

CLAIMS

What is claimed is:

1. A virtual reality ride system comprising:
 - an electronic display configured to present virtual reality image content to a rider while the rider is being carried through a ride environment by a ride vehicle;
 - one or more sensors configured to determine sensor data indicative of movement characteristics of the ride vehicle in the ride environment; and
 - virtual reality processing circuitry communicatively coupled to the electronic display and the one or more sensors, wherein the virtual reality processing circuitry is configured to:
 - determine a predicted movement profile of the ride vehicle based at least in part on the sensor data received from the one or more sensors, wherein the predicted movement profile indicates that the ride vehicle is expected to move a predicted movement magnitude during a predicted movement duration;
 - determine a target perceived movement magnitude greater than the predicted movement magnitude at least in part by applying a movement-exaggeration factor to the predicted movement magnitude; and
 - determine movement-exaggerated virtual reality image content to be presented on the electronic display during the predicted movement duration at least in part by adapting default virtual reality image content to incorporate the target perceived movement magnitude.
2. The virtual reality ride system of claim 1, wherein the virtual reality ride system is a roller coaster ride system, a lazy river ride system, a log flume ride system, a boat ride system, a drop tower ride system, a pendulum ride system, a swing ride system, a scrambler ride system, or a robotic arm ride system.
3. The virtual reality ride system of claim 1, wherein the virtual reality processing circuitry is configured to instruct the electronic display to display the movement-exaggerated virtual reality image content during the predicted movement duration corresponding with the predicted movement magnitude.

4. The virtual reality ride system of claim 1, wherein the virtual reality processing circuitry is configured to determine the movement-exaggerated virtual reality image content at least in part by translating the default virtual reality image content a distance corresponding with the target perceived movement magnitude.

5. The virtual reality ride system of claim 1, wherein:
the predicted movement profile indicates that the ride vehicle is expected to move an additional predicted movement magnitude during an additional predicted movement duration;
and

the virtual reality processing circuitry is configured to:

determine an additional target perceived movement magnitude greater than the additional predicted movement magnitude at least in part by applying an additional movement-exaggeration factor to the additional predicted movement magnitude; and

determine additional movement-exaggerated virtual reality image content to be presented on the electronic display during the additional predicted movement duration at least in part by adapting additional default virtual reality image content to incorporate the additional target perceived movement magnitude.

6. The virtual reality ride system of claim 5, wherein a value of the movement-exaggeration factor applied to the predicted movement magnitude is different from a value of the additional movement-exaggeration factor applied to the additional predicted movement magnitude when:

image content of the movement-exaggerated virtual reality image content to be presented on the electronic display during the predicted movement duration differs from the additional movement-exaggerated virtual reality image content to be presented on the electronic display during the additional predicted movement duration;

the predicted movement magnitude of the ride vehicle expected to occur during the predicted movement duration differs from the additional predicted movement magnitude of the ride vehicle that is expected to occur during the additional predicted movement duration;

duration of the predicted movement duration differs from duration of the additional predicted movement duration; or
any combination thereof.

7. The virtual reality ride system of claim 1, wherein the movement-exaggeration factor comprises an offset value, a gain value, or both.

8. The virtual reality ride system of claim 1, wherein:
the predicted movement profile indicates that the ride vehicle is expected to move in a predicted movement direction during the predicted movement duration; and
the virtual reality processing circuitry is configured to determine the movement-exaggerated virtual reality image content to be presented on the electronic display during the predicted movement duration at least in part by adapting the default virtual reality image content to incorporate a perceived movement direction that matches the predicted movement direction of the ride vehicle.

9. The virtual reality ride system of claim 1, wherein the virtual reality processing circuitry is configured to determine the predicted movement profile of the ride vehicle using a ride vehicle movement prediction model that at least in part describes one or more expected relationships between the sensor data and subsequent movement characteristics of the ride vehicle.

10. The virtual reality ride system of claim 1, wherein:
the ride environment comprises a water body and at least one buoy configured to float on the water body; and
the one or more sensors comprise an environment sensor implemented on the at least one buoy, wherein the environment sensor is configured to determine sensor data indicative of proximity of the ride vehicle to the at least one buoy, movement characteristics of the at least one buoy, movement characteristics of a wave in the water body, or any combination thereof.

11. The virtual reality ride system of claim 1, wherein:
the ride environment comprises a water body and a wall adjacent the water body; and
the one or more sensors comprise at least one environment sensor positioned on the wall,
wherein the at least one environment sensor is configured to determine sensor data indicative of
proximity of the ride vehicle to the wall, movement characteristics of a wave in the water body,
or both.

