

TARGET ASSEMBLY SYSTEM AND METHOD

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to and the benefit of U.S. Provisional Application Serial No. 63/461,535, filed April 24, 2023, entitled “TARGET ASSEMBLY SYSTEM AND METHOD,” which is herein incorporated by reference in its entirety for all purposes.

BACKGROUND

[0002] This section is intended to introduce the reader to various aspects of art that may be related to various aspects of the present disclosure, which are described and/or claimed below. This discussion is believed to help provide the reader with background information to facilitate a better understanding of the various aspects of the present disclosure. Accordingly, it is understood that these statements are to be read in this light, and not as admissions of prior art.

[0003] Entertainment venues, such as theme or amusement parks, have been created to provide guests with various immersive experiences. These entertainment venues may include various attractions, such as rides (e.g., rollercoasters), shows, games, and the like, some of which employing a ride assembly configured to move guest(s) along a ride path (e.g., track), show effects configured to enhance the immersive experiences of the guest(s), etc.

[0004] In certain traditional attractions, one or more guests may operate a device, such as a ball launcher configured to launch a ball, to hit a target assembly. Detection features may be configured to determine whether the guest successfully hit the target assembly with, for example, the ball launched by the ball launcher. Unfortunately, detection features of traditional attractions may be imprecise or susceptible failure, which may negatively affect the guest's experience. Further, such traditional attractions may be

limited in scope and immersion. Accordingly, it is now recognized that improved target assemblies and corresponding amusement attractions are desired.

BRIEF DESCRIPTION

[0005] Certain embodiments commensurate in scope with the originally claimed subject matter are summarized below. These embodiments are not intended to limit the scope of the disclosure, but rather these embodiments are intended only to provide a brief summary of certain disclosed embodiments. Indeed, the present disclosure may encompass a variety of forms that may be similar to or different from embodiments set forth below.

[0006] In an embodiment, a system includes a nozzle configured to eject a liquid. The system also includes a wall having a surface facing the nozzle and a thickness extending from the surface. The system also includes one or more target sensors (e.g., capacitance sensors) configured to detect, through the thickness of the wall, a presence of the liquid at or adjacent to the surface.

[0007] In an embodiment, a target assembly for an amusement attraction includes a wall having a surface and a thickness extending from the surface. The target assembly also includes one or more target sensors (e.g., capacitance sensors) configured to detect, through the thickness of the wall, a presence of a liquid at or adjacent to the surface.

[0008] In an embodiment, an amusement system includes a first nozzle operatable by a first guest to eject a first liquid, a second nozzle operatable by a second guest to eject a second liquid, a target facing the first nozzle and the second nozzle, and one or more target sensors (e.g., capacitance sensors) configured to detect, through a thickness of the target, a presence of the first liquid, the second liquid, or both at the target. The amusement system may also include a control system configured to receive sensor feedback from the one or more target sensors (e.g., capacitance sensors), and determine, based at least in part on the sensor feedback, a first game score corresponding to the first

guest, a second game score corresponding to the second guest, a team score corresponding to the first guest and the second guest, or any combination thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] These and other features, aspects, and advantages of the present disclosure will become better understood when the following detailed description is read with reference to the accompanying drawings in which like characters represent like parts throughout the drawings, wherein:

[0010] FIG. 1 is an overhead view of an attraction (e.g., a ride system) having a target sensor (e.g., capacitance sensor) configured to detect, at a target assembly of the attraction, a presence of a liquid ejected from a nozzle of the attraction, in accordance with an aspect of the present disclosure;

[0011] FIG. 2 is a schematic diagram illustrating a portion of the attraction of FIG. 1, in accordance with an aspect of the present disclosure;

[0012] FIG. 3 is a perspective view of nozzle devices and target sensors (e.g., capacitance sensors) corresponding to target assemblies employable in the attraction of FIG. 1, in accordance with an aspect of the present disclosure;

[0013] FIG. 4 is a perspective view of a nozzle device employable in the attraction of FIG. 1, in accordance with an aspect of the present disclosure;

[0014] FIG. 5 is a side view of the target assembly employable in the attraction of FIG. 1, the target assembly including a wall with a first surface configured to face the nozzle of the attraction, and a target sensor (e.g., capacitance sensor) disposed on a second surface of the wall opposing the first surface, in accordance with an aspect of the present disclosure;

[0015] FIG. 6 is a side view of the target assembly employable in the attraction of FIG. 1, the target assembly including a wall with a surface configured to face the nozzle of the attraction, and a target sensor (e.g., capacitance sensor) embedded in the wall, in accordance with an aspect of the present disclosure;

[0016] FIG. 7 is a side view of the target assembly employable in the attraction of FIG. 1, the target assembly including an enclosure configured to shield the target sensor (e.g., capacitance sensor) from certain aspects of a surrounding environment, in accordance with an aspect of the present disclosure;

[0017] Fig. 8 is a front view of multiple target assemblies employable on a common wall (or character) in the attraction of FIG. 1, in accordance with an aspect of the present disclosure;

[0018] FIG. 9 is a perspective view of a target assembly employable in the attraction of FIG. 1, the target assembly including a target sensor array (e.g., capacitance sensor array) having at least two target sensors (e.g., capacitance sensors), in accordance with an aspect of the present disclosure;

[0019] FIG. 10 is a schematic illustration of an attraction employing a target assembly and an electrical circuit completed by a nozzle device ejecting a liquid onto the target assembly, in accordance with an aspect of the present disclosure; and

[0020] FIG. 11 is a process flow diagram illustrating a method of operating an attraction, such as the attraction in FIG. 1, employing one or more target assemblies and one or more nozzle devices configured to eject liquid onto the one or more target assemblies, in accordance with an aspect of the present disclosure.

DETAILED DESCRIPTION

[0021] One or more specific embodiments will be described below. In an effort to provide a concise description of these embodiments, not all features of an actual

implementation are described in the specification. It should be appreciated that in the development of any such actual implementation, as in any engineering or design project, numerous implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which may vary from one implementation to another. Moreover, it should be appreciated that such a development effort might be complex and time consuming, but would nevertheless be a routine undertaking of design, fabrication, and manufacture for those of ordinary skill having the benefit of this disclosure.

[0022] When introducing elements of various embodiments of the present disclosure, the articles “a,” “an,” and “the” are intended to mean that there are one or more of the elements. The terms “comprising,” “including,” and “having” are intended to be inclusive and mean that there may be additional elements other than the listed elements. Additionally, it should be understood that references to “one embodiment” or “an embodiment” of the present disclosure are not intended to be interpreted as excluding the existence of additional embodiments that also incorporate the recited features.

[0023] The present disclosure relates generally to target assemblies and corresponding controls employed, for example, in an amusement park attraction. In accordance with certain embodiments, the amusement park attraction may include a nozzle device (e.g., water cannon, spray blaster, etc.) configured to eject a liquid (e.g., water, treated water such as chlorinated water, water colored by dye, by watercolor, or by paint, etc.) toward the target assembly. For example, a guest may operate the nozzle device to eject the liquid toward a first surface of a wall of the target assembly. A target sensor (e.g., capacitance sensor) may be disposed on a second surface of the wall opposing the first surface, or the target sensor may be embedded within the wall. In this way, the target sensor may be hidden from view from the guest's perspective (e.g., where the first surface of the wall faces the guest). The target sensor may be configured to detect, at the first surface of the wall, a presence of the liquid ejected from the nozzle device operated by the guest. For example, the target sensor may include a capacitance sensor configured

to detect the presence of the liquid at the first surface of the wall by detecting a capacitance of the liquid. Other types of target sensors may include imaging sensors (e.g., a camera, a light detection and ranging (LIDAR) sensor, etc.), light sensors with or without light emitters (e.g., visible light sensors, infrared light sensors, ultraviolet light sensors, laser sensors), etc. Discussion of the target sensor and corresponding functionality is provided in detail with respect to the drawings below.

