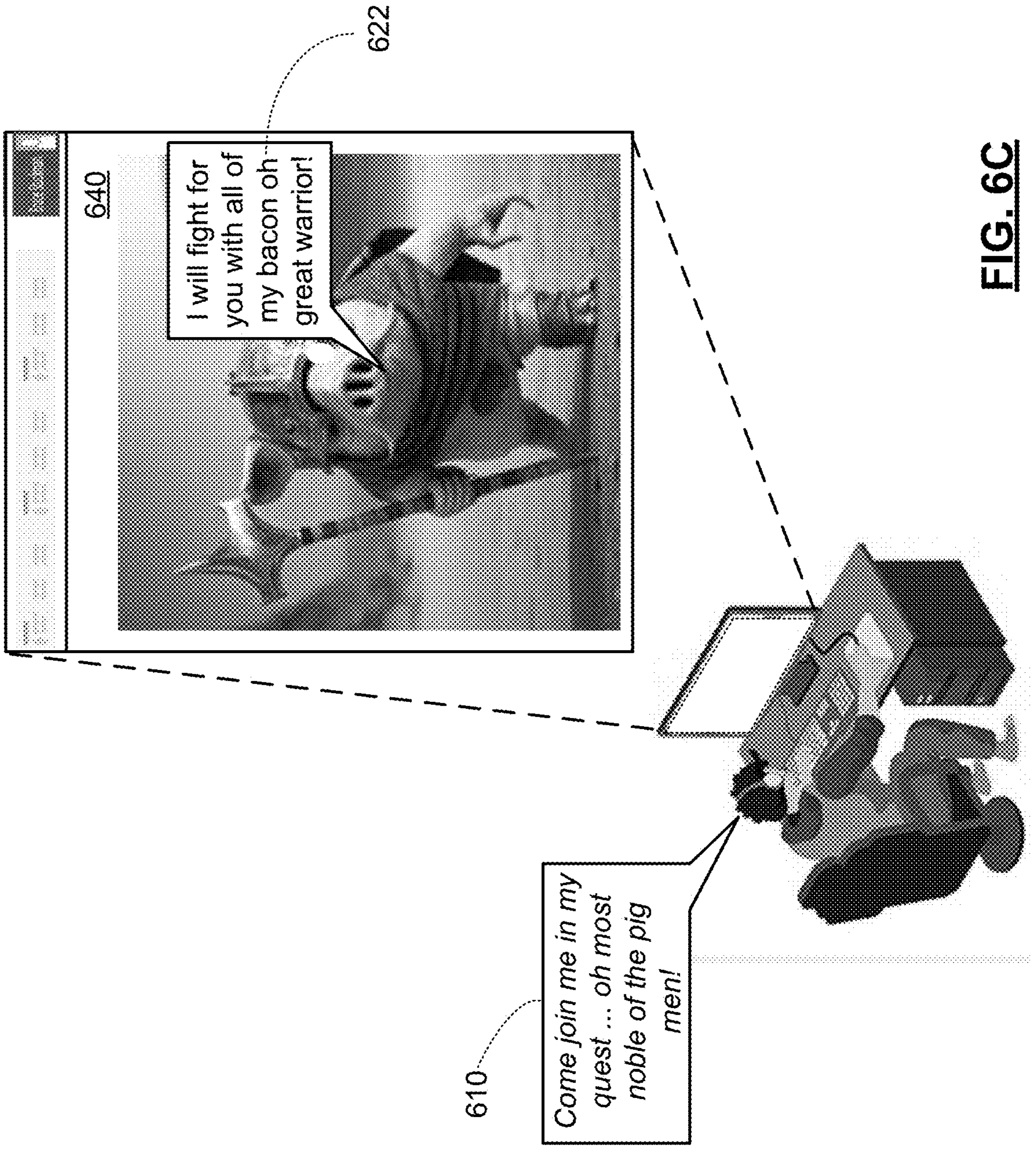
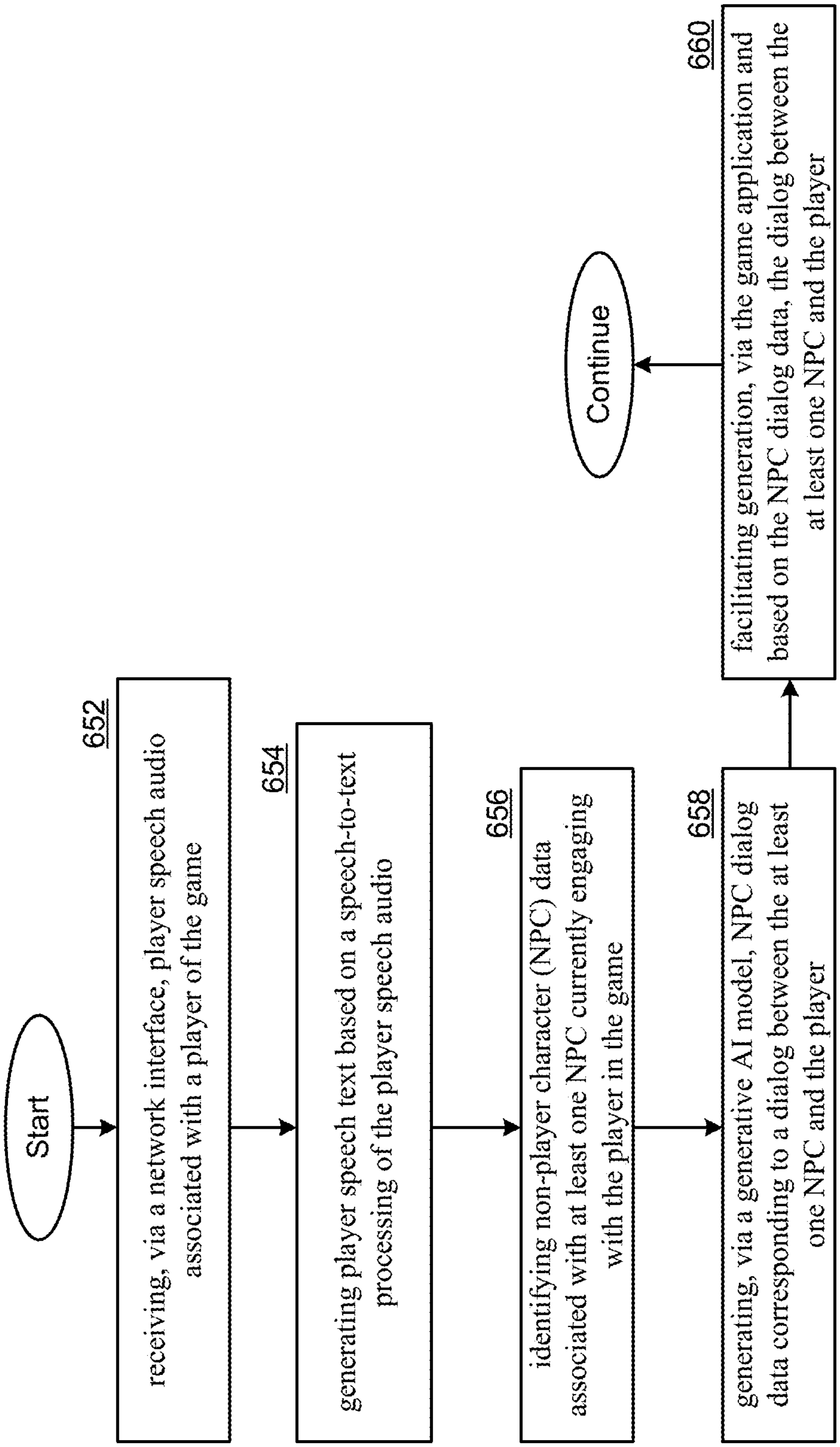

622
640
I will fight for you with all of my bacon oh great warrior!
610
Come join me in my quest ... oh most noble of the pig men!

