

What is claimed is:

1. A system for processing user input, comprising:

display comprising a visualization of a user interface;

user input device comprising at least one selected from the group consisting of touch input and pen input, the user input device adapted to output signals corresponding to user input;

input processing system operatively connected to the user input device, the input processing system adapted to receive the signals corresponding to user input and to emit signals corresponding to the received signals;

first graphical processing and output system comprising software running in a software stack, the first graphical processing and output system adapted to receive at least some of the emitted signals and to generate high-latency data that can affect the visualization of the user interface on the display and to output the high-latency data for use by the display in response to the at least some of the emitted signals;

second graphical processing and output system implemented at least partially in hardware, the second graphical processing and output system adapted to substantially simultaneously receive the at least some of the emitted signals and to generate low-latency data that can affect the visualization of the user interface on the display and to output the generated low-latency data for use by the display in response to the at least some of the emitted signals;

wherein, with respect to the response to the at least some of the emitted signals, the second graphical processing and output system is adapted to output the generated low-latency data with low latency relative to the output of the high-latency data by the first graphical processing and output system; and

the display being configured to display at least some of the low-latency data and at least some of the high-latency data on the visualization of the user interface.

2. The system for processing user input according to claim 1, wherein the low-latency data is generated by associating data corresponding to a defined response with one or more of the at least some of the emitted signals.

3. The system for processing user input according to claim 1, wherein the high-latency data is generated by rendering a response to one or more of the at least some of the emitted signals.
4. The system for processing user input according to claim 1, wherein the high-latency data and the low-latency data have substantially equal fidelity.
5. The system for processing user input according to claim 1, wherein the high-latency data and the low-latency data have unequal fidelity.
6. The system for processing user input according to claim 5, wherein at least some of the high-latency data is of higher fidelity than the corresponding low-latency data.
7. The system for processing user input according to claim 1, wherein the second graphical processing and output system is implemented, at least in part, in at least one selected from the group of field-programmable gate array (FPGA), application-specific integrated circuit (ASIC), a microcontroller, a graphics processing unit (GPU), or a system on a chip (SoC).
8. The system for processing user input according to claim 1, wherein the second graphical processing and output system is implemented in logic integrated into an existing component of a computing system.
9. The system for processing user input according to claim 8, wherein the existing component of the computing system comprises at least one selected from the group of a graphics processing unit (GPU), input device controller, central processing unit (CPU), microcontroller, or system on a chip (SoC).
10. The system for processing user input according to claim 1, wherein the first graphical processing and output system includes state information reflecting at least one state of the first graphical processing and output system, and the second graphical processing and output system's response is dependent upon the state information.
11. The system for processing user input according to claim 1, wherein the second graphical processing and output system comprises user interface element logic.

12. The system for processing user input according to claim 11, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the second graphical processing and output system is adapted to perform hit testing based on information in the UI elements data.

13. The system for processing user input according to claim 1, wherein the emitted signals are sent in a stream to the first and second graphical processing and output system, and the second graphical processing and output system is adapted to delete one or more of the emitted signals from the stream, preventing such deleted signals from being part of the at least some of the emitted signals corresponding to the received data that are received by the first graphical processing and output system.

14. The system for processing user input according to claim 1, wherein the at least some of the emitted signals corresponding to the high-latency data for use by the display differ from the at least some of the emitted signals corresponding to the low-latency data.

15. The system for processing user input according to claim 1, wherein the second graphical processing and output system outputs the generated low-latency data for use by the display within 10 ms of receiving a corresponding emitted signal.

16. The system for processing user input according to claim 1, wherein the second graphical processing and output system outputs the generated low-latency data for use by the display within 5 ms of receiving a corresponding emitted signal.

17. The system for processing user input according to claim 1, wherein the second graphical processing and output system outputs the generated low-latency data for use by the display within 1 ms of receiving a corresponding emitted signal.

18. The system for processing user input according to claim 1, further comprising an additional output device, and wherein in response to the at least some of the emitted signals, the second graphical processing and output system generates additional output data for use by the additional output device.

19. The system for processing user input according to claim 18, wherein the additional output device and additional output data are selected from the group comprising: an audio output device and audio data, and a haptic feedback device and haptic feedback data.
20. The system for processing user input according to claim 1, wherein a difference between at least some of the low-latency data that can affect the visualization of the user interface and corresponding high-latency data that can affect the visualization of the user interface is perceptible to a user.
21. The system for processing user input according to claim 1, wherein at least some of the low-latency data that can affect the visualization of the user interface and at least some of the corresponding high-latency data that can affect the visualization of the user interface is blended in a manner that is not noticeable by a user.
22. The system for processing user input according to claim 1, configured to provide a low-latency system response in a form that is dictated by application logic.
23. The system for processing user input according to claim 1, wherein the form of low-latency system response comprises a response or set of responses selected from the group consisting of: an auditory response, a visual response, and a haptic response.
24. The system for processing user input according to claim 1, configured to provide a low-latency system response in a form that is dictated by system logic.
25. The system for processing user input according to claim 1, wherein the user input device comprises a direct-touch input device employing at least one of the technologies selected from the group consisting of: resistive, direct illumination, frustrated total-internal reflection, diffuse illumination, projected capacitive, capacitive coupling, acoustic wave, and sensor-in-pixel.
26. The system for processing user input according to claim 2, wherein the second graphical processing and output system comprises at least one pre-rendered visual, and wherein the low-latency data corresponds to one or more of the at least one pre-rendered visual.
27. The system for processing user input according to claim 26, wherein the high-latency data and the low-latency data have unequal fidelity.

28. The system for processing user input according to claim 26, wherein the first graphical processing and output system includes state information reflecting at least one state of the first graphical processing and output system, and the second graphical processing and output system's response is dependent upon the state information.

29. The system for processing user input according to claim 26, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements, and

wherein the second graphical processing and output system is adapted to perform hit testing based on information in the UI elements data.

