CLAIMS:

1. A resistance control system of an amusement attraction, the resistance control system comprising:

a support assembly comprising a base, a pivot joint, and a support beam extending between the base and the pivot joint;

a spring plate coupled to the pivot joint of the support assembly;

at least one spring engaged with the spring plate;

an actuator plate positioned between the spring plate and the base of the support assembly; and

at least one actuator coupled between the actuator plate and the base, wherein the at least one actuator is configured to move and secure the actuator plate relative to the pivot joint to adjust a resistance to movement about the pivot joint.

2. The resistance control system of claim 1, comprising a controller communicatively coupled to the at least one actuator and configured to cause the at least one actuator to extend or contract to a target length based on a weight of a rider.

3. The resistance control system of claim 2, wherein the controller is configured to reset the at least one actuator from the target length to a default length in response to determining that a ride cycle of the amusement attraction is completed.

4. The resistance control system of claim 2, comprising a weight sensor coupled to the support assembly, wherein the weight sensor is configured to transmit a signal indicative of the weight of the rider to the controller.

5. The resistance control system of claim 4, wherein the controller comprises a memory storing a resistance setting database, and wherein the controller is configured to cause the at least one actuator to move the actuator plate based on the weight of the rider by:

querying the resistance setting database to determine the target length of the at least one actuator; and

operate the at least one actuator to extend or contract to reach the target length.

6. The resistance control system of claim 1, comprising a VR device, wherein the VR device comprises a VR controller communicatively coupled to the at least one actuator, and wherein the VR controller is configured to cause the at least one actuator to move the actuator plate to correspond to a virtual environment that the VR device presents to a rider.

7. The resistance control system of claim 1, comprising a VR device, a VR controller configured to operate the VR device, and a vehicle controller that is communicatively coupled to both the at least one actuator and the VR controller, wherein the vehicle controller is configured to control the at least one actuator to correspond to a simulated environment that the VR device presents to a rider based on communication between the vehicle controller and the VR controller.

8. The resistance control system of claim 7, comprising a position sensor coupled to the spring plate and communicatively coupled to the vehicle controller or the VR controller, wherein the position sensor is configured to transmit a signal indicative of the position of the spring plate to the vehicle controller or the VR controller to facilitate generation of a target set of virtual images by the VR device.

9. The resistance control system of claim 8, wherein the position sensor is an inclinometer or an accelerometer.

10. The resistance control system of claim 1, wherein the at least one spring comprise at least six conical springs spaced in a circular formation along a surface of the spring plate, wherein the at least one actuator comprise at least three actuators spaced in the circular formation between the base and the actuator plate, wherein the pivot joint is configured to

enable pivotal motion around at least one axis, and wherein the spring plate comprises a frame with openings therethrough.

11. A method of controlling a ride vehicle of an amusement attraction, the method comprising:

receiving, via a vehicle controller of the ride vehicle, input indicative of a weight of a rider of the ride vehicle, wherein the ride vehicle comprises a base, a support beam coupled to the base, a spring plate that supports the rider while on the ride vehicle and is pivotally coupled to the support beam, an actuator plate selectively positioned between the spring plate and the base via at least one actuator, and at least one spring engaged with the spring plate, wherein the at least one spring is configured to selectively compress against the actuator plate based on movements of the rider;

querying, via the vehicle controller, a resistance setting database to retrieve a target actuator length for the at least one actuator that corresponds to the weight of the rider;

controlling, via the vehicle controller, the at least one actuator to adjust based on the target actuator length for at least a portion of a ride cycle of the amusement attraction; and

controlling, via the vehicle controller, the at least one actuator to adjust based on a default actuator length in response to determining that the ride cycle is completed.

12. The method of claim 11, wherein controlling the at least one actuator to adjust based on the target actuator length comprises tuning a resistance of movement of the spring plate about the support beam.

13. The method of claim 11, wherein the input indicative of the weight of the rider is received from a weight sensor disposed between the rider and the base of the ride vehicle.