FIG. 6C


Start
652
receiving, via a network interface, player speech audio associated with a player of the game
654
generating player speech text based on a speech-to-text processing of the player speech audio
656
identifying non-player character (NPC) data associated with at least one NPC currently engaging with the player in the game
658
generating, via a generative AI model, NPC dialog data corresponding to a dialog between the at least one NPC and the player
660
facilitating generation, via the game application and based on the NPC dialog data, the dialog between the at least one NPC and the player
Continue

650

FIG. 6D

GAME DEVELOPMENT VIA GENERATIVE AI

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The present U.S. Utility Patent application claims priority pursuant to 35 U.S.C. § 119(e) to U.S. Provisional Application No. 63/492,412, entitled "GENERATIVE AI FOR USE WITH ELECTRONIC GAMES", filed Mar. 27, 2023; and U.S. Provisional Application No. 63/494,685, entitled "GAME CUTSCENE DEVELOPMENT VIA GENERATIVE AI", filed Apr. 6, 2023, both of which are hereby incorporated herein by reference in their entirety and made part of the present U.S. Utility Patent Application for all purposes.

TECHNICAL FIELD

[0002] The present disclosure relates to processing systems, platforms and applications used in the development and support of electronic games.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0003] FIG. **1**A presents a block diagram representation of an example system for the development of electronic games.

[0004] FIG. **1**B presents a block diagram representation of an example system to support the play of online gaming.

[0005] FIGS. **2**A-**2**E present pictorial representations of example screen displays.

[0006] FIG. **2**F presents a flowchart representation of an example method.

[0007] FIGS. **3**A-**3**D present pictorial representations of example screen displays.

[0008] FIG. **3**E presents a flowchart representation of an example method.

[0009] FIGS. **4**A-**4**C present pictorial representations of example screen displays.

[0010] FIG. **4**D presents a flowchart representation of an example method.

[0011] FIGS. **5**A-**5**E present pictorial representations of example screen displays.

[0012] FIG. **5**F presents a flowchart representation of an example method.

[0013] FIGS. **5**G-**5**J present pictorial representations of example screen displays.

[0014] FIG. **5**K presents a flowchart representation of an example method.

[0015] FIGS. **6**A-**6**B present block diagram representations of example systems.

[0016] FIG. **6**C presents a pictorial representation of example gameplay of an online game.

[0017] FIG. **6**D presents a flowchart representation of an example method.

DETAILED DESCRIPTION

[0018] With the proliferation of game consoles, smart phones, tablets and other personal computing devices, the electronic gaming industry (including mobile gaming and online gaming), continues to grow worldwide. Game developers employ game development platforms to develop games to meet the appetite of worldwide players for new and more sophisticated content.

[0019] FIG. **1**A presents a block diagram representation of an example system in accordance with various examples. In particular, a system **100-1** is presented to facilitate the creation, development, testing, balancing, improving, revision, optimizing, adaptation and/or updating of various gaming applications. Examples of such gaming/game applications include massive and other multiplayer games and/or single player games including shooter or other combat games, fantasy games or other action or adventure games, simulation games that simulate the operation of real-world vehicles, devices or systems, realtime strategy games, puzzles, sports games, role-playing games, board games or other video or digitally animated games.

[0020] The system **100-1** includes a game development platform **105** that communicates via a network **115** utilizing the network interface (I/F) **120**. The network **115** can be the Internet or other wide area or local area network, either public or private. The network interface **120** can include an Ethernet interface, a Universal Serial Bus (USB) interface, an IEEE 1394 Firewire interface, and/or other wired interface, a 3G, 4G, 5G or other cellular wireless transceiver, a Bluetooth transceiver, a WiFi transceiver, UltraWideBand transceiver, WIMAX transceiver, ZigBee transceiver or other wireless interface, and/or other network card or modem for communicating via the network **115**.

[0021] The game development platform **105** also includes a processing module **130** and memory module **140** that stores an operating system (O/S) **148-1** such as an Apple, Unix, Linux or Microsoft operating system or other operating system, along with applications, databases and libraries that, for example, include character generation tools **142**, cutscene generation tools **143**, speech generation tools **144**, other game development tools **146**, and game applications **147-1** that can include prior game versions as well as versions of gaming/game applications under development. In particular, the operating system (O/S) **148**, character generation tools **142**, cutscene generation tools **143**, speech generation tools **144**, other game development tools **146**, and game applications **147-1** can each include operational instructions, that when executed by the processing module **130**, cooperate to configure the processing module **130** into a special purpose device to perform the particular functions of the game development platform **105** described herein.

[0022] The game development platform **105** may include a one or more user interfaces (I/F) **150** such as a display device, touch screen, key pad, touch pad, joy stick, thumb wheel, a mouse, one or more buttons, a speaker, a microphone, an accelerometer, gyroscope or other motion or position sensor, video camera, eye tracker or other interface devices that provide information to one or more operators of the game development platform **105** and that generate data in response to the operators' interaction with the game development platform **105**.

[0023] The processing module **130** can be implemented via a single processing device or a plurality of processing devices. Such processing devices can include a microprocessor, micro-controller, digital signal processor, microcomputer, central processing unit, quantum computing device, field programmable gate array, programmable logic device, state machine, logic circuitry, analog circuitry, digital circuitry, and/or any device that manipulates signals (analog and/or digital) based on operational instructions that are stored in a memory, such as memory module **140**. The memory module **140** can include a hard disc drive or other disc drive, read-only memory, random access memory, volatile memory, non-volatile memory, static memory, dynamic memory, flash memory, cache memory, storage network and/or any device that stores digital information. Note that when the processing device implements one or more of its functions via a state machine, analog circuitry, digital circuitry, and/or logic circuitry, the memory storing the corresponding operational instructions may be embedded within, or external to, the circuitry comprising the state machine, analog circuitry, digital circuitry, and/or logic circuitry. While a particular bus architecture is presented that includes a single bus **160**, other architectures are possible including additional data buses and/or direct connectivity between one or more elements. Further, the game development platform **105** can include one or more additional elements that are not specifically shown.