30. The system for processing user input according to claim 26, wherein the emitted signals are sent in a stream to the first and second graphical processing and output system, and the second graphical processing and output system is adapted to delete one or more of the emitted signals from the stream, preventing such deleted signals from being part of the at least some of the emitted signals corresponding to the received data that are received by the first graphical processing and output system.

31. The system for processing user input according to claim 26, further comprising an additional output device, and wherein in response to the at least some of the emitted signals, the second graphical processing and output system generates additional output data for use by the additional output device.

32. The system for processing user input according to claim 31, wherein the additional output device and additional output data are selected from the group comprising: an audio output device and audio data, and a haptic feedback device and haptic feedback data.

33. The system for processing user input according to claim 1, wherein the second graphical processing and output system's response is independent of the first graphical processing and output system.

34. The system for processing user input according to claim 1, wherein the second graphical processing and output system's response is dependent upon the first graphical

processing and output system, and state information is passed from the first graphical processing and output system to the second graphical processing and output system.

35. The system for processing user input according to claim 34, wherein data passed from the first graphical processing and output system to the second graphical processing and output system is comprised of one or more pieces of data describing one or more of the graphical elements in the user interface, and wherein the data passed is selected from the group consisting of: the size, the location, the appearance, alternative appearances, response to user input, and the type of graphical elements in the user interface.

36. The system for processing user input according to claim 31, wherein data passed from the first graphical processing and output system to the second graphical processing and output system describes appearance or behavior of a button, a slider, a draggable or resizable GUI element, a scrollable list, a spinner, a drop-down list, a menu, a toolbar, a combo box, a movable icon, a fixed icon, a tree view, a grid view, a scroll bar, a scrollable window, or a user interface element.

37. The system for processing user input according to claim 1, wherein high- and low-latency visualizations are combined on a single display by at least one of: overlapping two projected images, logically combining the visualizations in a display buffer, overlapping two transparent layers each capable of displaying one of the high- and low-latency visualizations, interlacing pixels of the display such that some are filled from the low-latency visualizations and some are filled from the high-latency visualizations, or interlacing the frames of the display such that some are filled from the low-latency visualizations and some are filled from the high-latency visualizations.

38. The system for processing user input according to claim 1, wherein the second graphical processing and output system is configured to process the events with low fidelity with respect to a fidelity of the first graphical processing and output system.

39. The system for processing user input according to claim 1, wherein the input processing system performs decimation on user input signals before they are received by one or both of the first or second graphical processing and output systems.

40. The system for processing user input according to claim 1, wherein user input signals received by the first and second graphical processing and output systems have been differentially processed.

41. A system for processing user input, comprising:

display comprising a visualization of a user interface;

user input device adapted to output signals corresponding to user input;

input processing system operatively connected to the user input device, the input processing system adapted to receive the signals corresponding to user input and to emit a stream of signals corresponding to at least some of the received signals;

first graphical processing and output system adapted to receive at least a portion of the stream of signals and to generate high-latency data that can affect the visualization of the user interface on the display and to output the high-latency data for use by the display in response to at least some of the signals in the at least a portion of the stream of signals received by the first graphical processing and output system;

second graphical processing and output system adapted to receive at least a portion of the stream of signals and to generate low-latency data that can affect the visualization of the user interface on the display and to output the generated low-latency data for use by the display in response to the at least some of the signals in the at least a portion of the stream of signals received by the second graphical processing and output system, the second graphical processing and output system being configured to output the generated low-latency data with low latency relative to the output of the high-latency data by the first output graphical processing and output system; and

the display being configured to merge at least some of the low-latency data and at least some of the high-latency data onto the visualization of the user interface.

42. The system for processing user input claimed in claim 41, wherein the low-latency data is generated by associating data corresponding to a defined response to one or more of the at least some of the signals in the at least a portion of the stream of signals received by the second graphical processing and output system.

43. The system for processing user input claimed in claim 41, wherein the high-latency data is generated by rendering.
44. The system for processing user input according to claim 41, wherein the high-latency data and the low-latency data have substantially equal fidelity.
45. The system for processing user input according to claim 41, wherein the high-latency data and the low-latency data have unequal fidelity.
46. The system for processing user input according to claim 45, wherein at least some of the high-latency data is of higher fidelity than the corresponding low-latency data.
47. The system for processing user input according to claim 41, wherein the second graphical processing and output system is implemented, at least in part, in at least one selected from the group of field-programmable gate array (FPGA), application-specific integrated circuit (ASIC), a microcontroller, a graphics processing unit (GPU), or a system on a chip (SoC).
48. The system for processing user input according to claim 41, wherein the second graphical processing and output system is implemented in logic integrated into an existing component of a computing system.
49. The system for processing user input according to claim 48, wherein the existing component of the computing system comprises at least one selected from the group of a graphics processing unit (GPU), input device controller, central processing unit (CPU), microcontroller, or system on a chip (SoC).
50. The system for processing user input according to claim 41, wherein the first graphical processing and output system includes state information reflecting at least one state of the first graphical processing and output system, and the second graphical processing and output system's response is dependent upon the state information.
51. The system for processing user input according to claim 41, wherein the second graphical processing and output system comprises user interface element logic.

52. The system for processing user input according to claim 51, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the second graphical processing and output system is adapted to perform hit testing based on information in the UI elements data.

53. The system for processing user input according to claim 41, wherein the second graphical processing and output system is adapted to delete one or more of the signals from the stream, preventing such deleted signals from being part of the at least a portion of the stream of signals corresponding to at least some of the received data that are received by the first graphical processing and output system.

54. The system for processing user input according to claim 41, wherein the at least a portion of the stream of signals corresponding to the high-latency data differ from the at least a portion of signals corresponding to the low-latency data.

55. The system for processing user input according to claim 41, wherein the second graphical processing and output system outputs the generated low-latency data for use by the display within 5 ms of receiving a corresponding emitted signal.

56. The system for processing user input according to claim 41, further comprising an additional output device, and wherein in response to one or more signals in the at least a portion of the stream of signals, the second graphical processing and output system generates additional output data for use by the additional output device.

57. The system for processing user input according to claim 56, wherein the additional output device and additional output data are selected from the group comprising: an audio output device and audio data, and a haptic feedback device and haptic feedback data.