[0024] In some embodiments, the target assembly may be integrated with a show element of the amusement park attraction, such as an avatar, a humanoid, a robot, a figurine, an actuatable character, etc. By hiding the target sensor (e.g., capacitance sensor) from view from the guest's perspective, as described above, an authenticity of the show element is improved over traditional configurations in which a sensor and/or other componentry is on a location of the target assembly facing the guest. Further, as described in detail with reference to the drawings, an accuracy, precision, and/or reliability of the target sensor in detecting the presence of the liquid at the wall of the target assembly is not reduced in response to movement of the target assembly. Indeed, the target sensor may not include any movable mechanical componentry, unlike certain traditional sensing technologies. Accordingly, certain embodiments employ moveable show elements having the target assembly (or portions thereof) integrated therein, where movement of the show elements does not impact sensor readings by the target sensor. Further, in certain embodiments, a hydrophobic or superhydrophobic coating may be employed at the first surface of the wall of the target assembly and configured to repel the liquid from the wall, such that the liquid does not saturate the first surface of the wall and/or reside on the first surface of the wall for longer than a desirable moment in (or interval of) time. In this way, the target sensor may be capable of detecting multiple "hits" on the target assembly in quick succession. More detailed aspects of the target assembly or assemblies, the target sensor(s), etc. will be provided with reference to the drawings.

[0025] In certain embodiments, a control system may control one or more effects of the amusement park attraction in response to the target sensor (e.g., capacitance sensor)

detecting, at the wall of the target assembly, the presence of a liquid ejected from a nozzle device controlled by the guest. For example, the control system may control, in response to a sufficient amount of the liquid (e.g., fluid film) hitting the wall of the target assembly and being detected by the target sensor, a light, a water feature, a speaker configured to emit audio, a pyrotechnic effect, a flame effect, a bubble effect, a confetti effect, an animated figure actuation, movement of a ride vehicle of the amusement park attraction, a scoreboard (e.g., digital scoreboard), other effects, or any combination thereof. Control of other effects is also possible. Further, in certain embodiments, the amusement park attraction may employ control features whereby actuation of certain effects is initiated in response to team achievements (e.g., via two guests operating two respective nozzles), an order of targets hit by the nozzle device(s) operated by the guest(s), etc. These and other features are described in detail below with reference to the drawings.

[0026] Turning now to the drawings, FIG. 1 is an overhead view of an embodiment of an attraction 10 (e.g., a ride system) having one or more target sensors 12 (e.g., capacitance sensors, imaging sensors such as cameras or light detection and ranging (LIDAR) sensors, light sensors with or without light emitters (e.g., visible light sensors, infrared light sensors, ultraviolet light sensors, laser sensors, etc.) configured to detect, at a target assembly 14 of the attraction 10, a presence of a liquid 24 (e.g., water, treated water such as chlorinated water, water colored by dye, by watercolor, or by paint, etc.) ejected from a nozzle device 16 (e.g., a water cannon, spray blaster, etc.) of the attraction 10. Although the attraction 10 illustrated in FIG. 1 is discussed in certain instances below in the context of a ride system employing a ride path 18 (e.g., a track), a ride vehicle 20 configured to move along the ride path 18, and a loading station 19 at which guests may enter and leave the ride vehicle 20, it should be understood that features related to the target assembly 14 (and/or other target assemblies of the attraction 10, described in detail below) may be employed in the context of other types of attractions, such as those that do

not employ the ride path 18, the ride vehicle 20, and the loading station 19 (e.g., platform-based attractions, walk-through attractions, shows, games, etc.).

[0027] In the illustrated embodiment, the ride vehicle 20 may include a number of seats 21, such as six pairs of two seats 21 each (e.g., twelve total seats 21). However, any number of seats 21 or other restraint mechanisms may be employed, and other configurations of the seats 21 are possible in accordance with the present disclosure. A guest 22 situated in one of the seats 21 on the ride vehicle 20 may operate the nozzle device 16 (e.g., water cannon, spray blaster, etc.) to eject the liquid 24 at the target assembly 14. For simplicity, only one instance of the nozzle device 16 corresponding to the ride vehicle 20 is shown. However, in other embodiments, multiple nozzle devices may be employed, such as one instance of the nozzle device 16 per each instance of the seat 21.

[0028] The nozzle device 16 may eject a laminar flow of the liquid 24 or a non-laminar flow of the liquid 24. Further, the nozzle device 16 may be operated while the ride vehicle 20 is in motion, during a time period in which the ride vehicle 20 is stationary, or both. In some embodiments, the target assembly 14 may be configured to move (e.g., change position, change orientation). As shown, the target assembly 14 may be moved along a target assembly path (e.g., track) 26. In other embodiments, the target assembly 14 may be a drone or other device configured to be moved absent the target assembly path 26.

[0029] Movement of the target assembly 14, the ride vehicle 20, or both may be controlled by a control system (e.g., controller, control assembly) 28. For example, the control system 28 may include memory circuitry 30 (e.g., one or more memory) storing instructions thereon, processing circuitry 32 (e.g., one or more processors) configured to execute the instructions stored on the memory circuitry 30, and communication circuitry 34 (e.g., one or more transmitters, receivers, transceivers, wired connections, etc.) configured to receive and/or transmit communications to various componentry of the

attraction 10. As an example, the memory circuitry 30 may store instructions thereon that, when executed by the processing circuitry 32, causes the processing circuitry 32 to instruct (e.g., via communications enabled by the communication circuitry 34) movement of the ride vehicle 20, movement of the target assembly 14, actuation of various effects of the attraction 10, or any combination thereof, as described in detail below. It should be noted that the memory circuitry 30, the processing circuitry 32, and/or the communication circuitry 34 may be separate (e.g., separate systems, separate assemblies, separate components) and not integrated in a single controller (e.g., the control system 28). In other words, the memory circuitry 30, the processing circuitry 32, and/or the communication circuitry 34 may be off-board from an integrated control. For example, in an embodiment in which the control system 28 includes a controller, the communication circuitry 34 may be off-board from the controller and coupled with the controller via a wired or wireless connection.

[0030] Further, the processor circuitry 32 (e.g. of the control system 28) may include one or more microprocessors, one or more “general-purpose” microprocessors, one or more special-purpose microprocessors, and/or one or more application specific integrated circuits (ASICs), or some combination thereof. For example, the processing circuitry 32 may include one or more reduced instruction set (RISC) or complex instruction set (CISC) processors. The memory circuitry 30 (e.g., of the control system 28) may include one or more volatile memory, such as random access memory (RAM), and/or one or more nonvolatile memory, such as read-only memory (ROM). The memory circuitry 30 may store a variety of information and may be used for various purposes. For example, the memory circuitry 30 may store processor-executable instructions (e.g., firmware or software) for the processing circuitry 32 to execute, such as instructions for controlling various componentry of the attraction 10. The memory circuitry 30 and/or the processing circuitry 32 may be located in any suitable portion of the attraction 10.

[0031] The target assembly 14 may include at least one instance of the target sensor 12 (e.g., capacitance sensor), as previously described, where the target sensor 12 is

configured to detect a presence, at the target assembly 14, of the liquid 24 ejected from the nozzle device 16 in response to operation of the nozzle device 16 by the guest 22. That is, the target sensor 12 may be configured to detect the presence of the liquid 24 at a front-facing surface 36 of a wall of the target assembly 14 and through a thickness of the wall (e.g., without the liquid 24 directly contacting the target sensor 12). In this way, the target sensor 12 may be hidden from view from the perspective of the guest 22 on the ride vehicle 20. In some embodiments, the target assembly 14 may be (or may be formed on) a figurine, an avatar, a humanoid, a robot, a cartoon character, or some other show element (e.g., where the target assembly 14 includes an aesthetic that corresponds to a theme of the attraction 10). By hiding the target sensor 12 from view from the perspective of the guest 22, an authenticity of the target assembly 14 (e.g., the figure, avatar, humanoid, a robot, cartoon character, etc.) may be improved over configurations in which sensing technologies are visible from the perspective of the guest 22 in the ride vehicle 20.