[0024] In various examples, the game development platform **105** improves the technology of game development by leveraging the use of generative AI tools **125** to quickly and easily support the generation of sophisticated game content, including narratives, dialog, images of characters, scenery and/or other elements of a game including still images and video and/or other media. Examples of such generative AI tools **125** include ChatGPT, DALL-E, GPT-4 and other tools of OpenAI, as well as Midjourney, Imagen, Bard, and/or Stable Diffusion, etc. These generative AI tools **125** operate via servers, cloud computing and/or other processing systems that utilize large language models, anomaly detection techniques, decision trees, association rules, expert systems and other knowledge-based systems, computer vision models, artificial neural networks, convolutional neural networks, support vector machines (SVMs), Bayesian networks, genetic algorithms, feature learning, sparse dictionary learning, preference learning, deep learning and other machine learning techniques that are trained using training data via unsupervised, semi-supervised, supervised and/or reinforcement learning, and/or other AI. In various examples, the generative AI-tools are trained to consider trillions of records including, for example, whole libraries of images, video, literature, text, speech and/or other media. The human mind is not equipped to perform such AI techniques, not only due to the complexity of these techniques and the enormous number of records to be considered, but also due to the fact that artificial intelligence, by its very definition-requires “artificial” intelligence—i.e. machine/non-human intelligence.

[0025] It should be noted, that while the generative AI tools **125** are shown as being external to the game development platform **105**, other configurations are possible where one or more of the generative AI tools **125** can be incorporated within the to the game development platform itself. It should also be noted that while character generation tools **142**, cutscene generation tools **143**, speech generation tools **144**, other game development tools **146** are shown as being internal to the game development platform **105**, in other examples, any subset of the various elements of the game development platform **105** can be implemented external to the game development platform **105** and coupled to the other components via the network **115**. Furthermore, the game development platform **105** can be implemented in a cloud computing configuration with any or all of the various elements of the game development platform **105** implemented within the cloud.

[0026] Consider an example where the game development platform **105** includes character generation tools **142** and operates to perform game character development via generative AI. In particular, the processing module **130** is configured by operational instructions included within one or more elements of memory module **140** to perform the following:

[0027] receiving, via a user interface, first natural language text that includes a character description to be associated with a character of a game under development;

[0028] generating, based on the first natural language text and via a generative AI model trained on a library of images and natural language descriptions, image data corresponding to the character of the game under development;

[0029] receiving, via the user interface, second natural language text that includes an updated character description to be associated with the character of the game under development;

[0030] generating, via the generative AI model and based on the second natural language text, updated image data corresponding to the character of the game under development;

[0031] receiving, via the user interface, an indication that the updated image data is accepted; and

[0032] generating, via the game development platform, the game under development to include the updated image data corresponding to the character.

[0033] In various examples, the character is a non-player character. The natural language descriptions can correspond to the library of images. The updated image data can be generated further based on the image data.

[0034] Consider an example where the game development platform **105** includes speech generation tools **144** and operates to perform game character speech development via generative AI. In particular, the processing module **130** is configured by operational instructions included within one or more elements of memory module **140** to perform the following:

[0035] receiving, via a user interface, first natural language text that includes a character description to be associated with a non-player character of a game under development;

[0036] generating, based on the first natural language text and via a first generative AI model trained on a library of images and natural language descriptions, image data corresponding to the non-player character of the game under development;

[0037] receiving, via the user interface, second natural language text that indicates a speech theme;

[0038] generating, via a second generative AI model and based on the second natural language text, speech data corresponding to the non-player character of the game under development;

[0039] receiving, via the user interface, an indication that the speech data is accepted; and

[0040] generating, via the game development platform, the game under development to include the speech data corresponding to the non-player character.

[0041] Consider an example where the game development platform **105** includes cutscene development tools **143** and operates to perform game cutscene development via generative AI. In particular, the processing module **130** is configured by operational instructions included within one or more elements of memory module **140** to perform the following:

[0042] receiving, via a user interface, first natural language text that includes a character description to be associated with a non-player character of a game under development;

[0043] generating, based on the first natural language text and via a first generative AI model trained on a library of images and natural language descriptions, image data corresponding to the non-player character of the game under development;

[0044] receiving, via the user interface, second natural language text that indicates a speech theme;

[0045] generating, via a second generative AI model and based on the second natural language text, speech data corresponding to the non-player character of the game under development;

[0046] receiving, via the user interface, an indication that the speech data is accepted; and

[0047] generating, via a third generative AI model and based on the image data and speech data, cutscene data corresponding to the game under development;

[0048] receiving, via the user interface, an indication that the cutscene data is accepted; and

[0049] generating, via the game development platform, the game under development to include the cutscene data.

[0050] Consider an example where the game development platform **105** operates to perform game cutscene development via generative AI with character dialog. In particular, the processing module **130** is configured by operational instructions included within one or more elements of memory module **140** to perform the following:

[0051] receiving, via a user interface, first natural language text that indicates a first dialog theme associated with a first non-player character of a game under development;

[0052] receiving, via a user interface, second natural language text that indicates a second dialog theme associated with a second non-player character of a game under development;

[0053] generating, via a first generative AI model, dialog data corresponding to a dialog between the first non-player character and the second non-player character;

[0054] receiving, via the user interface, an indication that the dialog data is accepted;

[0055] generating, via a second generative AI model and based on the dialog data and image data associated with the first non-player character and the second non-player character, cutscene data corresponding to the game under development;

[0056] receiving, via the user interface, an indication that the cutscene data is accepted;

[0057] and

[0058] generating, via the game development platform, the game under development to include the cutscene data.

[0059] Consider an example where the game development platform **105** operates to perform game cutscene development via generative AI with seeded character dialog. In particular, the processing module **130** is configured by operational instructions included within one or more elements of memory module **140** to perform the following:

[0060] receiving, via a user interface, first natural language text that indicates a dialog seed associated with a first non-player character of a game under development;

[0061] generating, via a first generative AI model and responsive to the first natural language text, first dialog response data of a second non-player character corresponding to a dialog between the first non-player character and the second non-player character;

[0062] receiving, via the user interface, an indication that the first dialog response data is accepted;

[0063] generating, via the first generative AI model and responsive to the first dialog response data, second dialog response data of the first non-player character corresponding to the dialog between the first non-player character and the second non-player character;

[0064] receiving, via the user interface, an indication that the second dialog response data is accepted;

[0065] generating, via a second generative AI model and based on the dialog between the first non-player character and the second non-player character, cutscene data corresponding to the game under development;

[0066] receiving, via the user interface, an indication that the cutscene data is accepted; and

[0067] generating, via the game development platform, the game under development to include the cutscene data.

[0068] The further operation of this system will be described in greater detail in conjunction with the figures that that follow, including many optional functions and features and examples thereof that can be used in many different combinations not expressly shown.

[0069] FIG. **1**B presents a block diagram representation of an example system to support the play of online gaming. In particular, a system **100-2** is shown having a gaming platform **175** that includes many similar elements to the game development platform **105** that are referred to by common reference numerals. The memory module **140** of gaming platform **175** stores game applications **147-2** such as one or more games **147-1** that were developed and finalized via the game development platform **105**. The memory module **140** also stores player data **149** such as subscription and other account information, as well as game status one or more sets of game parameters, game player profiles or game preferences, and other content and/or other gaming data associated with players, etc. In operation, the gaming platform **175** facilitates download and/or play of the gaming applications **147-2** over the network **115** via client devices **112-1** . . . **112**-*n*.