58. The system for processing user input according to claim 41, wherein a difference between at least some of the low-latency data that can affect the visualization of the user interface and corresponding high-latency data that can affect the visualization of the user interface is perceptible to a user.

59. The system for processing user input according to claim 41, wherein at least some of the low-latency data that can affect the visualization of the user interface and at least some of the corresponding high-latency data that can affect the visualization of the user interface is blended in a manner that is not noticeable by a user.

60. The system for processing user input according to claim 41, configured to provide a low-latency system response in a form that is dictated by application logic.

61. The system for processing user input according to claim 60, wherein the form of low-latency system response comprises a response or set of responses selected from the group consisting of: an auditory response, a visual response, and a haptic response.

62. The system for processing user input according to claim 41, configured to provide a low-latency system response in a form that is dictated by system logic.

63. The system for processing user input according to claim 41, wherein the user input device comprises a direct-touch input device employing at least one of the technologies selected from the group consisting of: resistive, direct illumination, frustrated total-internal reflection, diffuse illumination, projected capacitive, capacitive coupling, acoustic wave, and sensor-in-pixel.

64. The system for processing user input according to claim 42, wherein the second graphical processing and output system comprises at least one pre-rendered visual, and wherein the low-latency data corresponds to one or more of the at least one pre-rendered visual.

65. The system for processing user input according to claim 64, wherein the high-latency data and the low-latency data have unequal fidelity.

66. The system for processing user input according to claim 64, wherein the first graphical processing and output system includes state information reflecting at least one state of the first graphical processing and output system, and the second graphical processing and output system's response is dependent upon the state information.

67. The system for processing user input according to claim 64, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the second graphical processing and output system is adapted to perform hit testing based on information in the UI elements data.

68. The system for processing user input according to claim 64, wherein the emitted signals are sent in a stream to the first and second graphical processing and output system, and the second graphical processing and output system is adapted to delete one or more of the emitted signals from the stream, preventing such deleted signals from being part of the at least some of the emitted signals corresponding to the received data that are received by the first graphical processing and output system.

69. The system for processing user input according to claim 64, further comprising an additional output device, and wherein in response to the at least some of the emitted signals, the second graphical processing and output system generates additional output data for use by the additional output device.

70. The system for processing user input according to claim 69, wherein the additional output device and additional output data are selected from the group comprising: a visual output device and visual data, an audio output device and audio data, and a haptic feedback device and haptic feedback data.

71. The system for processing user input according to claim 41, wherein the user input device is configured to receive user input in at least one form selected from the group consisting of: touch, multi-touch, pen, eye movement, eye tracking, in-air gesture, audio, mouse, keyboard and varying pressure.

72. A system for processing user input, comprising:

input device;

input processing unit;

high-latency subsystem;

low-latency subsystem implemented at least partially in hardware;

input processing unit software for generating signals in response to user inputs; and,

output device;

wherein the low-latency subsystem receives the signals and generates at least one low-latency output with low latency relative to the high-latency subsystem and the high-latency subsystem processes at least some of the signals and generates at least one high-latency output with high latency relative to the low-latency subsystem;

wherein the input device, the input processing unit, the high-latency subsystem, the low-latency subsystem, the input processing unit software and the output device being arranged such that:

the low-latency processing subsystem operates independently of and parallel to the high-latency processing subsystem; and

at least some of the user input signals are processed by both the low-latency subsystem and the high-latency subsystem, the low-latency subsystem outputting to the output device a response to a given user input signal with low-latency and the high-latency subsystem outputting to the output device a response to the given user input signal with high-latency.

73. The system for processing user input claimed in claim 72, wherein low-latency data generated by the low-latency subsystem is generated by associating data corresponding to a defined response to one or more of the at least some of the signals in the at least a portion of the stream of signals received by the low-latency subsystem.

74. The system for processing user input claimed in claim 72, wherein high-latency data generated by the high-latency subsystem is generated by rendering.

75. The system for processing user input according to claim 72, wherein high-latency data generated by the high-latency subsystem and low-latency data generated by the low-latency subsystem have substantially equal fidelity.

76. The system for processing user input according to claim 72, wherein high-latency data generated by the high-latency subsystem and low-latency data generated by the low-latency subsystem have unequal fidelity.

77. The system for processing user input according to claim 72, wherein the high-latency subsystem generates high-latency data and the low-latency subsystem generates low-latency data,

and wherein at least some of the high-latency data is of higher fidelity than the corresponding low-latency data.

78. The system for processing user input according to claim 72, wherein the low-latency subsystem is implemented, at least in part, in at least one selected from the group of field-programmable gate array (FPGA), application-specific integrated circuit (ASIC), a microcontroller, a graphics processing unit (GPU), or a system on a chip (SoC).

79. The system for processing user input according to claim 72, wherein the low-latency subsystem is implemented in logic integrated into an existing component of a computing system.

80. The system for processing user input according to claim 79, wherein the existing component of the computing system comprises at least one selected from the group of a graphics processing unit (GPU), input device controller, central processing unit (CPU), microcontroller, or system on a chip (SoC).

81. The system for processing user input according to claim 72, wherein high-latency subsystem includes state information reflecting at least one state of the high-latency subsystem, and the low-latency subsystem's response is dependent upon the state information.

82. The system for processing user input according to claim 72, wherein the low-latency subsystem comprises user interface element logic.

83. The system for processing user input according to claim 82, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the low-latency subsystem is adapted to perform hit testing based on information in the UI elements data.

84. The system for processing user input according to claim 72, wherein the low-latency subsystem is adapted to delete one or more of the signals from the stream, preventing such deleted signals from being part of the at least a portion of the stream of signals corresponding to at least some of the received data that are received by the high-latency subsystem.

