CLAIMS

1. An interactive video game system, comprising:

an array of volumetric sensors disposed around a play area and configured to collect respective volumetric data for each player of a plurality of players; and

a controller communicatively coupled to the array of volumetric sensors and configured to:

receive, from the array of volumetric sensors, the respective volumetric data of each player of the plurality of players;

combine the respective volumetric data of each player of the plurality of players to generate at least one respective shadow model of each player of the plurality of players; and

present the generated respective shadow model of each player of the plurality of players in a virtual environment; and

a display device disposed near the play area, wherein the display device is configured to display the virtual environment to the plurality of players in the play area.

2. The interactive video game system of claim 1, wherein the array of volumetric sensors comprises an array of LIDAR devices.

3. The interactive video game system of claim 1, wherein the volumetric sensors of the array are symmetrically distributed around a perimeter of the play area.

4. The interactive video game system of claim 1, wherein the controller is configured to:

combine the respective volumetric data of each player of the plurality of players to generate at least one respective skeletal model of each player of the plurality of players;

determine in-game actions of each player of the plurality of players in the play area and corresponding in-game effects based, at least in part, on the generated at least one respective skeletal model; and

update the generated respective shadow model of each player of the plurality of players and the virtual environment based on the determined in-game actions and in-game effects.

5. The interactive video game system of claim 1, wherein the controller is configured to: generate a respective volumetric model for each player of the plurality of players; and generate a simulated image that includes the volumetric model of a particular player of the plurality of players within the virtual environment when game play concludes.

6. The interactive video game system of claim 1, wherein the play area is a three-dimensional

(3D) play area and the array of volumetric sensors is configured to collect the respective volumetric data for each player of the plurality of players with respect to a width, a height, and a depth of the 3D play area.

7. The interactive video game system of claim 1, wherein the play area is a two-dimensional (2D) play area and the array of volumetric sensors is configured to collect the respective volumetric data for each of the plurality of players with respect to a width and a height of the 2D play area.

8. An interactive video game system, comprising:

a display device disposed near a play area and configured to display a virtual environment to a plurality of players in the play area;

an array of sensing units disposed around the play area, wherein each sensing unit of the array comprises respective processing circuitry configured to determine a partial model of at least one player of the plurality of players;

a controller communicatively coupled to the array of sensing units, wherein the controller is configured to:

receive, from the array of sensing units, the partial models of each player of the plurality of players;

generate a respective model of each player of the plurality of players by fusing the partial models of each player of the plurality of players;

determine in-game actions of each player of the plurality of players based, at least in part, on the generated respective model of each player of the plurality of players; and

display a respective virtual representation of each player of the plurality of players in the virtual environment on the display device based, at least in part, on the generated respective model and the in-game actions of each player of the plurality of players; and

an interface panel communicatively coupled to the controller, wherein the interface panel comprises a plurality of input devices configured to receive input from the plurality of players during game play and electrical circuitry configured to transmit a signal to the controller that corresponds to the input.

9. The interactive video game system of claim 8, wherein each sensing unit of the array of sensing units comprises a respective sensor communicatively coupled to the respective processing circuitry, wherein the respective processing circuitry of each sensing unit of the array of sensing units is configured to determine a respective portion of the generated respective model of each player of the plurality of players based on data collected by the respective sensor of the sensing unit.

10. The interactive video game system of claim 9, wherein each sensing unit of the array of

sensing units is communicatively coupled to the controller via an internet protocol (IP) network, and wherein the interactive video game system comprises a system clock configured to enable the controller to synchronize the partial models of each player of the plurality of players as the partial models are received along the IP network.

11. The interactive video game system of claim 8, wherein the array of sensing units comprises an array of depth cameras, LIDAR devices, or a combination thereof, symmetrically distributed around a perimeter of the play area.

12. The interactive video game system of claim 11, wherein the array of sensing units is disposed above the plurality of players and is directed at a downward angle toward the play area, and wherein the array of sensing units comprises at least three sensing units.