[0070] FIGS. **2**A-**2**D present pictorial representations of example screen displays **200-1**, **200-2**, **200-3**, and **200-4**. As previously discussed, the game development platform **105** can operate to perform game character development via generative AI. In particular, a screen display **200-1** of FIG. **2**A shows an interactive user interface the responds to action of the user to receive first natural language text that includes a character description to be associated with a character (such as a non-player character) of a game under development. The game development platform **105** has generated, based on the first natural language text and via a generative AI model (e.g., via Midjourney or another image generator included in the generative AI tools **125** that is trained on a library of images and natural language descriptions), image data **205-1** corresponding to the character of the game under development. Screen display **200-2** of FIG. **2**B shows an interactive user interface responds to actions of the user to receive second natural language text that includes an updated character description to be associated with the character of the game under development. In the example shown, merely the changes are presented, but in other examples, the full updated description could be input, based on the operation of the particular generative AI model. The game development platform **105** then generates, via the generative AI model and based on the second natural language text, updated image data **205-2**, e.g. new imagery corresponding to the character of the game under development. This process is repeated again in FIG. **2**C via screen display **200-3** and updated image **205-3** and again via screen display **200-4** and updated image **205-4** until the interface receives an indication that the updated image data is accepted (saved) in FIG. **2**D. In response, the game development platform **105** can generate/update the game under development to include the updated image data **205-4** corresponding to the character. For example, the image data corresponding to the character can be included in a character library or other database, code or data used to implement the game. An example screen display **210** of the finished character in the completed game is shown in FIG. **2**E.

[0071] FIG. **2**F presents a flowchart representation of an example method. In particular, a method **250** is presented for use in conjunction with game development platform **105** and/or any of the functions and features described herein. Step **252** includes receiving, via a user interface, first natural language text that includes a character description to be associated with a character of a game under development. Step **254** includes generating, based on the first natural language text and via a generative AI model trained on a library of images and natural language descriptions, image data corresponding to the character of the game under development. Step **256** includes receiving, via the user interface, second natural language text that includes an updated character description to be associated with the character of the game under development. Step **258** includes generating, via the generative AI model and based on the second natural language text, updated image data corresponding to the character of the game under development. Step **260** includes receiving, via the user interface, an indication that the updated image data is accepted. Step **262** includes generating, via the game development platform, the game under development to include the updated image data corresponding to the character.

[0072] FIGS. **3**A-**3**B present pictorial representations of example screen displays **300-1** and **300-2**. As previously discussed, the game development platform **105** can operate to perform game character development via generative AI with speech. In particular, a screen display **200-1** of FIG. **2**A shows an interactive user interface the responds to action of the user to receive natural language text that indicates a speech theme to be associated with a non-player character. The game development platform **105** generates a generative AI model (e.g., a natural language text generator included in generative AI tools **125**) based on the natural language text, speech data corresponding to the non-player character of the game under development as shown in screen display **300-2** of FIG. **3**B and receives an indication via the user interface that the speech data is accepted.

[0073] An example screen display **310-1** of the finished character speech in the completed game is shown in FIG. **3**C. While the utterance of the non-player character is shown via a text box, in other examples, actual speech audio can be generated either with, or without, simulated lip movements of the character. In further examples, multiple versions of a single non-player character can be generated along with multiple utterances and triggered based on events that occur in the game itself. In the example of FIG. **3**D shown in screen display **310-2**, the character has had his battle axe knocked away. As a result of this game event, the character image data has been updated to reflect a secondary weapon (based on previously saved variants of the image generated utilizing the generative AI tools **125**) and, as a result, corresponding speech data previously generated utilizing the generative AI tools **125** is also presented to correspond to the occurrence of this event within the game.

[0074] FIG. **3**E presents a flowchart representation of an example method. In particular, a method **350** is presented for use in conjunction with game development platform **105** and/or any of the functions and features described herein. Step **352** includes receiving, via a user interface, first natural language text that includes a character description to be associated with a non-player character of a game under development. Step **354** includes generating, based on the first natural language text and via a first generative AI model trained on a library of images and natural language descriptions, image data corresponding to the non-player character of the game under development. Step **356** includes receiving, via the user interface, second natural language text that indicates a speech theme. Step **358** includes generating, via a second generative AI model and based on the second natural language text, speech data corresponding to the non-player character of the game under development. Step **360** includes receiving, via the user interface, an indication that the speech data is accepted. Step **362** includes generating, via the game development platform, the game under development to include the speech data corresponding to the non-player character.

[0075] FIGS. **4**A-**4**C present pictorial representations of example screen displays **400-1**, **400-2** and **400-3**. As previously discussed, the game development platform **105** can operate to perform game cutscene development via generative AI. This cutscene can be a non-player interactive sequence of images and/or video that includes narrative, dialog or other speech by one or more non-player characters.

[0076] In particular, a screen display **400-1** of FIG. **4**A shows an interactive user interface that responds to action of the user to receive first natural language text that includes a character description to be associated with a non-player character of a game under development. The game development platform **105** then generates, based on the first natural language text and via a generative AI model (e.g., an image generator included in the generative AI tools **125** that is trained on a library of images and natural language descriptions), image data corresponding to the character of the game under development. In the example shown, the user has chosen to save this image of the non-player character.

[0077] Screen display **400-2** of FIG. **4**B shows an interactive user interface that responds to action of the user to receive second natural language text that indicates a speech theme. The game development platform **105** then generates, via a second generative AI model (such as a speech generation tool included in the AI generative tools **125**) and based on the second natural language text, speech data corresponding to the non-player character of the game under development. In the example shown, the user has indicated, via the user interface, to save this speech data corresponding to the non-player character.

[0078] Screen display **400-3** of FIG. **4**C shows an interactive user interface that responds to action of the user to generate, via a third generative AI model (included in AI generative tools **125**) and based on the image data and speech data, cutscene data such as video or other image sequences corresponding to the game under development. While the utterance of the non-player character is shown via a text box, in other examples, actual speech audio can be generated either with, or without, simulated lip movements of the character. In the example shown, the user has indicated, via the user interface, to save this cutscene data for incorporation in the completed game.

[0079] FIG. **4**D presents a flowchart representation of an example method. In particular, a method **450** is presented for use in conjunction with game development platform **105** and/or any of the functions and features described herein. Step **452** includes receiving, via a user interface, first natural language text that includes a character description to be associated with a non-player character of a game under development. Step **454** includes generating, based on the first natural language text and via a first generative AI model trained on a library of images and natural language descriptions, image data corresponding to the non-player character of the game under development. Step **456** includes receiving, via the user interface, second natural language text that indicates a speech theme. Step **458** includes generating, via a second generative AI model and based on the second natural language text, speech data corresponding to the non-player character of the game under development. Step **460** includes receiving, via the user interface, an indication that the speech data is accepted. Step **462** includes generating, via a third generative AI model and based on the image data and speech data, cutscene data corresponding to the game under development. Step **464** includes receiving, via the user interface, an indication that the cutscene data is accepted. Step **466** includes generating, via the game development platform, the game under development to include the cutscene data.

[0080] FIGS. **5**A-**5**E present pictorial representations of example screen displays **500-1**, **500-2**, **500-3**, **500-4** and **500-5**. As previously discussed, the game development platform **105** can operate to perform game cutscene development via generative AI with dialog between two or more non-player characters.