85. The system for processing user input according to claim 72, wherein the at least a portion of the stream of signals corresponding to the high-latency data differ from the at least a portion of signals corresponding to the low-latency data.
86. The system for processing user input according to claim 72, wherein the low-latency subsystem outputs the generated low-latency data for use by the display within 5 ms of receiving a corresponding emitted signal.
87. The system for processing user input according to claim 72, further comprising an additional output device, and wherein in response to one or more signals in the at least a portion of the stream of signals, the low-latency subsystem generates additional output data for use by the additional output device.
88. The system for processing user input according to claim 87, wherein the additional output device and additional output data are selected from the group comprising: an audio output device and audio data, and a haptic feedback device and haptic feedback data.
89. The system for processing user input according to claim 72, wherein a difference between at least some of the low-latency data that can affect the visualization of the user interface and corresponding high-latency data that can affect the visualization of the user interface is perceptible to a user.
90. The system for processing user input according to claim 72, wherein at least some of the low-latency data that can affect the visualization of the user interface and at least some of the corresponding high-latency data that can affect the visualization of the user interface is blended in a manner that is not noticeable by a user.
91. The system for processing user input according to claim 72, configured to provide a low-latency system response in a form that is dictated by application logic.
92. The system for processing user input according to claim 91, wherein the form of low-latency system response comprises a response or set of responses selected from the group consisting of: an auditory response, a visual response, and a haptic response.
93. The system for processing user input according to claim 72, configured to provide a low-latency system response in a form that is dictated by system logic.

94. The system for processing user input according to claim 72, wherein the user input device comprises a direct-touch input device employing at least one of the technologies selected from the group consisting of: resistive, direct illumination, frustrated total-internal reflection, diffuse illumination, projected capacitive, capacitive coupling, acoustic wave, and sensor-in-pixel.

95. The system for processing user input according to claim 73, wherein the low-latency subsystem comprises at least one pre-rendered visual, and wherein the low-latency data corresponds to one or more of the at least one pre-rendered visual.

96. The system for processing user input according to claim 95, wherein the high-latency data and the low-latency data have unequal fidelity.

97. The system for processing user input according to claim 95, wherein the high-latency subsystem includes state information reflecting at least one state of the high-latency subsystem, and the low-latency subsystem's response is dependent upon the state information.

98. The system for processing user input according to claim 95, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the low-latency subsystem is adapted to perform hit testing based on information in the UI elements data.

99. The system for processing user input according to claim 95, wherein the emitted signals are sent in a stream to the high- and low-latency subsystems, and the low-latency subsystem is adapted to delete one or more of the emitted signals from the stream, preventing such deleted signals from being part of the at least some of the emitted signals corresponding to the received data that are received by the high-latency subsystem.

100. The system for processing user input according to claim 95, further comprising an additional output device, and wherein in response to the at least some of the emitted signals, the low-latency subsystem generates additional output data for use by the additional output device.

101. The system for processing user input according to claim 100, wherein the additional output device and additional output data are selected from the group comprising: a visual output

device and visual data, an audio output device and audio data, and a haptic feedback device and haptic feedback data.

102. The system for processing user input according to claim 72, wherein the user input device is configured to receive user input in at least one form selected from the group consisting of: touch, multi-touch, pen, eye movement, eye tracking, in-air gesture, audio, mouse, keyboard and varying pressure.

103. A system for processing user input, comprising:

input device;

input processing unit;

high-latency subsystem comprising software running in a software stack;

low-latency subsystem;

input processing unit software adapted to generate signals in response to user inputs;

and,

output device;

wherein the low-latency subsystem processes the signals with low latency relative to the high-latency subsystem and the high-latency subsystem processes the user input events with high latency relative to the low-latency subsystem;

wherein the low-latency subsystem receives the signals and generates at least one low-latency output with low latency relative to the high-latency subsystem and the high-latency subsystem processes at least some of the signals and generates at least one high-latency output with high latency relative to the low-latency subsystem;

wherein the input device, the input processing unit, the high-latency subsystem, the low-latency processing subsystem, the input processing unit software and the output device being arranged such that:

the low-latency processing subsystem operates independently of and parallel to the high-latency processing subsystem; and

at least some of the user input signals are processed by both the low-latency subsystem and the high-latency subsystem, the low-latency subsystem outputting to the output device a response to a given user input signal with low-latency and the high-latency subsystem outputting to the output device a response to the given user input signal with high-latency.

104. The system for processing user input claimed in claim 103, wherein low-latency data generated by the low-latency subsystem is generated by associating data corresponding to a defined response to one or more of the at least some of the signals in the at least a portion of the stream of signals received by the low-latency subsystem.

105. The system for processing user input claimed in claim 103, wherein high-latency data generated by the high-latency subsystem is generated by rendering.

106. The system for processing user input according to claim 103, wherein high-latency data generated by the high-latency subsystem and low-latency data generated by the low-latency subsystem have substantially equal fidelity.

107. The system for processing user input according to claim 103, wherein high-latency data generated by the high-latency subsystem and low-latency data generated by the low-latency subsystem have unequal fidelity.

108. The system for processing user input according to claim 103, wherein the high-latency subsystem generates high-latency data and the low-latency subsystem generates low-latency data, and wherein at least some of the high-latency data is of higher fidelity than the corresponding low-latency data.

109. The system for processing user input according to claim 103, wherein the low-latency subsystem is implemented, at least in part, in at least one selected from the group of field-programmable gate array (FPGA), application-specific integrated circuit (ASIC), a microcontroller, a graphics processing unit (GPU), or a system on a chip (SoC).

110. The system for processing user input according to claim 103, wherein the low-latency subsystem is implemented in logic integrated into an existing component of a computing system.

111. The system for processing user input according to claim 110, wherein the existing component of the computing system comprises at least one selected from the group of a graphics

processing unit (GPU), input device controller, central processing unit (CPU), microcontroller, or system on a chip (SoC).

112. The system for processing user input according to claim 103, wherein the high-latency subsystem includes state information reflecting at least one state of the high-latency subsystem, and the low-latency subsystem's response is dependent upon the state information.

113. The system for processing user input according to claim 103, wherein the low-latency subsystem comprises user interface element logic.

114. The system for processing user input according to claim 113, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the low-latency subsystem is adapted to perform hit testing based on information in the UI elements data.

