CLAIMS

~~We claim:~~

1. A system comprising:

a sensor configured to measure an ankle angle,

a display,

a controller comprising at least one processor, wherein the controller is configured to perform operations including:

operating a sensor to generate a first signal representative of ankle angle over a first period of time;

determining, based on the first signal, a range of angles detected over the first period of time;

operating a display to provide an indication to prime a repetitive motor movement, wherein the indication represents at least a portion of the repetitive motor movement;

operating the sensor to generate a second signal representative of ankle angle over a second period of time;

during the second period of time, mapping the second signal to a user location relative to the repetitive motor movement; and

during the second period of time, operating the display to update the indication that represents the repetitive motor movement, wherein operating the display to update the indication that represents the repetitive motor movement includes updating a location, relative to the representation of the repetitive motor movement, of a cursor according to the user location.

2. The system of claim 1, wherein the repetitive motor movement consists of multiple identical cycles of a periodic motion spanning the second period of time.

3. The system of claim 2, wherein providing an indication to prime a repetitive motor movement comprises providing an indication that represents at least one full cycle of the repetitive motor movement.

4. The system of claim~~s~~ 2 or 3, wherein providing an indication to prime a repetitive motor movement comprises providing an indication that represents at least 1.5 full cycles of the repetitive motor movement.

~~5. The system of claims 1-4, wherein providing an indication to prime a repetitive motor movement comprises providing an indication of a geometric path.~~

~~6. The system of claims 1-4, wherein providing an indication to prime a repetitive motor movement comprises providing an indication of a continuous trace.~~

~~7~~5. The system of any one of claims 1-~~6~~4, wherein providing an indication to prime a repetitive motor movement comprises providing an indication of a plurality of discrete symbols.

~~8~~6. The system of claim ~~7~~5, ~~further comprising~~ wherein the operations further comprise:

determining a distance between the location of the cursor and a location of a particular symbol of the plurality of discrete symbols;

determining that the distance is less than a distance threshold value; and

responsive to determining that the distance is less than the distance threshold value, incrementing or decrementing a counter~~.~~

~~9. The system of claim 8~~, wherein the counter is visible on the display.

~~10~~7. The system of ~~claims 8 or 9~~ claim 6, ~~further comprising~~ wherein the operations further comprise:

responsive to determining that the distance is less than the distance threshold value, operating the display to remove at least a portion of the indication from the display.

~~11. The system according to any preceding claim, wherein the user location is a vertical location.~~

~~12. The system of any of claims 1-10, wherein the user location is a horizontal location.~~

~~13. The system of claims 1-10, wherein the user location is an angular location relative to a central point.~~

~~14~~8. The system of any preceding claim, wherein mapping the second signal to the user location relative to the repetitive motor movement comprises mapping the second signal to the user location relative to the repetitive motor movement such that 80% of the detected range of angles is mapped to a full range of the repetitive motor movement~~-~~.

~~15. The system of any preceding claim, further comprising deriving, from the second signal, a quantitative measurement of a user's performance of the repetitive motor movement.~~

~~16. The system of claim 15, further comprising storing the quantitative measurement for later retrieval.~~

~~17. The system of claims 15 or 16, further comprising comparing the quantitative measurement to a goal threshold and storing the result for later retrieval.~~

~~18. The system of claim 17, further comprising operating the display to indicate the result of the comparison.~~

~~19. The system of claims 15-18, wherein the quantitative measurement is accuracy.~~

~~20~~9. The system of ~~claim 17~~ any preceding claim, wherein the ~~system~~ operations further comprise~~s~~:

deriving, from the second signal, a quantitative measurement of a user's performance of the repetitive motor movement;

comparing the quantitative measurement to a goal threshold;

operating the sensor to generate a third signal representative of ankle angle over a third period of time;

during the third period of time, mapping the third signal to a user location relative to the repetitive motor movement; and

during the third period of time, operating the display to update the indication that represents the repetitive motor movement, wherein operating the display to update the indication that represents the repetitive motor movement includes updating a location, relative to the representation of the repetitive motor movement, of the cursor according to the user location.

~~21~~10. The system of claim ~~20~~9, wherein operating the display during the second period of time to update the indication that represents the repetitive motor movement comprises updating the indication such that the representation of the repetitive motor movement is translated across the display at a first speed and wherein operating the display during the third period of time to update the indication that represents the repetitive motor movement comprises updating the indication such that the representation of the repetitive motor movement is translated across the display at a second speed.

~~22~~11. The system of claim ~~21~~10, ~~further comprising~~ wherein the operations further comprise determining the quantitative measure is less than the goal threshold and, responsive to determining the quantitative measure is less than the goal threshold, operating the display such that the second speed is less than the first speed.