14. The method of claim 11, wherein the ride vehicle comprises an inclinometer coupled to the spring plate and configured to transmit a position signal of the spring plate to the vehicle controller, and wherein the method comprises coordinating, via the vehicle controller, a virtual reality (VR) environment presented to the rider through a VR device based on the position signal from the inclinometer.

15. The method of claim 14, comprising:

receiving, via the vehicle controller, a haptic feedback request from a VR controller of the VR device; and

controlling the at least one actuator to sequentially extend, retract, or both to fulfill the haptic feedback request by manipulating the actuator plate.

16. A resistance control system of an amusement attraction, the resistance control system comprising:

a spring plate including a seat configured to receive a rider;

a plurality of spring columns engaged with the spring plate, wherein each spring column of the plurality of spring columns is passively height-adjustable based on a weight of the rider; and

a plurality of locking devices configured to selectively secure the plurality of spring columns at an adjusted height during a ride cycle of the amusement attraction.

17. The resistance control system of claim 16, wherein each spring column of the plurality of spring columns comprises a compound mechanical spring comprising at least two spring regions coupled in series, wherein each spring region of the at least two spring regions comprises a respective spring constant that enables compression of the respective spring region in response to the weight of the rider being within a respective target weight range.

18. The resistance control system of claim 16, comprising a vehicle controller configured to instruct the plurality of locking devices to release the plurality of spring columns.

19. The resistance control system of claim 16, wherein the plurality of locking devices are ratcheting devices that are each configured to secure a respective ribbed end of a rigid or flexible elongate shaft of each spring column of the plurality of spring columns.

20. The resistance control system of claim 16, wherein each spring column of the plurality of spring columns comprises a helical spring and a cable extending within the helical spring, and wherein a respective locking device of the plurality of locking devices is configured to capture the cable to retain the helical spring at the adjusted height.

21. A resistance control system of an amusement attraction, the resistance control system comprising: a support assembly comprising a base, a pivot joint, and a support beam extending between the base and the pivot joint; a spring plate coupled to the pivot joint of the support assembly and configured to support a rider; at least one spring engaged with the spring plate; an actuator plate positioned between the spring plate and the base of the support assembly; and at least one actuator coupled between the actuator plate and the base, wherein the at least one actuator is configured to move and secure the actuator plate relative to the pivot joint to adjust a resistance to movement about the pivot joint.

22. The resistance control system of claim 21, comprising a controller communicatively coupled to the at least one actuator and configured to cause the at least one actuator to extend or contract to a target length based on a weight of the rider.

23. The resistance control system of claim 22, wherein the controller is configured to reset the at least one actuator from the target length to a default length in response to determining that a ride cycle of the amusement attraction is completed.

24. The resistance control system of claim 22, comprising a weight sensor coupled to the support assembly, wherein the weight sensor is configured to transmit a signal indicative of the weight of the rider to the controller.

25. The resistance control system of claim 24, wherein the controller comprises a memory storing a resistance setting database, and wherein the controller is configured to cause the at least one actuator to move the actuator plate based on the weight of the rider by: querying the resistance setting database to determine the target length of the at least one actuator; and operating the at least one actuator to extend or contract to reach the target length.

26. The resistance control system of claim 21, comprising a virtual reality (VR) device, wherein the VR device comprises a VR controller communicatively coupled to the at least one actuator, and wherein the VR controller is configured to cause the at least one actuator to move the actuator plate to correspond to a virtual environment that the VR device presents to the rider.

27. The resistance control system of claim 21, comprising a virtual reality (VR) device, a VR controller configured to operate the VR device, and a vehicle controller that is communicatively coupled to both the at least one actuator and the VR controller, wherein the vehicle controller is configured to control the at least one actuator to correspond to a simulated environment that the VR device presents to the rider based on communication between the vehicle controller and the VR controller.