[0032] Further, the target sensor 12 (e.g., capacitance sensor) may be non-mechanical or, in other words, capable of detecting the presence of the liquid 24 at the target assembly 14 without substantial movement of structure of the target sensor 12. For example, the target sensor 12 may detect the presence of the liquid 24 at the target assembly 14 in response to an amount of the liquid 24 present at the front-facing surface 36 of the target assembly 14 exceeding a threshold amount (e.g., threshold quantity). In some embodiments, the target sensor 12 may detect the presence of the liquid 24 at the front-facing surface 36 of the target assembly 14 in response to a fluid film presence and/or formation (e.g., fluid film size (e.g., fluid film thickness, fluid film area, fluid film volume)) of the liquid 24 on the front-facing surface 36 exceeding a threshold fluid film presence and/or formation (e.g., threshold fluid film size (e.g., fluid film thickness, fluid film area, fluid film volume)). Indeed, the target sensor 12 may be a capacitance sensor configured to detect a capacitance of the liquid 24 (e.g., where the liquid 24 is conductive and/or includes a dielectric constant different from air) in response to the above-described

threshold conditions being met. In other embodiments, the target sensor 12 may include an imaging sensor (e.g., a camera or LIDAR sensor), light sensors with or without light emitters (e.g., visible light sensor, infrared light sensor, ultraviolet light sensor, or laser sensor), etc.

[0033] Additionally or alternatively, the target sensor 12 may be configured to accurately and reliably detect the presence of the liquid 24 at the target assembly 14 despite movement of the target assembly 14 and/or movement of the target sensor 12 attached to the target assembly 14 described above. Thus, the target sensor 12 may be more accurate and reliable than sensing technologies that are negatively impacted by movement of said sensing technologies (and/or targets on which said sensing technologies are disposed). More detailed aspects of the target assembly 14 and the target sensor 12 corresponding to the target assembly 14 will be provided below with reference to later drawings.

[0034] The control system 28 may be communicatively coupled with the target sensor 12 and configured to instruct one or more aspects (e.g., one or more effects) of the attraction 10 in response to the guest 22 successfully hitting the target assembly 14 with the liquid 24 ejected from the nozzle device 16. For example, in response to determining that the guest 22 successfully hit the target assembly 14 with the liquid 24 ejected from the nozzle device 16, the control system 28 may be configured to instruct a movement of the ride vehicle 20 and/or seats thereof (e.g., roll, pitch, or yaw movement, a change of direction, speed, or acceleration, a spinning routine, a rise or drop or elevation change, etc.), a movement or animation of the target assembly 14 or certain parts thereof, such as an appendage (e.g., arm, leg) of a character corresponding to the target assembly 14, a body (e.g., torso) of the character, a head of the character, any other parts of the character, etc.), one or more other effects of the attraction 10, or any combination thereof.

[0035] The one or more other effects of the attraction 10 may include, for example, a visual effect system 38 (e.g., light, image projector, or a display (e.g., light-emitting diode display, organic light-emitting diode display, liquid crystal display)) instructed to

emit a visual output (e.g., various colors, brightness, images, etc.), a speaker 40 instructed to emit audio (e.g., controlled to a different volume, to play music, to play dialogue, etc.), a water feature 42 instructed to initiate, disable, or change a color of liquid (e.g., water), to produce a liquid fountain (e.g., water fountain) or a mist, etc., and/or to change a body of water (e.g., lake, pond, lagoon, liquid reservoir) to include a particular color of liquid (e.g., water), produce a tide or a current, etc., a scoreboard instructed to change a score on the scoreboard, the ride path 18 (or associated componentry, such as a switch) instructed to change a path, direction, velocity, acceleration, etc. of the ride vehicle 20, additional targets instructed to change or cause an appearance or disappearance thereof, an environmental weather effect instructed to change an environment (e.g., external environment) about the attraction 10, such as wind speed or direction, cloud coverage, daylight (e.g., switching between daytime and nighttime) simulated by the attraction 10, etc., another effect 46 instructed to actuate a confetti cannon, a pyrotechnic effect, a flame effect, a bubble effect, an animated figure motion and/or actuation, or any combination thereof. The above-described effects of the attraction 10 form a non-exhaustive list of examples in accordance with the present disclosure, and it should be understood that the present disclosure includes other examples of effects.

[0036] The above-described controls, among others in accordance with the present disclosure, may improve an immersive experience associated with the attraction 10. It should be noted that certain effects may be integrated with (e.g., formed on or attached to) the target assembly 14 in certain embodiments. For example, in some embodiments, the visual effect system 38 and/or the speaker 40 may be coupled to or otherwise integrated with the target assembly 14. As an example, the visual effect system 38 may comprise light(s), and the lights may be integrated with cartoon eyes of a cartoon character corresponding to the target assembly 14, where the visual effect system 38 is controlled to a bright red color by the control system 28 in response to the target sensor 12 (e.g., capacitance sensor) detecting the presence of the liquid 24 at the front-facing surface 36 of the target assembly 14. The above-described features are provided as non-

limiting examples and it should be understood that the present disclosure may include other controls in response to the guest 22 successfully hitting the target assembly 14 via the liquid 24 ejected by the nozzle device 16 operated by the guest 22.

[0037] As shown, the attraction 10 may include a second target assembly 48 (e.g., configured to move along a second target assembly path 50) including at least one second target sensor 52 (e.g., capacitance sensor), a second speaker 54 associated with the second target assembly 48, a second light 56 associated with the second target assembly 48, and a second additional effect 57 associated with the second target assembly 48. Likewise, the attraction 10 may include a third target assembly 58 (e.g., configured to move along a third target assembly path 60) including at least one third target sensor 62 (e.g., capacitance sensor), a third speaker 64 associated with the third target assembly 58, a third light 66 associated with the third target assembly 58, and a third additional effect 67 associated with the third target assembly 58. As shown, the second target assembly 48 is disposed along a location of the ride path 18 different than that of the target assembly 14, and the third target assembly 58 is disposed along a location of the ride path 18 different than that of the target assembly 14 and the second target assembly 48. In this way, the guest 22 may control the nozzle device 16 at various intervals of the ride path 18 in an effort to hit the various target assemblies 14, 48, 58 with the liquid 24 ejected from the nozzle device 16. However, it should be understood that, in some embodiments, multiple targets (e.g., the target assembly 14, the second target assembly 48, the third target assembly 58, etc.) may be integrated in or on a single feature (e.g., scenery, building, plant), character (e.g., figurine, animated figure, humanoid, robot, avatar, cartoon character), etc.. For example, the target assembly 14 may correspond to an appendage (e.g., arm, leg) of the character, the second target assembly 48 may correspond to a body or torso of the character, and the third target assembly 58 may correspond to a head of the character.

[0038] Further to the points above, in some embodiments, multiple ride vehicles and/or multiple nozzles devices may be employed. As shown, a second ride vehicle 70 may be

employed in the attraction 10. The second ride vehicle 70 may be similar to the first ride vehicle 20 (e.g., the second ride vehicle 70 may include various seats 71). A second guest 72 may be positioned in one of the seats 71 and may control a second nozzle device 74 configured to eject second liquid 75 via operation of the second nozzle device 74 by the second guest 72. In the illustrated embodiment, the second liquid 75 ejected by the second nozzle device 74 misses the target assembly 14, as shown. In embodiments employing two or more nozzle devices 16, 74 (e.g., with the two ride vehicles 20, 70, or with one ride vehicle having multiple nozzle devices 16, 74 thereon), the attraction 10 may include team-oriented objectives or criteria. That is, the control system 28 may instruct actuation of certain componentry of the attraction system 10 in certain ways in response to certain team-oriented objectives or criteria being met. For example, the control system 28 may instruct actuation of a component (e.g., the visual effect system 38, the speaker 40, etc.) in a first way in response to the guest 22 successfully hitting the target assembly 14 but the second guest 72 failing to hit the target assembly 14, in a second way in response to both of the guests 22, 72 successfully hitting the target assembly 14, and in a third way in response to the guest 22 failing to hit the target assembly 14 and the second guest 72 successfully hitting the target assembly 14. Additionally or alternatively, control (e.g., instruction) of various componentry (e.g., effects of the attraction 10) by the control system 28 may be based on an order in which the guest 22 and/or the second guest 72 successfully hit the target assembly 14. Additionally or alternatively, control (e.g., instruction) of various componentry (e.g., effects of the attraction 10) by the control system 28 may be based on an order in which the various target assemblies 14, 48, 58 are hit by the guest 22, the second guest 72, or both.