115. The system for processing user input according to claim 103, wherein the low-latency subsystem is adapted to delete one or more of the signals from the stream, preventing such deleted signals from being part of the at least a portion of the stream of signals corresponding to at least some of the received data that are received by the high-latency subsystem.

116. The system for processing user input according to claim 103, wherein the at least a portion of the stream of signals corresponding to the high-latency data differ from the at least a portion of signals corresponding to the low-latency data.

117. The system for processing user input according to claim 103, wherein the low-latency subsystem outputs the generated low-latency data for use by the display within 5 ms of receiving a corresponding emitted signal.

118. The system for processing user input according to claim 103, further comprising an additional output device, and wherein in response to one or more signals in the at least a portion of the stream of signals, the low-latency subsystem generates additional output data for use by the additional output device.

119. The system for processing user input according to claim 103, wherein the additional output device and additional output data are selected from the group comprising: an audio output device and audio data, and a haptic feedback device and haptic feedback data.

120. The system for processing user input according to claim 103, wherein a difference between at least some of the low-latency data that can affect the visualization of the user interface and corresponding high-latency data that can affect the visualization of the user interface is perceptible to a user.

121. The system for processing user input according to claim 103, wherein at least some of the low-latency data that can affect the visualization of the user interface and at least some of the corresponding high-latency data that can affect the visualization of the user interface is blended in a manner that is not noticeable by a user.

122. The system for processing user input according to claim 103, configured to provide a low-latency system response in a form that is dictated by application logic.

123. The system for processing user input according to claim 122, wherein the form of low-latency system response comprises a response or set of responses selected from the group consisting of: an auditory response, a visual response, and a haptic response.

124. The system for processing user input according to claim 103, configured to provide a low-latency system response in a form that is dictated by system logic.

125. The system for processing user input according to claim 103, wherein the user input device comprises a direct-touch input device employing at least one of the technologies selected from the group consisting of: resistive, direct illumination, frustrated total-internal reflection, diffuse illumination, projected capacitive, capacitive coupling, acoustic wave, and sensor-in-pixel.

126. The system for processing user input according to claim 104, wherein the low-latency subsystem comprises at least one pre-rendered visual, and wherein the low-latency data corresponds to one or more of the at least one pre-rendered visual.

127. The system for processing user input according to claim 126, wherein the high-latency data and the low-latency data have unequal fidelity.

128. The system for processing user input according to claim 126, wherein the high-latency subsystem includes state information reflecting at least one state of the high-latency subsystem, and the low-latency subsystem's response is dependent upon the state information.

129. The system for processing user input according to claim 126, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the low-latency subsystem is adapted to perform hit testing based on information in the UI elements data.

130. The system for processing user input according to claim 126, wherein the emitted signals are sent in a stream to the high- and low-latency subsystems, and the low-latency subsystem is adapted to delete one or more of the emitted signals from the stream, preventing such deleted signals from being part of the at least some of the emitted signals corresponding to the received data that are received by the high-latency subsystem.

131. The system for processing user input according to claim 126, further comprising an additional output device, and wherein in response to the at least some of the emitted signals, the low-latency subsystem generates additional output data for use by the additional output device.

132. The system for processing user input according to claim 131, wherein the additional output device and additional output data are selected from the group comprising: a visual output device and visual data, an audio output device and audio data, and a haptic feedback device and haptic feedback data.

133. The system for processing user input according to claim 103, wherein the user input device is configured to receive user input in at least one form selected from the group consisting of: touch, multi-touch, pen, eye movement, eye tracking, in-air gesture, audio, mouse, keyboard and varying pressure.

134. A system for processing user input, comprising:

input subsystem including an input device, the subsystem adapted to output signals in response to a plurality of user inputs to the input device, the signals comprising information concerning the input;

low-latency subsystem adapted to receive the signals and to generate a low-latency response in response to one or more of the signals, and to send at least one of the signals to a high-latency subsystem;

the high-latency subsystem adapted to receive the at least one of the signals, and to generate a high-latency response in response to one or more of the at least one of the signals; and,

output device operatively connected to the low-latency subsystem and the high-latency subsystem, the output device configured to blend the low-latency response and the high latency response;

wherein the low-latency subsystem generates the low-latency response with low latency relative to the high-latency subsystem and the high-latency subsystem generates the high-latency response with high latency relative to the low-latency subsystem.

135. The system for processing user input claimed in claim 134, wherein low-latency data generated by the low-latency subsystem is generated by associating data corresponding to a defined response to one or more of the at least some of the signals in the at least a portion of the stream of signals received by the low-latency subsystem.

136. The system for processing user input claimed in claim 134, wherein high-latency data generated by the high-latency subsystem is generated by rendering.

137. The system for processing user input according to claim 134, wherein high-latency data generated by the high-latency subsystem and low-latency data generated by the low-latency subsystem have substantially equal fidelity.

138. The system for processing user input according to claim 134, wherein high-latency data generated by the high-latency subsystem and low-latency data generated by the low-latency subsystem have unequal fidelity.

139. The system for processing user input according to claim 134, wherein the high-latency subsystem generates high-latency data and the low-latency subsystem generates low-latency data, and wherein at least some of the high-latency data is of higher fidelity than the corresponding low-latency data.

140. The system for processing user input according to claim 134, wherein the low-latency subsystem is implemented, at least in part, in at least one selected from the group of field-programmable gate array (FPGA), application-specific integrated circuit (ASIC), a microcontroller, a graphics processing unit (GPU), or a system on a chip (SoC).

141. The system for processing user input according to claim 134, wherein low-latency subsystem is implemented in logic integrated into an existing component of a computing system.

142. The system for processing user input according to claim 134, wherein the existing component of the computing system comprises at least one selected from the group of a graphics processing unit (GPU), input device controller, central processing unit (CPU), microcontroller, or system on a chip (SoC).

143. The system for processing user input according to claim 134, wherein the high-latency subsystem includes state information reflecting at least one state of the high-latency subsystem, and the low-latency subsystem's response is dependent upon the state information.

144. The system for processing user input according to claim 134, wherein the low-latency subsystem comprises user interface element logic.