13. The interactive video game system of claim 8, comprising a radio-frequency (RF) sensor communicatively coupled to the controller, wherein the controller is configured to receive data from the RF sensor to determine a relative position of a particular player of the plurality of players relative to remaining players of the plurality of players, the data indicating an identity, a location, or a combination thereof, for each player of the plurality of players.

14. The interactive video game system of claim 8, wherein the interface panel comprises at least one physical effects device configured to provide the plurality of players with at least one physical effect based, at least in part, on the determined in-game actions of each player of the plurality of players.

15. The interactive video game system of claim 8, comprising a database system communicatively coupled to the controller, wherein the controller is configured to query and receive information related to the plurality of players from the database system.

16. The interactive video game system of claim 15, wherein, to present the respective virtual representation of each player of the plurality of players, the controller is configured to: query and receive the information related to the plurality of players; and determine how to modify the virtual representation based on the received information.

17. The interactive video game system of claim 8, wherein the controller is configured to generate the respective virtual representation of each player of the plurality of players based on the generated respective model of each player of the plurality of players.

18. The interactive video game system of claim 8, wherein each of the partial models of each player of the plurality of players received from the array of sensing units comprises a partial shadow model, wherein the generated respective model of each player of the plurality of players generated by the controller comprises a shadow model, and wherein the respective virtual representation of each player of the plurality of players presented by the controller is directly based on the shadow model.

19. A method of operating an interactive video game system, comprising: receiving, via processing circuitry of a controller of the interactive video game system, partial models of a plurality of players positioned within a play area, wherein the partial models are generated by respective sensor processing circuitry of each sensing unit of an array of sensing units disposed around the play area;

fusing, via the processing circuitry, the received partial models of each player of the plurality of players to generate a respective model of each player of the plurality of players wherein each of the generated respective models comprises a respective shadow model;

determining, via the processing circuitry, in-game actions of each player of the plurality of players based, at least in part, on the generated respective models of each player of the plurality of players; and

presenting, via a display device, the respective shadow model of each player of the plurality of players in a virtual environment based, at least in part, on the generated respective models and the in-game actions of each player of the plurality of players.

20. The method of claim 19, comprising: scanning, using a volumetric sensor of each sensing unit of the array of sensing units, each player of the plurality of players positioned within the play area; generating, via the sensor processing circuitry of each sensing unit of the array of sensing units, the partial models of each player of the plurality of players; and providing, via a network, the partial models of each player of the plurality of players to the processing circuitry of the controller.

21. The method of claim 20, wherein each of the received partial models comprises a partial volumetric model, a partial skeletal model, a partial shadow model, or a combination thereof.

22. The method of claim 19, wherein the plurality of players comprises at least twelve players that are simultaneously playing the interactive video game system.

23. The method of claim 21, wherein each of the received partial models comprises the partial shadow model.

24. The method of claim 19, wherein the display device is disposed near the play area, and is configured to display the virtual environment to the plurality of players in the play area.

25. A video game system, comprising:

at least two sensing units disposed near a play area, wherein the at least two sensing units are each configured to collect respective scanning data of a player positioned in the play area and generate a partial model of the player by respective processing circuitry of each sensing unit;

a display device disposed near the play area and configured to present a virtual environment comprising a virtual representation of the player; and

a controller communicatively coupled to the at least two sensing units and the display device, wherein the controller comprises at least one processor configured to:

receive the partial model of the player from each sensing unit of the at least two sensing units;

fuse each received partial model to generate at least one model of the player; and

generate the virtual representation based on the generated at least one model and

instruct the display device to present the virtual environment comprising the generated virtual representation of the player.

26. The video game system of claim 25, wherein the generated virtual representation comprises a 2-dimensional shadow model of the player.