[0081] In particular, a screen display **500-1** of FIG. **5**A shows an interactive user interface that responds to action of the user to receive first natural language text that includes a dialog theme to be associated with a first non-player character of a game under development. Screen display **500-2** of FIG. **5**B shows an interactive user interface that responds to actions of the user to receive second natural language text that includes a dialog theme to be associated with a second non-player character of a game under development.

[0082] The game development platform **105** then generates, based on the first and second natural language text and via a generative AI model (e.g., or another dialog generator included in the generative AI tools **125**). The results are shown in screen display **500-3** of FIG. **5**C. In the example shown, the dialog of the second character is generated to respond to the dialog by the first character. The user has chosen to save this dialog between non-player characters. It should be noted however, that longer dialog exchanges between characters can be generated in a similar fashion, so that each character responds to the prior utterance(s) of the other character and further conditioned on the earlier dialog data for both itself and the other character. Furthermore, the initial dialog of one character can be generated either automatically or manually and fed to a chatbot (e.g. ChatGPT) that iteratively generates the dialog responses between NPCs.

[0083] Screen display **500-4** of FIG. **5**D shows an interactive user interface that responds to action of the user to generate, via a third generative AI model (included in AI generative tools **125**) and based on image data corresponding to the non-player characters and the dialog data, cutscene data corresponding to the game under development. While the utterance of the non-player character is shown via a text box, in other examples, actual speech audio can be generated either with, or without, simulated lip movements of the character. The cutscene continues with additional dialog in screen display **500-5** of FIG. **5**E. In the example shown, the user has indicated, via the user interface, to save this cutscene data for incorporation in the completed game.

[0084] FIG. **5**F presents a flowchart representation of an example method. In particular, a method **550** is presented for use in conjunction with game development platform **105** and/or any of the functions and features described herein. Step **552** includes receiving, via a user interface, first natural language text that indicates a first dialog theme associated with a first non-player character of a game under development. Step **554** includes receiving, via a user interface, second natural language text that indicates a second dialog theme associated with a second non-player character of a game under development. Step **556** includes generating, via a first generative AI model, dialog data corresponding to a dialog between the first non-player character and the second non-player character. Step **558** includes receiving, via the user interface, an indication that the dialog data is accepted. Step **560** includes generating, via a second generative AI model and based on the dialog data and image data associated with the first non-player character and the second non-player character, cutscene data corresponding to the game under development. Step **562** includes receiving, via the user interface, an indication that the cutscene data is accepted. Step **564** includes generating, via the game development platform, the game under development to include the cutscene data.

[0085] FIGS. **5**G-**5**J present pictorial representations of example screen displays. As previously discussed, dialog exchanges between characters can be seeded with natural language text and generative AI, (e.g., chatbot functionality) can be employed to generate dialog whereby each character responds to the prior utterance(s) of the other character. Screen display **520-1** of FIG. **5**G shows an interactive user interface that responds to actions of the user to select characters of a game under development to engage in a cutscene dialog and an initial order for this dialog. In the example shown the child NPC will start, followed by the professor NPC.

[0086] Screen display **520-2** of FIG. **5**H shows an interactive user interface that responds to actions of the user to receive natural language text that indicates a dialog seed associated with a first non-player character (the child in this case). Screen display **520-3** of FIG. **5**I shows where a first generative AI model (e.g., a chatbot) has generated, responsive to the first natural language text, first dialog response data of a second non-player character (the professor) corresponding to the dialog between the child and the professor. Furthermore, the user interface has received an indication from the user that the first dialog response data is accepted. Screen display **520-4** of FIG. **5**J shows where the generative AI model (e.g., a chatbot) has generated, responsive to the first dialog response data, second dialog response data of the first non-player character (the child) corresponding to the dialog between the child and the professor. Furthermore, the user interface has received an indication from the user that the second dialog response data is accepted.

[0087] As previously discussed, a second generative AI model can generate, based on the dialog between the first non-player character and the second non-player character, cutscene data corresponding to the game under development. Once accepted by the user via the user interface, this cutscene data can be incorporated into the game under development.

[0088] FIG. **5**K presents a flowchart representation of an example method. In particular, a method **570** is presented for use in conjunction with game development platform **105** and/or any of the functions and features described herein. Step **572** includes receiving, via a user interface, first natural language text that indicates a dialog seed associated with a first non-player character of a game under development. Step **574** includes generating, via a first generative AI model and responsive to the first natural language text, first dialog response data of a second non-player character corresponding to a dialog between the first non-player character and the second non-player character. Step **576** includes receiving, via the user interface, an indication that the first dialog response data is accepted. Step **578** includes generating, via the first generative AI model and responsive to the first dialog response data, second dialog response data of the first non-player character corresponding to the dialog between the first non-player character and the second non-player character.

[0089] Step **580** includes receiving, via the user interface, an indication that the second dialog response data is accepted. Step **582** includes generating, via a second generative AI model and based on the dialog between the first non-player character and the second non-player character, cutscene data corresponding to the game under development. Step **584** includes receiving, via the user interface, an indication that the cutscene data is accepted. Step **586** includes generating, via the game development platform, the game under development to include the cutscene data.

[0090] FIGS. **6**A-**6**B present block diagram representations of example systems. In system **600-1** of FIG. **6**A, a further example of gaming platform of **175** is shown where similar elements presented in conjunction with FIG. **1**B are referred to by common reference numbers. In this example, the gaming platform **175** further includes a dialog generation tool **602** that interacts with at least a portion of the generative AI tools **125** to generate player-interactive game character dialog via generative AI tools **125**. In this fashion, the gaming platform **175** facilitates interactive dialog between the player and one or more non-player characters in the game. This improves the technology of online gaming by making these non-player characters more realistic and interactive to the player-enhancing the player experience.

[0091] In various examples, the processing module **130** is configured by operational instructions included within one or more elements of memory module **140** to perform the following:

[0092] receiving, via a network interface, player speech audio associated with a player of the game;

[0093] generating player speech text based on a speech-to-text processing of the player speech audio;

[0094] identifying non-player character (NPC) data associated with at least one NPC currently engaging with the player in the game;

[0095] generating, via a generative AI model, NPC dialog data corresponding to a dialog between the at least one NPC and the player; and

[0096] facilitating generation, via the game application and based on the NPC dialog data, the dialog between the at least one NPC and the player.

[0097] Turning now to system **600-2** of FIG. **6**B, a further example of dialog generation tool **602** is shown. Player speech audio **610** associated with a player of the game is generated by a microphone included in a corresponding client device **112** of the player and transmitted via the network **115** to the gaming platform **175**. Speech to text generator **620** generates player speech text **612** based on a speech-to-text processing of the player speech audio **610**. Game data **608** processed by non-player character identifier **620** can be used to identify the particular non-player character (NPC) data **614** associated with at least one NPC identified to be currently engaging with the player in the game, for example, based on the NPC(s) in the vicinity of a player's character at that point of the game and/or based on an orientation of the character determined to be facing the NPC in the game world. In various embodiments, the speech to text generator **620** includes speech recognition processing on the generated speech text to recognize when a player has generated words or a phrase that are either directed to a particular non-player character reflected in the NPC data or would otherwise should elicit a response from an NPC(s), and only generates player speech text **612** in these circumstances.