145. The system for processing user input according to claim 144, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the low-latency subsystem is adapted to perform hit testing based on information in the UI elements data.

146. The system for processing user input according to claim 134, wherein the low-latency subsystem is adapted to delete one or more of the signals from the stream, preventing such deleted signals from being part of the at least a portion of the stream of signals corresponding to at least some of the received data that are received by the low-latency subsystem.

147. The system for processing user input according to claim 134, wherein the at least a portion of the stream of signals corresponding to the high-latency data differ from the at least a portion of signals corresponding to the low-latency data.

148. The system for processing user input according to claim 134, wherein the low-latency subsystem outputs the generated low-latency data for use by the display within 5 ms of receiving a corresponding emitted signal.

149. The system for processing user input according to claim 134, further comprising an additional output device, and wherein in response to one or more signals in the at least a portion of the stream of signals, the low-latency subsystem generates additional output data for use by the additional output device.

150. The system for processing user input according to claim 149, wherein the additional output device and additional output data are selected from the group comprising: an audio output device and audio data, and a haptic feedback device and haptic feedback data.

151. The system for processing user input according to claim 134, wherein a difference between at least some of the low-latency data that can affect the visualization of the user interface and corresponding high-latency data that can affect the visualization of the user interface is perceptible to a user.

152. The system for processing user input according to claim 134, wherein at least some of the low-latency data that can affect the visualization of the user interface and at least some of the corresponding high-latency data that can affect the visualization of the user interface is blended in a manner that is not noticeable by a user.

153. The system for processing user input according to claim 134, configured to provide a low-latency system response in a form that is dictated by application logic.

154. The system for processing user input according to claim 153, wherein the form of low-latency system response comprises a response or set of responses selected from the group consisting of: an auditory response, a visual response, and a haptic response.

155. The system for processing user input according to claim 134, configured to provide a low-latency system response in a form that is dictated by system logic.

156. The system for processing user input according to claim 134, wherein the user input device comprises a direct-touch input device employing at least one of the technologies selected from the group consisting of: resistive, direct illumination, frustrated total-internal reflection,

diffuse illumination, projected capacitive, capacitive coupling, acoustic wave, and sensor-in-pixel.

157. The system for processing user input according to claim 135, wherein the low-latency subsystem comprises at least one pre-rendered visual, and wherein the low-latency data corresponds to one or more of the at least one pre-rendered visual.

158. The system for processing user input according to claim 157, wherein the high-latency data and the low-latency data have unequal fidelity.

159. The system for processing user input according to claim 157, wherein the high-latency subsystem includes state information reflecting at least one state of the high-latency subsystem, and the low-latency subsystem's response is dependent upon the state information.

160. The system for processing user input according to claim 157, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the low-latency subsystem is adapted to perform hit testing based on information in the UI elements data.

161. The system for processing user input according to claim 157, wherein the emitted signals are sent in a stream to the high- and low-latency subsystems, and the low-latency subsystem is adapted to delete one or more of the emitted signals from the stream, preventing such deleted signals from being part of the at least some of the emitted signals corresponding to the received data that are received by the high-latency subsystem.

162. The system for processing user input according to claim 157, further comprising an additional output device, and wherein in response to the at least some of the emitted signals, the low-latency subsystem generates additional output data for use by the additional output device.

163. The system for processing user input according to claim 162, wherein the additional output device and additional output data are selected from the group comprising: a visual output device and visual data, an audio output device and audio data, and a haptic feedback device and haptic feedback data.

164. The system for processing user input according to claim 134, wherein the user input device is configured to receive user input in at least one form selected from the group consisting of: touch, multi-touch, pen, eye movement, eye tracking, in-air gesture, audio, mouse, keyboard and varying pressure.

165. A system for processing user input with low latency, comprising:

an input device;

an input processing unit;

a high-latency subsystem;

a low-latency subsystem;

input processing unit software adapted to generate signals in response to user inputs;

and,

output device;

wherein the low-latency subsystem processes a plurality of signals with low latency relative to the high-latency subsystem and the high-latency subsystem processes a plurality of the signals with high latency relative to the low-latency subsystem;

wherein the input device, the input processing unit, the high-latency subsystem, the low-latency processing subsystem, the input processing unit software and the output device being arranged such that:

at least some of the signals are processed in parallel by said low-latency subsystem and said high-latency subsystem, the low-latency subsystem creating a programmable response for output on the output device with low-latency and the high-latency subsystem creating a response for output on the output device with high-latency; and

the output device outputting the response from the low-latency subsystem and the response from the high-latency subsystem when the responses are output thereto.

166. The system for processing user input claimed in claim 165, wherein low-latency data generated by the low-latency subsystem is generated by associating data corresponding to a

defined response to one or more of the at least some of the signals in the at least a portion of the stream of signals received by the low-latency subsystem.

167. The system for processing user input claimed in claim 165, wherein high-latency data generated by the high-latency subsystem is generated by rendering.

168. The system for processing user input according to claim 165, wherein high-latency data generated by the high-latency subsystem and low-latency data generated by the low-latency subsystem have substantially equal fidelity.

169. The system for processing user input according to claim 165, wherein high-latency data generated by the high-latency subsystem and low-latency data generated by the low-latency subsystem have unequal fidelity.

170. The system for processing user input according to claim 165, wherein the high-latency subsystem generates high-latency data and the low-latency subsystem generates low-latency data, and wherein at least some of the high-latency data is of higher fidelity than the corresponding low-latency data.

171. The system for processing user input according to claim 165, wherein the low-latency subsystem is implemented, at least in part, in at least one selected from the group of field-programmable gate array (FPGA), application-specific integrated circuit (ASIC), a microcontroller, a graphics processing unit (GPU), or a system on a chip (SoC).

172. The system for processing user input according to claim 165, wherein the low-latency subsystem is implemented in logic integrated into an existing component of a computing system.

173. The system for processing user input according to claim 165, wherein the existing component of the computing system comprises at least one selected from the group of a graphics processing unit (GPU), input device controller, central processing unit (CPU), microcontroller, or system on a chip (SoC).