[0039] In some embodiments, the control system 28 may calculate various scores based on a performance by the first guest 22, the second guest 72, or both. For example, the control system 28 may calculate a first score corresponding to the first guest 22, a second score corresponding to the second guest 72, a team score corresponding to the first guest

22 and the second guest 72, or any combination thereof. The control system 28 and/or other componentry of the attraction system 10 may be configured to decipher when the liquid 24 ejected from the first nozzle device 16 hits a particular target (e.g., the target assembly 14), when the liquid 75 ejected from the second nozzle device 74 hits a particular target (e.g., the target assembly 14). That is, in response to the target sensor 12 (e.g., capacitance sensor) detecting the presence of liquid (e.g., the liquid 24 corresponding to the nozzle device 16 or additional liquid 75 corresponding to the second nozzle device 74), the attraction 10 may be capable of distinguishing which nozzle device 16 or 74 was employed to hit the corresponding target assembly 14.

[0040] In some embodiments, multiple instances of the target sensor 12 may be disposed on the target assembly 14 in a manner that enables the target sensors 12 and/or the control system 28 to distinguish a directionality of the detected liquid 24 or 75, which may be employed to infer which of the nozzle devices 16 or 74, respectively, was responsible for hitting the target assembly 14. Additionally or alternatively, locations of the ride vehicles 20, 70 on the ride path 18, which may be tracked by the control system 28, may be employed to determine which of the nozzles devices 16 or 74 was responsible for hitting the target assembly 14. Additionally or alternatively, the control system 28 may receive data from the nozzle devices 16, 74 themselves indicating when the nozzle devices 16, 74 were triggered to eject liquid 24, 75, where the nozzle devices 16, 74 were when they were triggered to eject liquid 24, 75 (or when the liquid 24, 75 contacted was detected, for example, by the target sensor(s) 12), and/or what orientation the nozzle devices 16, 74 were in (e.g., what direction each nozzle device 16, 74 was facing (e.g., relative to the position and/or orientation a ride vehicle, ride path, walking path, any other relative reference frame, absolute reference frame, cardinal direction) when they were triggered to eject liquid 24, 75). Other data and/or feedback may be employed by the control system 28 to determine the above-described conditions and calculate the scores corresponding to the first guest 22, the second guest 72, or a team including the first guest 22 and the second guest 72. Such scores may be based at least in part on a total number

of targets hit by the liquid 24, 75 ejected from each nozzle 16, 74, an order in which the targets are hit by the liquid 24, 75 ejected from the nozzles 16, 74, an order in which liquid 24, 75 ejected from each nozzle 16, 74 hits the targets, and/or other conditions.

[0041] FIG. 2 is a schematic diagram illustrating an embodiment of a portion of the attraction 10 of FIG. 1. Various aspects of the control system 28 in FIG. 1 are illustrated in FIG. 2. It should be understood that FIG. 2 is an example implementation of various componentry of the attraction 10 in FIG. 1, and that other implementations are possible in accordance with the present disclosure.

[0042] As shown, the target assembly 14 may include at least one target sensor 12 (e.g., capacitance sensor) and at least one visual effect system 38 (e.g., one or more lights) integrated with the target assembly 14. The target sensor 12 may be communicatively coupled with a ride/show breakout (RSB) element junction box 100 that distributes multi conductor cables to individual paths inside of the show action equipment. In general, the RSB element junction box 100 may be configured to transmit and/or receive data (e.g., multi-pair data) to and from various components of the attraction 10. For example, as shown, the RSB element junction box 100 is communicatively coupled to pneumatic valve controls 102 employed to control various aspects of the target assembly 14 or assemblies (e.g., a torso actuator 104 for actuating a torso of a figure 125 corresponding to the target assembly 14 or assemblies, an appendage actuator 106 for actuating an appendage (e.g., arm, leg) of the figure 125 corresponding to the target assembly 14 or assemblies, and a head actuator 108 for actuating a head of the figure 125 corresponding to the target assembly 14 or assemblies). In some embodiments, the figure 125 may include multiple targets (e.g., a first target corresponding to the appendage actuated by the appendage actuator 106, a second target corresponding to the torso actuated by the torso actuator 104, and a third target corresponding to the head actuated by the head actuator 108). Further, in some embodiments, the figure 125 (e.g., animated figure) may be separate from the targets and actuatable in response to feedback from the target sensor(s) 12 associated with the targets. A facility pneumatic supply 111 (e.g.,

pressurized tank) may be employed to provide pneumatic force(s) for operating the above-described actuators 104, 106, 108.

[0043] The RSB element junction box 100 may also be communicatively coupled to a water effects (WFX) pneumatic controls 112 in the illustrated embodiment, which may be fluidly coupled to the facility pneumatic supply 111 of the attraction 10. The WFX pneumatic controls 112 may be configured to control (e.g., instruct) the water feature(s) 42 (e.g., WFX nozzle) of the attraction 10 via (e.g., instructing) a water regulator 114 coupled with one or more pressurized water conduits 116 (e.g., extending from a facility water supply 117), and a pressurized water hose 118 coupling the water regulator 114 and the water feature(s) 42 (e.g., WFX nozzle). Control of the actuators 104, 106, 108 and the water feature(s) 42 (e.g., WFX nozzle) may be based on, as previously described, the target sensor 12 detecting the presence, at the target assembly 14 or assemblies, of a liquid 24, 75 ejected from the nozzle device(s) 16, 74 of FIG. 1. The actuators 104, 106, 108 (and/or other actuators or actuatable features in accordance with the present disclosure) may be mechanically, electronically, magnetically, pneumatically, and/or hydraulically actuated, among other possibly actuation techniques in accordance with the present disclosure. The WFX feature 42 may be controlled by other methods (e.g., hydraulic, mechanical, electrical magnetic) in addition to or instead of pneumatic techniques.

[0044] The RSB element junction box 100 may be communicatively coupled with a ride-show distribution (RSD) box 119 in the illustrated embodiment, where the RSD box 119 contains networked input/output devices and receives commands via a network in order to read state of inputs and control state of outputs. For example, the RSD box 119 is coupled with a sub-system controller (SSC) 120, which may be a programmable logic controller (PLC)-based computer that controls the entire ride/show system via the RSD box 119 or boxes. In some embodiments, the RSD box 119 is powered (e.g., via 24V DC power) via the SSC 120. The RSD box 119 or boxes may be network-linked via a ride/show network (RSN) box 122 configured to control (e.g., instruct) and/or facilitate

all or some of the communications between various componentry of the attraction 10, as shown. The RSN box 122 may be configured to transmit and/or receive data (e.g., via fiber-optic connections, multi-pair data connections, etc.) to and from various componentry, as shown, such as a show control supervisor (SCS) box 124. The SCS box 124 may be a PLC-based computer that determines show system response (e.g., lights, audio, video, other visuals, other effects) based on inputs received from the SSC box 120.

[0045] An audio/visual (AV) rack 126 may be controlled (e.g., instructed) to provide an audio signal to a speaker breakout box (SBB) 128 which transforms, modifies, packages, and/or relays the audio signal to the speaker 40, as shown. A show lighting control rack (SLCR) 130 and show lighting dimmer rack (SLDR) 132 may coordinate to ultimately control (e.g., instruct) the visual effect system 38 and their output illustrated in FIG. 2. For example, the SLCR 130 may transmit a digital multiplexer (DMX) signal to a light-emitting diode (LED) driver 134, which transforms, modifies, packages, and/or relays the DMX signal to a DMX decoder 136. The DMX decoder 136 also receives power (e.g., 24V DC power) from a transformer 138 configured to receive an input power (e.g., 120V AC power) from the SLDR 13, as shown. In general, the DMX decoder 136 generates regulated voltage outputs for operating the visual effect system 38 (e.g., in response to the target assembly 14 being hit by a nozzle device). As shown, data communications and/or power connections of the attraction 10 may include any wired connections, circuitry, and the like corresponding to the target sensor(s) 12, the visual effect system 38, the DMX decoder 136, the RSB element junction box 100, the pneumatic valve controls 102, the appendage actuator 104, the torso actuator 106, the head actuator 108, the WFX pneumatic controls 112, the water regulator 114, the pressurized water conduits 116, and/or the WFX feature 42 (e.g., nozzle). In accordance with the present disclosure, it should be understood that any analog or digital communication pathways illustrated in the attraction 10 of FIG. 1 may be wired or wireless.