[0098] The player speech text **612** and NPC data **614** are transmitted via the network interface to a generative AI model such as a chatbot included in the generative AI tools **125**, that responds by generating the NPC dialog data **616** corresponding to a dialog between the identified NPC(s) and the player. The NPC dialog generator **620** facilitates generation, via the game application and based on the NPC dialog data **616**, the dialog between the NPC(s) identified by the NPC ID data **618** and the player so that the corresponding dialog **622** is uttered by the particular NPC(s) identified.

[0099] FIG. **6**C presents a pictorial representation of example gameplay of an online game. In the example shown, the player speech audio **610** is identified as corresponding to an NPC in his character's vicinity in the game. The dialog generation tool **602** operates in conjunction with generative AI tools **125** to generate responsive dialog **622** with the player that is uttered, in realtime, via the NPC in the game.

[0100] FIG. **6**D presents a flowchart representation of an example method. In particular, a method **650** is presented for use in conjunction with gaming platform **175** and/or any of the functions and features described herein. Step **652**

includes receiving, via a network interface, player speech audio associated with a player of the game. Step **654** includes generating player speech text based on a speech-to-text processing of the player speech audio. Step **656** includes identifying non-player character (NPC) data associated with at least one NPC currently engaging with the player in the game. Step **658** includes generating, via a generative AI model, NPC dialog data corresponding to a dialog between the at least one NPC and the player. Step **660** includes facilitating generation, via the game application and based on the NPC dialog data, the dialog between the at least one NPC and the player.

[0101] As used herein, the terms "game character" can be used interchangeably to refer to a player or non-player game character in a game.

[0102] As used herein the term "tool" corresponds to a utility, application and/or other software routine that performs one or more specific functions in conjunction with a processing system.

[0103] It is noted that terminologies as may be used herein such as bit stream, stream, signal sequence, etc. (or their equivalents) have been used interchangeably to describe digital information whose content corresponds to any of a number of desired types (e.g., data, video, speech, text, graphics, audio, etc. any of which may generally be referred to as 'data').

[0104] As may be used herein, the terms "substantially" and "approximately" provides an industry-accepted tolerance for its corresponding term and/or relativity between items. For some industries, an industry-accepted tolerance is less than one percent and, for other industries, the industry-accepted tolerance is 10 percent or more. Other examples of industry-accepted tolerance range from less than one percent to fifty percent. Industry-accepted tolerances correspond to, but are not limited to, component values, integrated circuit process variations, temperature variations, rise and fall times, thermal noise, dimensions, signaling errors, dropped packets, temperatures, pressures, material compositions, and/or performance metrics. Within an industry, tolerance variances of accepted tolerances may be more or less than a percentage level (e.g., dimension tolerance of less than +/−1%). Some relativity between items may range from a difference of less than a percentage level to a few percent. Other relativity between items may range from a difference of a few percent to magnitude of differences.

[0105] As may also be used herein, the term(s) "configured to", "operably coupled to", "coupled to", and/or "coupling" includes direct coupling between items and/or indirect coupling between items via an intervening item (e.g., an item includes, but is not limited to, a component, an element, a circuit, and/or a module) where, for an example of indirect coupling, the intervening item does not modify the information of a signal but may adjust its current level, voltage level, and/or power level. As may further be used herein, inferred coupling (i.e., where one element is coupled to another element by inference) includes direct and indirect coupling between two items in the same manner as "coupled to".

[0106] As may even further be used herein, the term "configured to", "operable to", "coupled to", or "operably coupled to" indicates that an item includes one or more of power connections, input(s), output(s), etc., to perform, when activated, one or more its corresponding functions and may further include inferred coupling to one or more other items. As may still further be used herein, the term "associated with", includes direct and/or indirect coupling of separate items and/or one item being embedded within another item.

[0107] As may be used herein, the term "compares favorably", indicates that a comparison between two or more items, signals, etc., indicates an advantageous relationship that would be evident to one skilled in the art in light of the present disclosure, and based, for example, on the nature of the signals/items that are being compared. As may be used herein, the term "compares unfavorably", indicates that a comparison between two or more items, signals, etc., fails to provide such an advantageous relationship and/or that provides a disadvantageous relationship. Such an item/signal can correspond to one or more numeric values, one or more measurements, one or more counts and/or proportions, one or more types of data, and/or other information with attributes that can be compared to a threshold, to each other and/or to attributes of other information to determine whether a favorable or unfavorable comparison exists. Examples of such a advantageous relationship can include: one item/signal being greater than (or greater than or equal to) a threshold value, one item/signal being less than (or less than or equal to) a threshold value, one item/signal being greater than (or greater than or equal to) another item/signal, one item/signal being less than (or less than or equal to) another item/signal, one item/signal matching another item/signal, one item/signal substantially matching another item/signal within a predefined or industry accepted tolerance such as 1%, 5%, 10% or some other margin, etc. Furthermore, one skilled in the art will recognize that such a comparison between two items/signals can be performed in different ways. For example, when the advantageous relationship is that signal **1** has a greater magnitude than signal **2**, a favorable comparison may be achieved when the magnitude of signal **1** is greater than that of signal **2** or when the magnitude of signal **2** is less than that of signal **1**. Similarly, one skilled in the art will recognize that the comparison of the inverse or opposite of items/signals and/or other forms of mathematical or logical equivalence can likewise be used in an equivalent fashion. For example, the comparison to determine if a signal X>5 is equivalent to determining if −X<−5, and the comparison to determine if signal A matches signal B can likewise be performed by determining-A matches-B or not(A) matches not(B). As may be discussed herein, the determination that a particular relationship is present (either favorable or unfavorable) can be utilized to automatically trigger a particular action. Unless expressly stated to the contrary, the absence of that particular condition may be assumed to imply that the particular action will not automatically be triggered. In other examples, the determination that a particular relationship is present (either favorable or unfavorable) can be utilized as a basis or consideration to determine whether to perform one or more actions. Note that such a basis or consideration can be considered alone or in combination with one or more other bases or considerations to determine whether to perform the one or more actions. In one example where multiple bases or considerations are used to determine whether to perform one or more actions, the respective bases or considerations are given equal weight in such determination. In another example where multiple bases or considerations are used to determine whether to perform one or more actions, the respective bases or considerations are given unequal weight in such determination.

[0108] As may be used herein, one or more claims may include, in a specific form of this generic form, the phrase "at least one of a, b, and c" or of this generic form "at least one of a, b, or c", with more or less elements than "a", "b", and "c". In either phrasing, the phrases are to be interpreted identically. In particular, "at least one of a, b, and c" is equivalent to "at least one of a, b, or c" and shall mean a, b, and/or c. As an example, it means: "a" only, "b" only, "c" only, "a" and "b", "a" and "c", "b" and "c", and/or "a", "b", and "c".