174. The system for processing user input according to claim 165, wherein the high-latency subsystem includes state information reflecting at least one state of the high-latency subsystem, and the low-latency subsystem is dependent upon the state information.

175. The system for processing user input according to claim 165, wherein the low-latency subsystem comprises user interface element logic.

176. The system for processing user input according to claim 175, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the low-latency subsystem is adapted to perform hit testing based on information in the UI elements data.

177. The system for processing user input according to claim 165, wherein the low-latency subsystem is adapted to delete one or more of the signals from the stream, preventing such deleted signals from being part of the at least a portion of the stream of signals corresponding to at least some of the received data that are received by the high-latency subsystem.

178. The system for processing user input according to claim 165, wherein the at least a portion of the stream of signals corresponding to the high-latency data differ from the at least a portion of signals corresponding to the low-latency data.

179. The system for processing user input according to claim 165, wherein the low-latency subsystem outputs the generated low-latency data for use by the display within 5 ms of receiving a corresponding emitted signal.

180. The system for processing user input according to claim 165, further comprising an additional output device, and wherein in response to one or more signals in the at least a portion of the stream of signals, the low-latency subsystem generates additional output data for use by the additional output device.

181. The system for processing user input according to claim 180, wherein the additional output device and additional output data are selected from the group comprising: an audio output device and audio data, and a haptic feedback device and haptic feedback data.

182. The system for processing user input according to claim 165, wherein a difference between at least some of the low-latency data that can affect the visualization of the user interface and corresponding high-latency data that can affect the visualization of the user interface is perceptible to a user.

183. The system for processing user input according to claim 165, wherein at least some of the low-latency data that can affect the visualization of the user interface and at least some of the corresponding high-latency data that can affect the visualization of the user interface is blended in a manner that is not noticeable by a user.

184. The system for processing user input according to claim 165, configured to provide a low-latency system response in a form that is dictated by application logic.

185. The system for processing user input according to claim 184, wherein the form of low-latency system response comprises a response or set of responses selected from the group consisting of: an auditory response, a visual response, and a haptic response.

186. The system for processing user input according to claim 165, configured to provide a low-latency system response in a form that is dictated by system logic.

187. The system for processing user input according to claim 165, wherein the user input device comprises a direct-touch input device employing at least one of the technologies selected from the group consisting of: resistive, direct illumination, frustrated total-internal reflection, diffuse illumination, projected capacitive, capacitive coupling, acoustic wave, and sensor-in-pixel.

188. The system for processing user input according to claim 165, wherein the low-latency subsystem comprises at least one pre-rendered visual, and wherein the low-latency data corresponds to one or more of the at least one pre-rendered visual.

189. The system for processing user input according to claim 188, wherein the high-latency data and the low-latency data have unequal fidelity.

190. The system for processing user input according to claim 188, wherein the high-latency subsystem includes state information reflecting at least one state of the high-latency subsystem, and the low-latency subsystem's response is dependent upon the state information.

191. The system for processing user input according to claim 188, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the low-latency subsystem is adapted to perform hit testing based on information in the UI elements data.

192. The system for processing user input according to claim 188, wherein the emitted signals are sent in a stream to the high- and low-latency subsystems, and the low-latency subsystem is adapted to delete one or more of the emitted signals from the stream, preventing such deleted signals from being part of the at least some of the emitted signals corresponding to the received data that are received by the high-latency subsystem.

193. The system for processing user input according to claim 188, further comprising an additional output device, and wherein in response to the at least some of the emitted signals, the low-latency subsystem generates additional output data for use by the additional output device.

194. The system for processing user input according to claim 193, wherein the additional output device and additional output data are selected from the group comprising: a visual output device and visual data, an audio output device and audio data, and a haptic feedback device and haptic feedback data.

195. The system for processing user input according to claim 165, wherein the user input device is configured to receive user input in at least one form selected from the group consisting of: touch, multi-touch, pen, eye movement, eye tracking, in-air gesture, audio, mouse, keyboard and varying pressure.

196. A system for processing user input with low latency, comprising:

an input device;

output device;

an input processing unit;

input processing unit software adapted to generate signals in response to user inputs;

a high-latency response subsystem adapted to create a high-latency response to at least some of the signals;

a low-latency response subsystem implemented at least partially in hardware, the low-latency response subsystem adapted to create a low-latency response to at least some of the signals, the low-latency response subsystem comprising one or more parameters affecting the low-latency response;

wherein the low-latency response is not of higher latency than the high-latency response, and the high-latency response is not of lower latency than the low-latency response with respect to common signals;

wherein the input device, output device, the input processing unit, input processing unit software, the high-latency response subsystem and the low-latency response subsystem are arranged such that:

the user input signals are processed in parallel by said low-latency subsystem and said high-latency subsystem;

the output device outputs the low-latency response and the high-latency response; and

wherein application software can alter the one or more parameters affecting the low-latency response.

197. The system for processing user input claimed in claim 196, wherein low-latency data generated by the low-latency subsystem is generated by associating data corresponding to a defined response to one or more of the at least some of the signals in the at least a portion of the stream of signals received by the low-latency subsystem.

198. The system for processing user input claimed in claim 196, wherein high-latency data generated by the high-latency subsystem is generated by rendering.

199. The system for processing user input according to claim 196, wherein high-latency data generated by the high-latency subsystem and low-latency data generated by the low-latency subsystem have substantially equal fidelity.

200. The system for processing user input according to claim 196, wherein high-latency data generated by the high-latency subsystem and low-latency data generated by the low-latency subsystem have unequal fidelity.

201. The system for processing user input according to claim 196, wherein the high-latency subsystem generates high-latency data and the low-latency subsystem generates low-latency data, and wherein at least some of the high-latency data is of higher fidelity than the corresponding low-latency data.

202. The system for processing user input according to claim 196, wherein the low-latency subsystem is implemented, at least in part, in at least one selected from the group of field-programmable gate array (FPGA), application-specific integrated circuit (ASIC), a microcontroller, a graphics processing unit (GPU), or a system on a chip (SoC).