[0046] FIG. 3 is a perspective view of nozzle devices (e.g., the first nozzle device 16 and the second nozzle device 74) and target sensors (e.g., the first target sensor 12, the second

target sensor 52, and the third target sensor 62) corresponding to various target assemblies (e.g., the first target assembly 14, the second target assembly 48, and the third target assembly 58, respectively) employable in the attraction 10 of FIG. 1. Although the features illustrated in FIG. 3 may be employed in the context of the attraction 10 of FIG. 1 including one or more ride vehicles, it should be understood that presently disclosed features may be employed in the context of attractions that do not employ ride vehicles moved along a ride path (e.g., track), such as an attraction (e.g., a show, a game, etc.) arranged in a booth or on a platform.

[0047] In the illustrated embodiment, the target assemblies 14, 48, 58 are disposed on a common wall 160 or character corresponding to the common wall 160. For simplicity, the common wall 160 in the illustrated embodiment includes a flat cylindrical shape. However, it should be understood that the common wall 160 may be representative of scenery (e.g., plants, buildings, fences), or a character, such as a humanoid, a robot, an avatar, a figure or figurine, etc., and that the target assemblies 14, 48, 58 may correspond to various locations on the common wall 160, such as a head of a character, an appendage of a character, a torso of a character, etc. Further, while the target assembly 14 includes the target sensor 12 (e.g., capacitance sensor) as shown, it should be understood that multiple instances of the target sensor 12 may be disposed at the target assembly 14 in other embodiments, which also may be the case for the other target assemblies 48, 58 in FIG. 3.

[0048] As shown, the nozzle device 16 includes a base 162, a nozzle 164 protruding from the base 162 and configured to eject the liquid 24 therefrom, and a control panel 166. The control panel 166 may include a nozzle control pad 168 configured to control (e.g., instruct) movement of the nozzle 164 (e.g., pivoting the nozzle 164 about an anchor point 169) and a liquid control pad 170 configured to control ejection of the liquid 24 from the nozzle 164. Similarly, the additional nozzle device 164 includes a base 172, a nozzle 174, a control panel 176, a nozzle control pad 178, and a liquid control pad 180. An inner diameter 182 of the nozzle 164 of the first nozzle device 16 and an inner diameter

184 of the nozzle 174 of the second nozzle device 74 may each be within a range of about 5 millimeters (mm) to about 7 mm. Further, the nozzle devices 16, 74 may be configured to eject the liquids 24, 75, respectively, such that a respective jet of each of the liquids 24, 75 includes a pressure between about 140 kilopascal (kPa) and about 280 kPa. Further still, the nozzle devices 16, 74 each may be configured to eject the liquids 24, 75 in bursts ranging between 1 second and 10 seconds (e.g., about 2 second bursts). It should be understood that each of the nozzle devices 16, 74 is configured to receive a pressurized liquid, such as water, and eject the pressurized liquid from the respective nozzles 164, 174. Various liquid regulating valves, tanks, pumps, etc. may be employed to provide the pressurized liquid ejected from the nozzles 164, 174 of the nozzle devices 16, 74, respectively. Larger or smaller ranges of the inner diameters 182, 184 of the nozzles 164, 174, pressure, flow rates, etc. may be utilized depending on desired output of liquid pressure and/or liquid ejection distance (e.g., distance desired to project the liquid 24, 75)

[0049] In some embodiments, the nozzle devices 16, 74 may be configured differently than shown in FIG. 3 and described above. For example, FIG. 4 is a perspective view of an embodiment of a seat 189, a platform 191, and a nozzle device 193 mounted on the platform 191 and employable in the attraction 10 of FIG. 1 and/or any other attractions in accordance with the present disclosure. In the illustrated embodiment, a liquid activator 194 (e.g., a lever, a trigger, a switch, a dial, a button, etc.) may be employed to activate a flow of liquid 195, such as water, from a nozzle 196 of the nozzle device 193. Further, the nozzle 196 may be actuated (e.g., moved) in a first circumferential direction about first pivot points 197 (e.g., hinge(s), ball joint(s), etc.) and a second circumferential direction about a second pivot point 198 (e.g., hinge, ball joint, etc.) via a grip 199 attached to the nozzle 196 and accessible by a guest. The first pivot points 197 and the second pivot point 198 may be disposed at or on, or integrated with, a cradle 201 between the nozzle 196 and the platform 191.

[0050] It should be noted that the various features of each nozzle device 16, 74, 193 described above and/or below may not be mutually exclusive from one another. That is,

certain features in the nozzle device 16, for example, may be employed in the nozzle device 193, and vice versa. Further, other nozzle device features may be employed in accordance with the present disclosure. In general, the nozzle devices 16, 74, 193 may be configured for aiming with or without a system for spinning, rotating, or otherwise moving the nozzles 164, 174, 196, respectively (e.g., with or without a chair for the guest), such as a yoked system that may comprise a trigger where aiming and/or spinning is controlled together. Another system could include a holding system used for all aiming that may include one or more holds (e.g., grips or rests) for stabilizing during use (e.g., aiming, ejecting water), such as a water blaster on one or more ball joints (e.g., joint(s) allowing rotation (e.g., pivot joint, ball joint, universal joint)) and/or pedals used by the guest for rotating the system. Additionally or alternatively, the nozzle devices 16, 74, 193 may include handheld water blasters handled by the guests (e.g., including spinnable or otherwise movable seats for the guests to facilitate guest-controlled orientation or perspective). Other nozzle device features in accordance with the present disclosure are also possible.

[0051] Returning now to FIG. 3, the common wall 160 includes the first (e.g., front-facing) surface 36 described above with respect to FIG. 1, a second surface 190 (e.g., back-facing surface) opposing the first surface 36, and a thickness 192 extending from the first surface 36 (e.g., to the second surface 190). In certain embodiments, the target sensors 12, 52, 62 (e.g., capacitance sensors) are disposed on the second surface 190 facing away from the nozzle devices 16, 74, such that a presence of the target sensors 12, 52, 62 is concealed from a perspective of a user at the nozzle devices 16, 74. The wall 160 may include a material (e.g. plastic, ceramic, or some other non-metallic material) through which the target sensor(s) 12, 52, 62 can detect the liquid(s) 24, 75 present at the first surface 36. Target sensor (e.g., capacitance sensor) settings, the thickness 192 of the wall 160, a material of the wall 160, other aspects in accordance with the present disclosure, or any combination thereof may be tuned to ensure that, when the liquid 24 hits the target assembly corresponding to the target sensor 12, for example, the target

sensor 12 will detect the presence of the liquid 24 at the first surface 36. In some embodiments, for example, with factory settings of the target sensor 12 (e.g., capacitance sensor), the thickness 192 of the wall 160 may be set at about 10 mm or less to ensure that the target sensor 12 detects, through the thickness 192 of the wall 160, the presence of the liquid 24 at the first surface 36. In this way, the thickness 192 may correspond to a detection distance for which the target sensor 12 is calibrated or otherwise configured to detect the liquid 24.