28. The resistance control system of claim 27, comprising a position sensor coupled to the spring plate and communicatively coupled to the vehicle controller or the VR controller, wherein the position sensor is configured to transmit a signal indicative of the position of the spring plate to the vehicle controller or the VR controller to facilitate generation of a target set of virtual images by the VR device.

29. The resistance control system of claim 28, wherein the position sensor is an inclinometer or an accelerometer.

30. The resistance control system of claim 21, wherein the at least one spring comprise at least six conical springs spaced in a circular formation along a surface of the spring plate, wherein the at least one actuator comprise at least three actuators spaced in the circular formation between the base and the actuator plate, wherein the pivot joint is configured to enable pivotal motion around at least one axis, and wherein the spring plate comprises a frame with openings therethrough.

31. A method of controlling a ride vehicle of an amusement attraction, the method comprising:

receiving, via a vehicle controller of the ride vehicle, input indicative of a weight of a rider of the ride vehicle, wherein the ride vehicle comprises a base, a support beam coupled to the base, a spring plate that supports the rider while on the ride vehicle and is pivotably coupled to the support beam, an actuator plate selectively positioned between the spring plate and the base via at least one actuator, and at least one spring engaged with the spring plate, wherein the at least one spring is configured to selectively compress against the actuator plate based on movements of the rider; querying, via the vehicle controller, a resistance setting database to retrieve a target actuator length for the at least one actuator that corresponds to the weight of the rider; controlling, via the vehicle controller, the at least one actuator to adjust based on the target actuator length for at least a portion of a ride cycle of the amusement attraction; and controlling, via the vehicle controller, the at least one actuator to adjust based on a default actuator length in response to determining that the ride cycle is completed.

32. The method of claim 31, wherein controlling the at least one actuator to adjust based on the target actuator length comprises tuning a resistance of movement of the spring plate about the support beam.

33. The method of claim 31, wherein the input indicative of the weight of the rider is received from a weight sensor disposed between the rider and the base of the ride vehicle.

34. The method of claim 31, wherein the ride vehicle comprises an inclinometer coupled to the spring plate and configured to transmit a position signal of the spring plate to the vehicle controller, and wherein the method comprises coordinating, via the vehicle controller, a virtual reality (VR) environment presented to the rider through a VR device based on the position signal from the inclinometer.

35. The method of claim 34, comprising: receiving, via the vehicle controller, a haptic feedback request from a VR controller of the VR device; and controlling the at least one actuator to sequentially extend, retract, or both to fulfill the haptic feedback request by manipulating the actuator plate.

36. A resistance control system of an amusement attraction, the resistance control system comprising:

an actuator plate; a spring plate configured to support a rider;

a support assembly comprising a pivot point, wherein the pivot joint is pivotably

coupling the actuator plate and the spring plate relative to one another; a spring engaged with the spring plate, wherein the spring is configured to compress against the actuator plate based on movement of the spring plate about the pivot joint;

an actuator coupled to the actuator plate, wherein the actuator is configured to move the actuator plate relative to the pivot joint; and

a controller communicatively coupled to the actuator, wherein the controller is configured to:

receive an input indicative of a weight of the rider supported by the spring plate; and control the actuator based on the input to move the actuator plate relative to the pivot joint and adjust a resistance to movement of the spring plate about the pivot joint as caused by the spring.

37. The resistance control system of claim 36, wherein the controller is configured to: query a database to retrieve a target actuator extension length for the actuator based on the weight of the rider; and control the actuator to adjust based on the target actuator extension length retrieved from the database.

38. The resistance control system of claim 37, comprising the database, wherein the database stores data associating a heavier weight of the rider to an increased target actuator extension length to increase the resistance to movement of the spring plate about the pivot joint.

39. The resistance control system of claim 36, comprising a virtual reality (VR) device configured to present a virtual environment, wherein the controller is configured to control the actuator to move the actuator plate based on the virtual environment presented by the VR device.

40. The resistance control system of claim 36, comprising a user interface, wherein the input comprises a user input entered via the user interface.