[0109] As may also be used herein, the terms "processing module", "processing circuit", "processor", "processing circuitry", and/or "processing unit" may be a single processing device or a plurality of processing devices. Such a processing device may be a microprocessor, micro-controller, digital signal processor, microcomputer, central processing unit, field programmable gate array, programmable logic device, state machine, logic circuitry, analog circuitry, digital circuitry, and/or any device that manipulates signals (analog and/or digital) based on hard coding of the circuitry and/or operational instructions. The processing module, module, processing circuit, processing circuitry, and/or processing unit may be, or further include, memory and/or an integrated memory element, which may be a single memory device, a plurality of memory devices, and/or embedded circuitry of another processing module, module, processing circuit, processing circuitry, and/or processing unit. Such a memory device may be a read-only memory, random access memory, volatile memory, non-volatile memory, static memory, dynamic memory, flash memory, cache memory, and/or any device that stores digital information. Note that if the processing module, module, processing circuit, processing circuitry, and/or processing unit includes more than one processing device, the processing devices may be centrally located (e.g., directly coupled together via a wired and/or wireless bus structure) or may be distributedly located (e.g., cloud computing via indirect coupling via a local area network and/or a wide area network). Further note that if the processing module, module, processing circuit, processing circuitry and/or processing unit implements one or more of its functions via a state machine, analog circuitry, digital circuitry, and/or logic circuitry, the memory and/or memory element storing the corresponding operational instructions may be embedded within, or external to, the circuitry comprising the state machine, analog circuitry, digital circuitry, and/or logic circuitry. Still further note that, the memory element may store, and the processing module, module, processing circuit, processing circuitry and/or processing unit executes, hard coded and/or operational instructions corresponding to at least some of the steps and/or functions illustrated in one or more of the Figures Such a memory device or memory element can be included in an article of manufacture.

[0110] One or more examples have been described above with the aid of method steps illustrating the performance of specified functions and relationships thereof. The boundaries and sequence of these functional building blocks and method steps have been arbitrarily defined herein for convenience of description. Alternate boundaries and sequences can be defined so long as the specified functions and relationships are appropriately performed. Any such alternate boundaries or sequences are thus within the scope and spirit of the claims. Further, the boundaries of these functional building blocks have been arbitrarily defined for convenience of description. Alternate boundaries could be defined as long as the certain significant functions are appropriately performed. Similarly, flow diagram blocks may also have been arbitrarily defined herein to illustrate certain significant functionality.

[0111] To the extent used, the flow diagram block boundaries and sequence could have been defined otherwise and still perform the certain significant functionality. Such alternate definitions of both functional building blocks and flow diagram blocks and sequences are thus within the scope and spirit of the claims. One of average skill in the art will also recognize that the functional building blocks, and other illustrative blocks, modules and components herein, can be implemented as illustrated or by discrete components, application specific integrated circuits, processors executing appropriate software and the like or any combination thereof.

[0112] In addition, a flow diagram may include a "start" and/or "continue" indication. The "start" and "continue" indications reflect that the steps presented can optionally be incorporated in or otherwise used in conjunction with one or more other routines. In addition, a flow diagram may include an "end" and/or "continue" indication. The "end" and/or "continue" indications reflect that the steps presented can end as described and shown or optionally be incorporated in or otherwise used in conjunction with one or more other routines. In this context, "start" indicates the beginning of the first step presented and may be preceded by other activities not specifically shown. Further, the "continue" indication reflects that the steps presented may be performed multiple times and/or may be succeeded by other activities not specifically shown. Further, while a flow diagram indicates a particular ordering of steps, other orderings are likewise possible provided that the principles of causality are maintained.

[0113] The one or more examples are used herein to illustrate one or more aspects, one or more features, one or more concepts, and/or one or more examples. A physical example of an apparatus, an article of manufacture, a machine, and/or of a process may include one or more of the aspects, features, concepts, examples, etc. described with reference to one or more of the examples discussed herein. Further, from figure to figure, the examples may incorporate the same or similarly named functions, steps, modules, etc. that may use the same or different reference numbers and, as such, the functions, steps, modules, etc. may be the same or similar functions, steps, modules, etc. or different ones.

[0114] Unless specifically stated to the contra, signals to, from, and/or between elements in a figure of any of the figures presented herein may be analog or digital, continuous time or discrete time, and single-ended or differential. For instance, if a signal path is shown as a single-ended path, it also represents a differential signal path. Similarly, if a signal path is shown as a differential path, it also represents a single-ended signal path. While one or more particular architectures are described herein, other architectures can likewise be implemented that use one or more data buses not expressly shown, direct connectivity between elements, and/or indirect coupling between other elements as recognized by one of average skill in the art.

[0115] The term "module" is used in the description of one or more of the examples. A module implements one or more functions via a device such as a processor or other processing device or other hardware that may include or operate in association with a memory that stores operational instructions. A module may operate independently and/or in conjunction with software and/or firmware. As also used herein, a module may contain one or more sub-modules, each of which may be one or more modules.

[0116] As may further be used herein, a computer readable memory includes one or more memory elements. A memory element may be a separate memory device, multiple memory devices, or a set of memory locations within a memory device. Such a memory device may be a read-only memory, random access memory, volatile memory, non-volatile memory, static memory, dynamic memory, flash memory, cache memory, a quantum register or other quantum memory and/or any other device that stores data in a non-transitory manner. Furthermore, the memory device may be in a form of a solid-state memory, a hard drive memory or other disk storage, cloud memory, thumb drive, server memory, computing device memory, and/or other non-transitory medium for storing data. The storage of data includes temporary storage (i.e., data is lost when power is removed from the memory element) and/or persistent storage (i.e., data is retained when power is removed from the memory element). As used herein, a transitory medium shall mean one or more of: (a) a wired or wireless medium for the transportation of data as a signal from one computing device to another computing device for temporary storage or persistent storage; (b) a wired or wireless medium for the transportation of data as a signal within a computing device from one element of the computing device to another element of the computing device for temporary storage or persistent storage; (c) a wired or wireless medium for the transportation of data as a signal from one computing device to another computing device for processing the data by the other computing device; and (d) a wired or wireless medium for the transportation of data as a signal within a computing device from one element of the computing device to another element of the computing device for processing the data by the other element of the computing device. As may be used herein, a non-transitory computer readable memory is substantially equivalent to a computer readable memory. A non-transitory computer readable memory can also be referred to as a non-transitory computer readable storage medium.

[0117] One or more functions associated with the methods and/or processes described herein can be implemented via a processing module that operates via the non-human "artificial" intelligence (AI) of a machine. Examples of such AI include machines that operate via anomaly detection techniques, decision trees, association rules, expert systems and other knowledge-based systems, computer vision models, artificial neural networks, convolutional neural networks, support vector machines (SVMs), Bayesian networks, genetic algorithms, feature learning, sparse dictionary learning, preference learning, deep learning and other machine learning techniques that are trained using training data via unsupervised, semi-supervised, supervised and/or reinforcement learning, and/or other AI. The human mind is not equipped to perform such AI techniques, not only due to the complexity of these techniques, but also due to the fact that artificial intelligence, by its very definition-requires "artificial" intelligence—i.e. machine/non-human intelligence.

[0118] One or more functions associated with the methods and/or processes described herein involve NFTs that are generated ("minted") and secured via blockchain or other decentralized computer network technology. The distributed nature of these technologies over different nodes, the contemporaneous nature of geographically distinct calculations, coupled with the extreme computational complexity of the required calculations means that these decentralized computer network technologies cannot practically be performed by the human mind.

[0119] One or more functions associated with the methods and/or processes described herein can be implemented as a large-scale system that is operable to receive, transmit and/or process data on a large-scale. As used herein, a large-scale refers to a large number of data, such as one or more kilobytes, megabytes, gigabytes, terabytes or more of data that are received, transmitted and/or processed. Such receiving, transmitting and/or processing of data cannot practically be performed by the human mind on a large-scale within a reasonable period of time, such as within a second, a millisecond, microsecond, a real-time basis or other high speed required by the machines that generate the data, receive the data, convey the data, store the data and/or use the data.