[0052] Further, aspects may be configured to prevent the target sensors 12, 52, 62 from falsely indicating a hit on the respective target assemblies 14, 48, 58 based on the presence of rain. For example, in general, the target sensors 14, 52, 58 (e.g., capacitance sensors) may be configured to detect a fluid film of liquid (e.g., corresponding to the liquids 24, 75) on the first surface 36 (e.g., front-facing surface) of the wall 160. Rainfall (e.g., relatively light rain) may not be suitable for generating a sufficient fluid film on the first surface 36 to be detected by the target sensors 14, 52, 58. Indeed, the target sensors 14, 52, 58 (e.g., capacitance sensors) may be calibrated to detect a threshold fluid film and rainfall (e.g., relatively light rain) may not achieve the threshold fluid film. Further, the first surface 36 of the wall 160 may be angled downwardly (e.g., relative to a Gravity vector) to reduce or negate an amount of rain that contacts and/or comes within a close proximity to the first surface 36, especially when the rain is not substantially directional (e.g., due to substantial wind surges). Additionally or alternatively, a shield 188 (e.g., wall) may be configured to block or reduce an amount of rain from contacting the wall 160. While the shield 188 is shown as overhanging the wall 160 in the illustrated embodiment, the shield 188 may be configured to shield the wall 160 from above, from below, and/or from one or more sides of the wall 160. Accordingly, presently disclosed embodiments may be suitable for indoor environments and outdoor environments, either of which may be referred to as an external environment.

[0053] As previously described with respect to FIGS. 1 and 2, various effects of the attraction 10 in FIGS. 1 and 2 may be controlled in response to targets on the wall 160

being hit by the liquid 24 and/or the liquid 75. Additionally or alternatively, scores may be calculated with respect to the first nozzle device 16 (or a first guest operating the first nozzle device 16), the second nozzle device 74 (or a second guest operating the second nozzle device 74), a combination of the first nozzle device 16 and the second nozzle device 74 (e.g., a team including the first guest and the second guest), or any combination thereof. Scores may be calculated based on various criteria (e.g., total targets hit, total hits on one or more of the targets, an order the targets are hit, accuracy).

[0054] FIGS. 5-8 illustrate various embodiments of one target assembly 14 employable in the attraction 10 of FIG. 1. For example, FIG. 5 is a side view of an embodiment of the target assembly 14 employable in the attraction 10 of FIG. 1, the target assembly 14 including (coupled with or integrated with) the wall 160 having the first (e.g., front-facing) surface 36 configured to face the nozzle(s) of the attraction 10, and the target sensor 12 (e.g., capacitance sensor) disposed on the second (e.g., rear-facing) surface 190 of the wall 160 opposing the first surface 36. In the illustrated embodiment, a target area 200 may be visible on the first surface 36 of the wall 160. Further, the target area 200 may be generally aligned with the target sensor 12 disposed on the second surface 190 of the wall 160. Accordingly, liquid (e.g., a fluid film) present on the first surface 36 at the target area 200 may be detected by the target sensor 12. In some embodiments, a hydrophobic or superhydrophobic coating 202 may be disposed on (or form) the first surface 36 of the wall 160. The coating 202 may be configured to repel liquid from the wall 160 such that the target sensor 12 can detect multiple hits on the target area 200 in rapid succession. The coating 202 may include, for example, an acrylic material, although other materials are also possible. In general, the target sensor 12 in FIG. 5 may be configured to detect, through an entirety of the thickness 192 of the wall 160, the presence of the liquid in the target area 200. As previously described, the target sensor 12 may detect the liquid in response to an amount of the liquid (e.g., a fluid film amount or size (e.g., thickness, area, volume) exceeding a threshold amount (e.g., a fluid film threshold amount or size (e.g., thickness, area, volume))).

[0055] FIG. 6 is a side view of an embodiment of the target assembly 14 employable in the attraction 10 of FIG. 1, the target assembly 14 including (coupled with or integrated with) the wall 160 having the first (e.g., front-facing) surface 36 configured to face the nozzle(s) of the attraction 10, and the target sensor 12 (e.g., capacitance sensor) embedded in the wall 160. The embodiment in FIG. 6 may be the same as, or similar to, the embodiment in FIG. 5, except that the target sensor 12 in FIG. 6 is embedded in the wall 160 and the target sensor 12 in FIG. 5 is disposed on the second (e.g., rear-facing) surface 190 of the wall 160. Accordingly, in FIG. 6, the target sensor 12 is configured to detect, through a portion of the thickness 192 of the wall 160, the presence of the liquid in the target area 200.

[0056] FIG. 7 is a side view of an embodiment of the target assembly 14 employable in the attraction 10 of FIG. 1, the target assembly 14 including an enclosure 210 configured to shield the target sensor 12 (e.g., capacitance sensor) from certain aspects of a surrounding environment, such as rain, moisture, sunlight, hail, temperature changes. The embodiment in FIG. 7 may be the same as, or similar to, the embodiment in FIG. 5, except that FIG. 7 includes the enclosure 210. In the illustrated embodiment, a gasket 212 is employed between the enclosure 210 and the wall 160, where the gasket 212 enables a seal that blocks or reduces ingress of environmental rain or moisture into an enclosure interior 214 defined by the enclosure 210 and surrounding the target sensor 12. Depending on the embodiment, the enclosure 210 may be, for example, fastened to the second surface 190 of the wall 160, welded to the second surface 190 of the wall 160, adhered to the second surface 190 of the wall 160 (e.g., via an adhesive), or otherwise coupled to the second surface 190 of the wall 160. In certain embodiments, the enclosure 210 may be sized such that the enclosure interior 214 is larger than the thickness 192 of the wall 160. For example, a width 216 of the enclosure interior 214 may be larger than the thickness 192 of the wall 160. Other dimensions measured from the target sensor 12 (e.g., capacitance sensor) to the enclosure 210 may also be larger than the thickness 192 of the wall 160. In this way, the target sensor 12 (e.g., capacitance sensor) may not detect

a false positive corresponding to liquid accumulated on (or otherwise contacting) the enclosure 210, as such liquid may be too far from the target sensor 12 (e.g., capacitance sensor) for detection.

[0057] In an embodiment, the target sensor (e.g., capacitance sensor, imaging sensor (e.g., a camera or LIDAR sensor), light sensor with or without light emitters (e.g., visible light sensor, infrared sensor, ultraviolet sensor, or laser sensor), etc.) may be adhered to the first surface 36, coupled to the first surface 36, or otherwise placed partially or fully in front of the first surface 36 (e.g., placed substantially between the nozzle(s) of the attraction 10 and the first surface wherein the sensor may be offset from a path or predicted path of the liquid ejected from the nozzle(s) of the attraction 10).

[0058] Fig. 8 is a front view of an embodiment of the common wall 160 having multiple target assemblies (e.g., the first target assembly 14, the second target assembly 48 and the third target assembly 58) disposed thereon. As previously described, the common wall 160 may not be entirely flat and instead may include curvilinear surfaces designed to facilitate an aesthetic reflective of scenery (e.g., plants, buildings), and/or a character, such as an avatar, a humanoid, a robot, a figure or figurine, etc. In the illustrated embodiment, the common wall 160 is representative of a grizzly bear. The target assemblies 14, 48, 58 are disposed in various locations of the common wall 160, such as the first target assembly 14 at an appendage (e.g., leg 230) of the grizzly bear, the second target assembly 48 at a torso 232 of the grizzly bear, and the third target assembly 58 at a head 234 of the grizzly bear. Although hidden from view in the illustrated perspective, the first target sensor 12 (e.g., capacitance sensor) of FIG. 1 may correspond to the first target assembly 14 illustrated in FIG. 8, the second capacitance sensor 52 (e.g., capacitance sensor) of FIG. 1 may correspond to the second target assembly 48 illustrated in FIG. 8, and the third capacitance sensor 62 (e.g., capacitance sensor) in FIG. 1 may corresponding to the third target assembly 58 illustrated in FIG. 8.

[0059] While certain of the above-described features are discussed in the context of a single target sensor corresponding to a single target assembly, it should be understood that multiple target sensors may be employed with respect to a single target assembly in accordance with the present disclosure. FIG. 9 is a perspective view of an embodiment of a target assembly 300 employing a wall 302 and a target sensor array 304 disposed on a surface 305 of the wall 302. For simplicity, FIG. 9 includes a first target sensor 306 (e.g., capacitance sensor) of the target sensor array 304 and a second target sensor 308 (e.g., capacitance sensor) of the target sensor array 304, although more target sensors (e.g., three or more, five or more, ten or more, etc.) may be employed in certain embodiments. As described with respect to earlier embodiments, the target sensor array 304 may be disposed on the surface 305 of the wall 302 opposing an additional surface 310 configured to face nozzle devices (not shown) that eject liquid toward and onto the additional surface 310.