27. The video game system of claim 25, wherein the shadow model comprises a texture-less model of the player having a shape corresponding to a silhouette of the player

28. The video game system of claim 25, wherein each sensing unit of the at least two sensing units comprises an infrared (IR) sensor configured to collect the respective scanning data.

29. The video game system of claim 28, wherein the at least two sensing units are positioned on an opposite portion of the play area relative to the display device.

30. The video game system of claim 25, wherein the at least one processor is configured to: identify an in-game action of the player based on the generated at least one model; and update the generated virtual representation, the presented virtual environment, or both based on the identified in-game action.

31. The video game system of claim 29, wherein the generated at least one model comprises a skeletal model of the player utilized to identify an in-game action.

32. The video game system of claim 25, comprising a radio frequency (RF) sensor configured to receive a uniquely identifying RF signal from a RF tag of the player, wherein the at least one

processor is configured to: receive the uniquely identifying RF signal from the RF sensor; and identify the player from a plurality of players based on the received uniquely identifying RF signal.

33. The video game system of claim 32, wherein the at least one processor is configured to: query a database based on the received uniquely identifying RF signal; and update the generated virtual representation, statistics of the player, attributes of the player, purchases of the player, or a combination thereof, based on the query.

34. The video game system of claim 25, wherein the display device comprises an electronic screen configured to present the virtual environment to a plurality of players that comprises the player, and wherein the virtual environment comprises respective virtual representations of the plurality of players.

35. The video game system of claim 25, wherein the at least two sensing units are communicatively coupled to the controller via a high-speed internet protocol (IP) network configured to provide low-latency data exchange.

36. A video game system for an amusement attraction, wherein the video game system comprises:

at least two sensing units disposed near a play area of the amusement attraction, wherein the at least two sensing units each comprises a sensor configured to execute one or more instructions stored in a respective memory circuitry to collect scanning data and generate a respective partial model of a player of the video game system based on the scanning data; and

a controller communicatively coupled to the at least two sensing units and an electronic display device, wherein the controller comprises at least one processor configured to:

receive the partial model of the player from each of the at least two sensing units;

fuse the received partial models of the player from each of the at least two sensing units to generate at least one model of the player;

generate a virtual representation of the player based on the generated at least one model; and

instruct the electronic display device to present the generated virtual representation in a virtual environment.

37. The video game system of claim 36, wherein the generated virtual representation comprises a shadow model of the player.

38. The video game system of claim 36, wherein the generated at least one model comprises a skeletal model, and wherein the at least one processor is configured to:

analyze changes in the skeletal model to identify in-game actions of the player; and

update the virtual representation, the virtual environment, or both based on the identified in-game actions.

39. The video game system of claim 36, wherein the scanning data collected by the at least two sensing units comprises 3-dimensional scanning data.

40. The video game system of claim 36, wherein the at least one processor is configured to receive the scanning data via a high-speed IP protocol.

41. A method of operating a video game system, the method comprising:

receiving, via processing circuitry of a controller, partial models of a player positioned within a play area, wherein the partial models are generated by respective processing circuitry of each sensing unit of a plurality of sensing units disposed near the play area;

fusing, via the processing circuitry of the controller, the received partial models of the player to generate at least one model of the player;

determining, via the processing circuitry of the controller, in-game actions of the player based on the generated at least one model;

generating, via the processing circuitry of the controller, a virtual representation of the player based on the generated at least one model and the determined in-game actions; and

presenting, via a display device, the virtual representation in a virtual environment.

42. The method of claim 41, wherein the received partial models comprise partial skeletal models, and wherein fusing the received partial models comprises: identifying one or more differences between the partial skeletal models; and averaging the identified differences to generate a smoothed skeletal model as the at least one model.

43. The method of claim 41, wherein fusing the received partial models comprises timestamping the received partial models via system clock communicatively coupled to the controller.

44. The method of claim 41, wherein the plurality of sensing units comprises two infrared (IR) sensing units that are each positioned on an opposite side of the play area from the display device.