[0120] One or more functions associated with the methods and/or processes described herein can require data to be manipulated in different ways within overlapping time spans. The human mind is not equipped to perform such different data manipulations independently, contemporaneously, in parallel, and/or on a coordinated basis within a reasonable period of time, such as within a second, a millisecond, microsecond, a real-time basis or other high speed required by the machines that generate the data, receive the data, convey the data, store the data and/or use the data.

[0121] One or more functions associated with the methods and/or processes described herein can be implemented in a system that is operable to electronically receive digital data via a wired or wireless communication network and/or to electronically transmit digital data via a wired or wireless communication network. Such receiving and transmitting cannot practically be performed by the human mind because the human mind is not equipped to electronically transmit or receive digital data, let alone to transmit and receive digital data via a wired or wireless communication network.

[0122] One or more functions associated with the methods and/or processes described herein can be implemented in a system that is operable to electronically store digital data in a memory device. Such storage cannot practically be performed by the human mind because the human mind is not equipped to electronically store digital data.

[0123] One or more functions associated with the methods and/or processes described herein may operate to cause an action by a processing module directly in response to a triggering event—without any intervening human interaction between the triggering event and the action. Any such actions may be identified as being performed "automatically", "automatically based on" and/or "automatically in response to" such a triggering event. Furthermore, any such actions identified in such a fashion specifically preclude the operation of human activity with respect to these actions—even if the triggering event itself may be causally connected to a human activity of some kind.

[0124] While particular combinations of various functions and features of the one or more examples have been expressly described herein, other combinations of these features and functions are likewise possible. The present disclosure is not limited by the particular examples disclosed herein and expressly incorporates these other combinations.

What is claimed is:

1. A method for use with a game development platform, the method comprising:

receiving, via a user interface, first natural language text that includes a character description to be associated with a character of a game under development;

generating, based on the first natural language text and via a generative AI model trained on a library of images and natural language descriptions, image data corresponding to the character of the game under development;

receiving, via the user interface, second natural language text that includes an updated character description to be associated with the character of the game under development;

generating, via the generative AI model and based on the second natural language text, updated image data corresponding to the character of the game under development;

receiving, via the user interface, an indication that the updated image data is accepted; and

generating, via the game development platform, the game under development to include the updated image data corresponding to the character.

2. The method of claim **1**, wherein the natural language descriptions correspond to the library of images.

3. The method of claim **1**, wherein updated image data is generated further based on the image data.

4. The method of claim **1**, wherein the character is a non-player character.

5. The method of claim **4**, further comprising:

receiving, via the user interface, third natural language text that indicates a speech theme;

generating, via a second generative AI model and based on the third natural language text, speech data corresponding to the non-player character of the game under development;

receiving, via the user interface, an indication that the speech data is accepted; and

generating, via the game development platform, the game under development to include the speech data corresponding to the non-player character.

6. The method of claim **5**, further comprising:

generating, via a third generative AI model and based on the image data and the speech data, cutscene data corresponding to the game under development;

receiving, via the user interface, an indication that the cutscene data is accepted; and

generating, via the game development platform, the game under development to include the cutscene data.

7. The method of claim **5**, further comprising:

receiving, via the user interface, fourth natural language text that indicates a second dialog theme associated with a second non-player character of the game under development;

generating, via the second generative AI model, dialog data corresponding to a dialog between the non-player character and the second non-player character;

receiving, via the user interface, an indication that the dialog data is accepted.

8. The method of claim **7**, further comprising:

generating, via a third generative AI model and based on the dialog between the non-player character and the second non-player character, cutscene data corresponding to the game under development.

9. The method of claim **8**, further comprising:

receiving, via the user interface, an indication that the cutscene data is accepted; and

generating, via the game development platform, the game under development to include the cutscene data.

10. The method of claim **5**, further comprising:

receiving, via a network interface, player speech audio associated with a player of the game;

generating player speech text based on a speech-to-text processing of the player speech audio;

identifying non-player character (NPC) data associated with at least one NPC currently engaging with the player in the game;

generating, via the second generative AI model, NPC dialog data corresponding to a dialog between the at least one NPC and the player; and

facilitating generation, based on the NPC dialog data, the dialog between the at least one NPC and the player.

11. A game development platform comprises:

a network interface configured to communicate via a network;

at least one processor;

a non-transitory machine-readable storage medium that stores operational instructions that, when executed by the at least one processor, cause the at least one processor to perform operations that include:

receiving, via a user interface, first natural language text that includes a character description to be associated with a character of a game under development;

generating, based on the first natural language text and via a generative AI model trained on a library of images and natural language descriptions, image data corresponding to the character of the game under development;

receiving, via the user interface, second natural language text that includes an updated character description to be associated with the character of the game under development;

generating, via the generative AI model and based on the second natural language text, updated image data corresponding to the character of the game under development;

receiving, via the user interface, an indication that the updated image data is accepted; and

generating, via the game development platform, the game under development to include the updated image data corresponding to the character.

12. The game development platform of claim **11**, wherein the natural language descriptions correspond to the library of images.

13. The game development platform of claim **11**, wherein updated image data is generated further based on the image data.

14. The game development platform of claim **11**, wherein the character is a non-player character.

15. The game development platform of claim **14**, the operations further comprising:

receiving, via the user interface, third natural language text that indicates a speech theme;

generating, via a second generative AI model and based on the third natural language text, speech data corresponding to the non-player character of the game under development;

receiving, via the user interface, an indication that the speech data is accepted; and

generating, via the game development platform, the game under development to include the speech data corresponding to the non-player character.

16. The game development platform of claim **15**, the operations further comprising:

generating, via a third generative AI model and based on the image data and the speech data, cutscene data corresponding to the game under development;

receiving, via the user interface, an indication that the cutscene data is accepted; and

generating, via the game development platform, the game under development to include the cutscene data.

17. The game development platform of claim **15**, the operations further comprising:

receiving, via the user interface, fourth natural language text that indicates a second dialog theme associated with a second non-player character of the game under development;

generating, via the second generative AI model, dialog data corresponding to a dialog between the non-player character and the second non-player character;

receiving, via the user interface, an indication that the dialog data is accepted.

18. The game development platform of claim **17**, the operations further comprising:

generating, via a third generative AI model and based on the dialog between the non-player character and the second non-player character, cutscene data corresponding to the game under development.

19. The game development platform of claim **18**, the operations further comprising:

receiving, via the user interface, an indication that the cutscene data is accepted; and

generating, via the game development platform, the game under development to include the cutscene data.

20. The game development platform of claim **15**, the operations further comprising:

receiving, via a network interface, player speech audio associated with a player of the game;

generating player speech text based on a speech-to-text processing of the player speech audio;

identifying non-player character (NPC) data associated with at least one NPC currently engaging with the player in the game;

generating, via the second generative AI model, NPC dialog data corresponding to a dialog between the at least one NPC and the player; and

facilitating generation, based on the NPC dialog data, the dialog between the at least one NPC and the player.

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