[0060] In accordance with the present disclosure, the target sensors 306, 308 may be employed to determine which nozzle device or nozzle devices (e.g., of a number of nozzle devices) successfully hit the target assembly 300. This may be accomplished in one or more ways. For example, in an embodiment, the first target sensor 306 may be configured to detect liquid in response to an amount of the liquid present at the additional surface 310 exceeding a first threshold amount, whereas the second target sensor 308 may be configured to detect liquid in response to an amount of the liquid present at the additional surface 310 exceeding a second threshold amount, where the second threshold amount differs from (e.g., is greater than) the first threshold amount. Further, a first nozzle device may be configured to eject a larger amount (e.g., volume) of liquid (and/or a greater flow rate of the liquid and/or a greater pressure of the liquid) than a second nozzle device. In this way, sensor readings from the first target sensor 306, the second target sensor 308, or both may be employed to determine whether the first nozzle, the second nozzle, or a combination of the first nozzle and the second nozzle successfully hits the target assembly 300 at a given moment in (or interval of) time. As described

above, additional target sensors (e.g., besides the first target sensor 306 and the second target sensor 308) may be employed in the target sensor array 304 with a tiered liquid amount threshold, liquid flow rate threshold, etc. to further facilitate distinguishing which nozzle device(s) successfully hit the target assembly 300 with liquid.

[0061] Additionally or alternatively, the target sensors 306, 308 may be designed with directional features such that the target sensor 306 detects liquid present at the additional surface 310 of the target assembly 300 and approaching or contacting the additional surface 310 at a first angle, and such that the target sensor 308 detects liquid present at the additional surface 310 of the target assembly 300 and approaching or contacting the additional surface 310 at a second angle different than the first angle. In this way, sensor feedback from the target sensors 306, 308 may be employed to determine which nozzle device(s) successfully hit the target assembly 300 with liquid. In some embodiments, positional and/or orientation data corresponding to the nozzle device(s) may be employed in conjunction with the above-described directional features of the target sensors 306, 308 to distinguish which nozzle device(s) successfully hit the target assembly 300.

[0062] In still other embodiments, each nozzle device may be configured to eject a different type of liquid, and each of the target sensors 306, 308 may be configured to detect a particular type of liquid based on the corresponding target of said particular type of liquid. Of course, in any of the embodiments described in the present disclosure, more than the two target sensors 306, 308 of the illustrated embodiment may be employed in the target sensor array 304 to improve an accuracy of distinguishing which nozzle device(s) successfully hit the target assembly 300. By distinguishing which nozzle device(s) successfully hit the target assembly 300, the system may calculate scores for each of the nozzle devices (or guests operating each of the nozzle devices). Further, team scores may be calculated based on a combination of two or more nozzle devices (and/or two or more corresponding guests). Discussion of scoring features is provided in detail above with reference to earlier drawings.

[0063] FIG. 10 is a schematic illustration of an embodiment of an attraction 400 employing a target assembly 402 and an electrical circuit 404 completed (e.g., closed) by a nozzle device 406 ejecting a liquid 410 onto the target assembly 402. As shown, the target assembly 402 may include an electrical contact 408 disposed thereon and configured to be contacted by the liquid 410 ejected from the nozzle device 406. An additional electrical contact 412 may be disposed in or on the nozzle device 406, where the additional electrical contact 412 is configured to contact the liquid 410 as the liquid 410 is ejected from the nozzle device 406. Wiring 414 may extend from the additional electrical contact 412 of the nozzle device 406 to the electrical contact 408 of the target assembly 402. Accordingly, the liquid 410 in contact with both the electrical contact 408 of the target assembly 402 and the additional electrical contact 412 of the nozzle device 406, the electrical circuit 404 including the electrical contacts 408, 412, the wiring 414, and the liquid 410 may close the electrical circuit 404. With the electrical circuit 404 closed, a power source 416 may transmit a current through the electrical circuit 404, which may be detected by a sensor 418. In response to the sensor 418 detecting the current (or some other parameter indicative of the closing of the electrical circuit 404), the attraction 400 may determine that the nozzle device 406 successfully hit the target assembly 402 with the liquid 410. The illustrated embodiment may be more accurate and/or reliable if the nozzle device 406 employed in the attraction 400 is configured to eject a laminar flow of the liquid 410.

[0064] In other embodiments, the electrical contacts 408, 412 and/or the wiring 414 may be excluded, and the flow (e.g., laminar flow) of the liquid 410 between the nozzle device 406 and the target assembly 402 may carry light (e.g., visible light sensor, infrared light sensor, ultraviolet light sensor, laser light sensor, or any other suitable light) transmitted from the nozzle device 406 to the target assembly 402. That is, while reference numeral 408 is employed to describe an electrical contact above, reference numeral 408 may represent a sensor (e.g., a visible light sensor, an infrared sensor, an ultraviolet sensor, a laser sensor, etc.) configured to detect the light transmitted through the flow of the liquid

410. Further, while reference numeral 412 is employed to describe an electrical contact above, reference numeral 412 may represent a light transmitter (e.g., a visible light sensor, an infrared light transmitter, an ultraviolet light transmitter, a laser light transmitter, etc.). In some embodiments, data may be packaged in the light and the data may indicate the source of the light, such as the nozzle device 406 or a separate nozzle device of the attraction 400. In this way, the data packaged in the light (e.g., via a controllable and/or pre-determined wavelength, intensity, frequency, period, etc.) may be employed to distinguish which nozzle device, such as the nozzle device 406, successfully hit the target assembly 402. Additionally or alternatively, the light transmitted through the flow (e.g., laminar flow) of the liquid 410 may include a particular color corresponding to the respective nozzle device, such as the nozzle device 406. As an example, the nozzle device 406 may be configured to transmit a red light, whereas another nozzle device of the attraction 400 may be configured to transmit a blue light. In this way, the color of the light (e.g., red light) may be detected and employed to distinguish which nozzle device, such as the nozzle device 406, successfully hit the target assembly 402.

[0065] FIG. 11 is a process flow diagram illustrating an embodiment of a method 500 of operating an attraction, such as the attraction 10 in FIG. 1, employing one or more target assemblies and one or more nozzle devices configured to eject liquid onto the one or more target assemblies. In the illustrated embodiment, the method 500 includes instructing (block 502), via a control system of the attraction, movement of a target assembly. For example, the target assembly may be moved along a target assembly path (e.g., track). In certain embodiments, the target assembly may be situated on a drone instructed (e.g., remote controlled or pre-programmed) to fly along a particular target assembly path.

[0066] The method 500 also includes ejecting (block 504), via one or more nozzle devices, liquid at a front-facing surface of the target assembly. Each nozzle device may be operated by a guest of the attraction. In some embodiments, the nozzle devices are

stationary (e.g., positioned on a platform), while in other embodiments, the nozzle devices are positioned on a ride vehicle that moves along a ride vehicle path (e.g., track), while in other embodiments the nozzle devices may be positioned along a walking path or other path (e.g., a nozzle may be positioned on a rail along a path) wherein the nozzle device may additionally be able to be moved along the path (e.g., a nozzle device may be positioned on a rail along a path and may be slide or rolled along the rail).

[0067] The method 500 also includes detecting (block 506), via one or more target sensors (e.g., capacitance sensors) and through a thickness of the target assembly, liquid present at the front-facing surface of the target assembly. As previously described, the one or more target sensors may be disposed on a rear-facing surface of the target assembly, or embedded within the target assembly, such that the one or more target sensors are hidden from view from the perspective of the one or more guests operating the one or more nozzle devices.