12. A method of operating a virtual reality ride system, comprising:
receiving, using processing circuitry implemented in the virtual reality ride system,
sensor data determined by one or more sensors while a ride vehicle is moving through a ride
environment of the virtual reality ride system;
predicting, using the processing circuitry, a movement magnitude that the ride vehicle
will experience at a time during a prediction horizon based at least in part on the sensor data
received from the one or more sensors;
determining, using the processing circuitry, a target perceived movement magnitude
corresponding with the time during the prediction horizon at least in part by applying one or
more movement-exaggeration factors to the movement magnitude that the ride vehicle is
predicted to experience at the time during the prediction horizon; and
determining, using the processing circuitry, movement-exaggerated virtual reality content
to be presented to a rider of the ride vehicle at the time by adapting default virtual reality content
corresponding with the time during the prediction horizon based at least in part on the target
perceived movement magnitude.

13. The method of operating the virtual reality ride system of claim 12, comprising
instructing, using the processing circuitry, an electronic display carried by the ride vehicle to
display the movement-exaggerated virtual reality content at the time.

14. The method of operating the virtual reality ride system of claim 12, wherein the
virtual reality ride system is a roller coaster ride system, a lazy river ride system, a log flume ride
system, a boat ride system, a drop tower ride system, a pendulum ride system, a swing ride
system, a scrambler ride system, or a robotic arm ride system.

15. The method of operating the virtual reality ride system of claim 12, comprising:
predicting, using the processing circuitry, an additional movement magnitude that the ride vehicle will experience at an additional time during the prediction horizon based at least in part on the sensor data received from the one or more sensors;

determining, using the processing circuitry, an additional target perceived movement magnitude corresponding with the additional time during the prediction horizon at least in part by applying the one or more movement-exaggeration factors to the additional movement magnitude that the ride vehicle is predicted to experience at the additional time during the prediction horizon; and

determining, using the processing circuitry, additional movement-exaggerated virtual reality content to be presented to a rider of the ride vehicle at the additional time by adapting default virtual reality content corresponding with the additional time during the prediction horizon based at least in part on the additional target perceived movement magnitude.

16. The method of operating the virtual reality ride system of claim 12, comprising predicting, using the processing circuitry, a movement direction that the ride vehicle will experience at the time during the prediction horizon based at least in part on the sensor data received from the one or more sensors, wherein adapting the default virtual reality to determine the movement-exaggerated virtual reality content comprises:

shifting the default virtual reality content in a direction corresponding with the movement direction that the ride vehicle is predicted to experience at the time; and

shifting the first default virtual reality content a distance corresponding with the target perceived movement magnitude that differs from the movement magnitude that the ride vehicle is predicted to experience at the time.

17. A tangible, non-transitory, computer readable medium storing instructions executable by one or more processors of a virtual reality ride system, wherein the instructions comprise instructions to:

determine, using the one or more processors, sensor data measured by one or more sensors as a ride vehicle is carrying a rider through a ride environment of the virtual reality ride system;

determine, using the one or more processors, a predicted movement magnitude of the ride vehicle that is predicted to occur during a subsequent time period based at least in part on the sensor data measured by the one or more sensors; and

determine, using the one or more processors, movement-exaggerated virtual reality image content based at least in part on the predicted movement magnitude such that presentation of the movement-exaggerated virtual reality image content to the rider results in a perceived movement magnitude that differs from the predicted movement magnitude of the ride vehicle.

18. The tangible, non-transitory, computer readable medium of claim 17, comprising instructions to instruct, using the one or more processors, an electronic display carried by the ride vehicle to display the movement-exaggerated virtual reality image content during the subsequent time period in which the predicted movement magnitude of the ride vehicle is predicted to occur.

19. The tangible, non-transitory, computer readable medium of claim 17, wherein the instructions to determine the movement-exaggerated virtual reality image content comprise instructions to:

determine a target magnitude of the perceived movement magnitude that differs from the predicted movement magnitude at least in part by applying one or more movement-exaggeration factors to the predicted movement magnitude of the ride vehicle; and

offsetting default virtual reality image content corresponding with the subsequent time period a distance corresponding with the target magnitude of the perceived movement magnitude that differs from the predicted movement magnitude of the ride vehicle.

20. The tangible, non-transitory, computer readable medium of claim 17, comprising instructions to determine, using the one or more processors, a predicted movement direction of the ride vehicle that is predicted to occur during the subsequent time period based at least in part on the sensor data measured by the one or more sensors, wherein the instructions to determine the movement-exaggerated virtual reality image content comprise instructions to:

offset default virtual reality image content corresponding with the subsequent time period in a direction corresponding with the predicted movement direction of the ride vehicle that is predicted to occur during the subsequent time period; and

offset the default virtual reality content corresponding with the subsequent time period a distance corresponding with a target magnitude of the perceived movement magnitude that differs from the predicted movement magnitude of the ride vehicle.