~~23~~12. The system of claim~~s~~ ~~21~~10 or ~~22~~11, ~~further comprising~~ wherein the operations further comprise determining the quantitative measure is greater than the goal threshold and,

responsive to determining the quantitative measure is greater than the goal threshold, operating the display such that the second speed is greater than the first speed.

~~24. The system of any preceding claim, wherein the system further comprises:~~
~~operating the sensor to generate a third signal representative of ankle angle over a third period of time;~~
~~during the third period of time, mapping the third signal to a user location relative to the repetitive motor movement; and~~
~~during the third period of time, operating the display to update the indication that represents the repetitive motor movement, wherein operating the display to update the indication that represents the repetitive motor movement includes updating a location, relative to the representation of the repetitive motor movement, of the cursor according to the user location; wherein the third period of time follows the second period of time after an interval of rest.~~

~~25~~13. The system of any ~~of~~ preceding claim, wherein the second period of time is between 18 and 22 minutes.

~~26~~14. The system of any one of claims ~~20~~9 ~~25~~13, wherein the third period of time is between 8 and 12 minutes.

~~27. The system of any of claims 24-26, wherein the interval of rest is between one and three minutes.~~

~~28. The system of any preceding claim, wherein the system further comprises providing brain stimulation.~~

~~29. The system of claim 28, wherein the brain stimulation is concurrent with at least one of the first period of time, second period of time, and third period of time.~~

~~30. The system of claims 28 or 29, wherein the brain stimulation is sound, direct vibration, electrical stimulation, or magnetic stimulation.~~

~~31. The system of any preceding claim, wherein the ankle is permitted to rotate around more than one axis.~~

~~32~~15. The system of any preceding claim, wherein the sensor detects ankle rotation only around a single axis.

~~33. The system of any preceding claim, wherein the sensor generates the first, second, and third signals from the ankle rotation only around a single axis.~~

~~34~~16. The system of any preceding claim, wherein the sensor is integrated into a garment.

~~35~~17. The system of any preceding claim, wherein the display is operably connected to at least one of a smart phone, tablet, computer, or other device adapted to receive wireless input signals.

~~36~~18. The system of any preceding claim, wherein the sensor is operably connected to a smart phone or smart watch.

~~37. The system of any preceding claim, wherein the sensor comprises a flex sensor.~~

~~38. The system of any of claims 1-36, wherein the sensor comprises a gyroscope.~~

~~39. The system of any of claims 1-36, wherein the sensor comprises an accelerometer.~~

~~40. The system of any of claims 1-36, wherein the sensor comprises a depth sensor.~~

~~41. The system of any preceding claim, wherein the sensor includes more than one sensor type.~~

~~42~~19. A method for ~~improved rehabilitation~~ generating a visualization of ankle motion ~~by visually-driven priming of motor movement~~, the method comprising:

operating a sensor to generate a first signal representative of ankle angle over a first period of time;

determining, based on the first signal, a range of angles detected over the first period of time;

operating a display to provide an indication to prime a repetitive motor movement, wherein the indication represents at least a portion of the repetitive motor movement;

operating the sensor to generate a second signal representative of ankle angle over a second period of time;

during the second period of time, mapping the second signal to a user location relative to the repetitive motor movement; and

during the second period of time, operating the display to update the indication that represents the repetitive motor movement, wherein operating the display to update the indication that represents the repetitive motor movement includes updating a location, relative to the representation of the repetitive motor movement, of a cursor according to the user location.

~~43. The method of claim 42, wherein the repetitive motor movement consists of multiple identical cycles of a periodic motion spanning the second period of time.~~

44. The method of claim 43, wherein providing an indication to prime a repetitive motor movement comprises providing an indication that represents at least one full cycle of the repetitive motor movement.

45. The method of claims 43 or 44, wherein providing an indication to prime a repetitive motor movement comprises providing an indication that represents at least 1.5 full cycles of the repetitive motor movement.

46. The method of claims 42-45, wherein providing an indication to prime a repetitive motor movement comprises providing an indication of a geometric path.

47 The method of claims 42-45, wherein providing an indication to prime a repetitive motor movement comprises providing an indication of a continuous trace.

48. The method of claims 42-47, wherein providing an indication to prime a repetitive motor movement comprises providing an indication of a plurality of discrete symbols.

49. The method of claim 48, further comprising:

determining a distance between the location of the cursor and a location of a particular symbol of the plurality of discrete symbols;

determining that the distance is less than a distance threshold value; and

responsive to determining that the distance is less than the distance threshold value, incrementing or decrementing a counter.

50. The method of claim 49, wherein the counter is visible on the display.

51. The method of claims 49 or 50, further comprising:

responsive to determining that the distance is less than the distance threshold value, operating the display to remove at least a portion of the indication from the display.