[0068] The method 500 may also include instructing (block 508), via the control system and based on sensor feedback from the one or more target sensors, at least one effect of the attraction. As previously described, various effects of the attraction may be instructed, such as movement of the target assembly (or individual componentry thereof), movement of the ride vehicle, one or more lights (e.g., integrated with the target assembly or separate from the target assembly), one or more speakers configured to emit audio, a confetti effect, a water effect or feature, a pyrotechnic effect, a flame effect, a bubble effect, a confetti effect, an animated figure, a scoreboard (e.g., illustrating a score of the various guests, teams of two or more of the various guests, etc.), additional or alternative effects or features, or any combination thereof.

[0069] It should be noted that certain methods (e.g., the method 500) in accordance with the present disclosure do not require all of the steps 502, 504, 506, 508 illustrated in FIG. 11. Further, it should be noted that FIG. 11 should not be taken to imply a particular

order of the steps 502, 504, 506, 508, and that the steps 502, 504, 506, 508 may be performed in any suitable order.

[0070] While only certain features have been illustrated and described herein, many modifications and changes will occur to those skilled in the art. It is, therefore, to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit of the present disclosure.

[0071] The techniques presented and claimed herein are referenced and applied to material objects and concrete examples of a practical nature that demonstrably improve the present technical field and, as such, are not abstract, intangible or purely theoretical. Further, if any claims appended to the end of this specification contain one or more elements designated as “means for [perform]ing [a function]...” or “step for [perform]ing [a function]...”, it is intended that such elements are to be interpreted under 35 U.S.C. 112(f). However, for any claims containing elements designated in any other manner, it is intended that such elements are not to be interpreted under 35 U.S.C. 112(f).

CLAIMS:

1. A target assembly system, comprising:
a nozzle configured to eject a liquid;
a wall having a surface facing the nozzle, and a thickness extending from the surface; and
one or more capacitance sensors configured to detect, through the thickness of the wall, a presence of the liquid at or adjacent to the surface.
2. The system of claim 1, wherein the wall comprises an additional surface opposing the surface such that the thickness extends from the surface to the additional surface, and the one or more capacitance sensors are disposed on the additional surface.
3. The system of claim 1, wherein the one or more capacitance sensors are configured to detect the presence of the liquid in response to a threshold quantity of the liquid being within a detection distance of the one or more capacitance sensors.
4. The system of claim 1, wherein the wall comprises a plastic or ceramic material.
5. The system of claim 1, wherein the surface of the wall comprises a hydrophobic or superhydrophobic coating configured to repel the liquid.
6. The system of claim 5, wherein the hydrophobic or superhydrophobic coating comprises acrylic.
7. The system of claim 1, wherein a dimension of the thickness of the wall is about 10 millimeters or less.

8. The system of claim 1, comprising an actuator configured to move the wall.

9. The system of claim 1, comprising one or more effects configured to be operated based on the one or more capacitance sensors detecting, through the thickness of the wall, the presence of the liquid at or adjacent to the surface.

10. The system of claim 9, wherein the one or more effects comprises a light, a water feature, a speaker configured to emit audio, a pyrotechnic effect, a flame effect, a bubble effect, a confetti effect, an animated figure actuation, or any combination thereof.

11. The system of claim 1, wherein the one or more capacitance sensors, a dimension of the thickness of the wall, a material of the wall, or any combination thereof is configured such that the one or more capacitance sensors does not detect, through the thickness of the wall, an additional presence of rain at or adjacent to the surface.

12. The system of claim 1, comprising an enclosure defining an enclosure interior in which the one or more capacitance sensors are disposed, wherein the enclosure is configured to shield the enclosure interior from an external environment.

13. The system of claim 1, wherein the nozzle comprises an inner diameter defining a flow path of the liquid through the nozzle, and a dimension of the inner diameter at or adjacent to an outlet of the nozzle is within a range of about 5 millimeters (mm) to about 7 mm.

14. The system of claim 1, wherein the nozzle is configured to eject the liquid such that a jet of the liquid ejected by the nozzle includes a pressure between about 140 kilopascal (kPa) and about 280 kPa.

15. The system of claim 1, wherein the one or more capacitance sensors comprise:

a first capacitance sensor configured to detect the presence of the liquid in response to a first threshold quantity of the liquid at or adjacent the surface; and

a second capacitance sensor configured to detect the presence of the liquid, an additional presence of an additional liquid, or both in response to a second threshold quantity of the liquid, the additional liquid, or both at or adjacent to the surface.

16. The system of claim 15, comprising:

a first effect configured to be operated based on first sensor feedback from the first capacitance sensor; and

a second effect configured to be operated based on the first sensor feedback and second sensor feedback from the second capacitance sensor.

17. The system of claim 1, wherein the nozzle is configured to eject a laminar flow of the liquid.

18. The system of claim 1, wherein the nozzle is configured to eject a non-laminar flow of the liquid.

19. The system of claim 1, comprising:

a first target corresponding to a first capacitance sensor; and

a second target corresponding to a second capacitance sensor, wherein the one or more capacitance sensors comprise the first capacitance sensor, the second capacitance sensor, or both.

20. The system of claim 19, comprising a control system configured to:

determine, based on sensor feedback from the first capacitance sensor, the second capacitance sensor, or both, an order in which the liquid is present at the first target and the second target; and

instruct one or more effects of the system based on the order.

21. A target assembly for an amusement attraction, comprising:

a wall having a surface and a thickness extending from the surface; and

one or more capacitance sensors configured to detect, through the thickness of the wall, a presence of a liquid at or adjacent to the surface.

22. The target assembly of claim 21, wherein a dimension of the thickness of the wall is 10 millimeters (mm) or less, and wherein the wall comprises a plastic or ceramic material.

23. The target assembly of claim 21, wherein the surface of the wall comprises a hydrophobic or superhydrophobic coating configured to repel the liquid.

24. The target assembly of claim 21, comprising:

an additional surface of the wall opposite the surface such that the thickness extends from the surface to the additional surface; and

an enclosure engaged with the additional surface of the wall to define an enclosure interior in which the one or more capacitance sensors are disposed, wherein the enclosure and the additional surface of the wall are configured to shield the enclosure interior from an external environment.

25. An amusement system, comprising:

a first nozzle operatable by a first guest to eject a first liquid;

a second nozzle operatable by a second guest to eject a second liquid;

a target facing the first nozzle and the second nozzle;

one or more capacitance sensors configured to detect, through a thickness of the target, a presence of the first liquid, the second liquid, or both at the target; and

a control system configured to:

receive sensor feedback from the one or more capacitance sensors; and

determine, based at least in part on the sensor feedback, a first game score corresponding to the first guest, a second game score corresponding to the second guest, a team score corresponding to the first guest and the second guest, or any combination thereof.

26. The amusement system of claim 25, comprising:

an additional target facing the first nozzle and the second nozzle; and

one or more additional capacitance sensors configured to detect, through a thickness of the additional target, an additional presence of the first liquid, the second liquid, or both at the target, wherein the control system is configured to:

receive additional sensor feedback from the one or more additional capacitance sensors; and

determine, based at least in part on the sensor feedback and the additional sensor feedback, the first game score, the second game score, the team score, or any combination thereof.

27. The amusement system of claim 26, wherein the target and the additional target are disposed on shared wall or surface.

28. The amusement system of claim 26, wherein the target is disposed on a first wall and the additional target is disposed on a second wall physically separate from the first wall.

29. The amusement system of claim 26, wherein the control system is configured to determine, based at least in part on the sensor feedback, the additional sensor feedback,

and a scoring algorithm, the first game score, the second game score, the team score, or any combination thereof, wherein the scoring algorithm assigns points to the first game score, the second game score, the team score, or any combination thereof based on:

- a total number of targets hit by the first liquid corresponding to the first nozzle, the second liquid corresponding to the second nozzle, or both;

- a first order in which the target is hit by the first liquid and the second liquid;

- a second order in which the target and the additional target are hit by the first liquid;

- a third order in which the target and the additional target are hit by the second liquid; or

- any combination thereof.

30. The amusement system of claim 26, wherein the control system is configured to instruct one or more lighting or water effects of the amusement system based at least in part on the sensor feedback.