52. A method according to any of claims 42-51, wherein the user location is a vertical location.

53. The method of any of claims 42-51, wherein the user location is a horizontal location.

54. The method of claims 42-51, wherein the user location is an angular location relative to a central point.

55. The method of any of claims 42-54, wherein mapping the second signal to the user location relative to the repetitive motor movement comprises mapping the second signal to the user location relative to the repetitive motor movement such that 80% of the detected range of angles is mapped to a full range of the repetitive motor movement .

56. The method of any of claims 42-55, further comprising deriving, from the second signal, a quantitative measurement of a user's performance of the repetitive motor movement.

57. The method of claim 46, further comprising storing the quantitative measurement for later retrieval.

58. The method of claims 56 or 57, further comprising comparing the quantitative measurement to a goal threshold and storing the result for later retrieval.

59. The method of claim 58, further comprising operating the display to indicate the result of the comparison.

60. The method of claims 56-59, wherein the quantitative measurement is accuracy.

61. The method of claim 58, wherein the method further comprises:

operating the sensor to generate a third signal representative of ankle angle over a third period of time;

during the third period of time, mapping the third signal to a user location relative to the repetitive motor movement; and

during the third period of time, operating the display to update the indication that represents the repetitive motor movement, wherein operating the display to update the indication that represents the repetitive motor movement includes updating a location, relative to the representation of the repetitive motor movement, of the cursor according to the user location.

62. The method of claim 61, wherein operating the display during the second period of time to update the indication that represents the repetitive motor movement comprises updating the indication such that the representation of the repetitive motor movement is translated across the display at a first speed and wherein operating the display during the third period of time to update the indication that represents the repetitive motor movement comprises updating the indication such that the representation of the repetitive motor movement is translated across the display at a second speed.

63. The method of claim 62, further comprising determining the quantitative measure is less than the goal threshold and, responsive to determining the quantitative measure is less than the goal threshold, operating the display such that the second speed is less than the first speed.

64. The method of claims 62 or 63, further comprising determining the quantitative measure is greater than the goal threshold and, responsive to determining the

quantitative measure is greater than the goal threshold, operating the display such that the second speed is greater than the first speed.

65. The method of any of claims 42-64, wherein the method further comprises:

operating the sensor to generate a third signal representative of ankle angle over a third period of time;

during the third period of time, mapping the third signal to a user location relative to the repetitive motor movement; and

during the third period of time, operating the display to update the indication that represents the repetitive motor movement, wherein operating the display to update the indication that represents the repetitive motor movement includes updating a location, relative to the representation of the repetitive motor movement, of the cursor according to the user location; wherein the third period of time follows the second period of time after an interval of rest.

66. The method of any of claims 42-66, wherein the second period of time is between 18 and 22 minutes.

67. The method of any of claims 61-66, wherein the third period of time is between 8 and 12 minutes.

68. The method of any of claims 65-67, wherein the interval of rest is between one and three minutes.

69. The method of claims 42-68, wherein the method further comprises providing brain stimulation.

70. The method of claim 69, wherein the brain stimulation is concurrent with at least one of the first period of time, second period of time, and third period of time.

71. The method of claims 69 or 70, wherein the brain stimulation is sound, direct vibration, electrical stimulation, or magnetic stimulation.

72. The method of any of claims 42-71, wherein the ankle is permitted to rotate around more than one axis.

73. The method of any of claims 42-72, wherein the sensor detects ankle rotation only around a single axis.

74. The method of any of claims 42-73, wherein the sensor generates the first, second, and third signals from the ankle rotation only around a single axis.

75. The method of any of claims 42-74, wherein the sensor is integrated into a garment.

~~76. The method of any of claims 42-75, wherein the display is operably connected to at least one of a smart phone, tablet, computer, or other device adapted to receive wireless input signals.~~

~~77. The method of any of claims 42-76, wherein the sensor is operably connected to a smart phone or smart watch.~~

~~78. The method of any of claims 42-77, wherein the sensor comprises a flex sensor.~~

~~79. The method of any of claims 42-77, wherein the sensor comprises a gyroscope.~~

~~80. The method of any of claims 42-77, wherein the sensor comprises an accelerometer.~~

~~81. The method of any of claims 42-77, wherein the sensor comprises a depth sensor.~~

~~82. The method of any of claims 42-81, wherein the sensor includes more than one sensor type.~~

~~83~~20. A non-transitory computer-readable medium, having stored thereon program instructions that, upon execution by the controller, cause the controller to perform the method of ~~any one of claims 42-71~~ claim 19.

~~84. A system comprising:~~

~~a sensor configured to measure an ankle angle;~~

~~a display;~~

~~a controller comprising at least one processor; and~~

~~a non-transitory computer-readable medium, having stored thereon program instructions that, upon execution by the controller, cause the controller to perform the method of any of claims 42-71.~~