203. The system for processing user input according to claim 196, wherein the low-latency subsystem is implemented in logic integrated into an existing component of a computing system.

204. The system for processing user input according to claim 196, wherein the existing component of the computing system comprises at least one selected from the group of a graphics processing unit (GPU), input device controller, central processing unit (CPU), microcontroller, or system on a chip (SoC).

205. The system for processing user input according to claim 196, wherein the high-latency subsystem includes state information reflecting at least one state of the high-latency subsystem, and the low-latency subsystem's response is dependent upon the state information.

206. The system for processing user input according to claim 196, wherein the low-latency subsystem comprises user interface element logic.

207. The system for processing user input according to claim 206, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the low-latency subsystem is adapted to perform hit testing based on information in the UI elements data.

208. The system for processing user input according to claim 196, wherein the low-latency subsystem is adapted to delete one or more of the signals from the stream, preventing such deleted signals from being part of the at least a portion of the stream of signals corresponding to at least some of the received data that are received by the high-latency subsystem.

209. The system for processing user input according to claim 196, wherein the at least a portion of the stream of signals corresponding to the high-latency data differ from the at least a portion of signals corresponding to the low-latency data.
210. The system for processing user input according to claim 196, wherein the low-latency subsystem outputs the generated low-latency data for use by the display within 5 ms of receiving a corresponding emitted signal.
211. The system for processing user input according to claim 196, further comprising an additional output device, and wherein in response to one or more signals in the at least a portion of the stream of signals, the low-latency subsystem generates additional output data for use by the additional output device.
212. The system for processing user input according to claim 211, wherein the additional output device and additional output data are selected from the group comprising: an audio output device and audio data, and a haptic feedback device and haptic feedback data.
213. The system for processing user input according to claim 196, wherein a difference between at least some of the low-latency data that can affect the visualization of the user interface and corresponding high-latency data that can affect the visualization of the user interface is perceptible to a user.
214. The system for processing user input according to claim 196, wherein at least some of the low-latency data that can affect the visualization of the user interface and at least some of the corresponding high-latency data that can affect the visualization of the user interface is blended in a manner that is not noticeable by a user.
215. The system for processing user input according to claim 196, configured to provide a low-latency system response in a form that is dictated by application logic.
216. The system for processing user input according to claim 215, wherein the form of low-latency system response comprises a response or set of responses selected from the group consisting of: an auditory response, a visual response, and a haptic response.
217. The system for processing user input according to claim 196, configured to provide a low-latency system response in a form that is dictated by system logic.

218. The system for processing user input according to claim 196, wherein the user input device comprises a direct-touch input device employing at least one of the technologies selected from the group consisting of: resistive, direct illumination, frustrated total-internal reflection, diffuse illumination, projected capacitive, capacitive coupling, acoustic wave, and sensor-in-pixel.

219. The system for processing user input according to claim 196, wherein the low-latency subsystem comprises at least one pre-rendered visual, and wherein the low-latency data corresponds to one or more of the at least one pre-rendered visual.

220. The system for processing user input according to claim 219, wherein the high-latency data and the low-latency data have unequal fidelity.

221. The system for processing user input according to claim 219, wherein the high-latency subsystem includes state information reflecting at least one state of the high-latency subsystem, and the low-latency subsystem's response is dependent upon the state information.

222. The system for processing user input according to claim 219, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the low-latency subsystem is adapted to perform hit testing based on information in the UI elements data.

223. The system for processing user input according to claim 219, wherein the emitted signals are sent in a stream to the high- and low-latency subsystems, and the low-latency subsystem is adapted to delete one or more of the emitted signals from the stream, preventing such deleted signals from being part of the at least some of the emitted signals corresponding to the received data that are received by the high-latency subsystem.

224. The system for processing user input according to claim 219, further comprising an additional output device, and wherein in response to the at least some of the emitted signals, the low-latency subsystem generates additional output data for use by the additional output device.

225. The system for processing user input according to claim 224, wherein the additional output device and additional output data are selected from the group comprising: a visual output

device and visual data, an audio output device and audio data, and a haptic feedback device and haptic feedback data.

226. The system for processing user input according to claim 196, wherein the user input device is configured to receive user input in at least one form selected from the group consisting of: touch, multi-touch, pen, eye movement, eye tracking, in-air gesture, audio, mouse, keyboard and varying pressure.

What is claimed is:

1. A system for processing user input with low latency, comprising:
 - an input device;
 - an input processing unit;
 - a high-latency subsystem;
 - a low-latency subsystem;
 - input processing unit software adapted to generate signals in response to user inputs; and,
 - output device;

wherein the low-latency subsystem processes a plurality of signals with low latency relative to the high-latency subsystem and the high-latency subsystem processes a plurality of the signals with high latency relative to the low-latency subsystem;

wherein the input device, the input processing unit, the high-latency subsystem, the low-latency processing subsystem, the input processing unit software and the output device being arranged such that:

at least some of the signals are processed in parallel by said low-latency subsystem and said high-latency subsystem, the low-latency subsystem creating a programmable response for output on the output device with low-latency and the high-latency subsystem creating a response for output on the output device with high-latency;

and

the output device outputting the response from the low-latency subsystem and the response from the high-latency subsystem when the responses are output thereto.
2. The system for processing user input claimed in claim 1, wherein low-latency data generated by the low-latency subsystem is generated by associating data corresponding to a defined response to one or more of the at least some of the signals in the at least a portion of the stream of signals received by the low-latency subsystem.

3. The system for processing user input according to claim 1, wherein high-latency data generated by the high-latency subsystem and low-latency data generated by the low-latency subsystem have substantially equal fidelity.
4. The system for processing user input according to claim 1, wherein high-latency data generated by the high-latency subsystem and low-latency data generated by the low-latency subsystem have unequal fidelity.
5. The system for processing user input according to claim 1, wherein the low-latency subsystem is implemented, at least in part, in at least one selected from the group of field-programmable gate array (FPGA), application-specific integrated circuit (ASIC), a microcontroller, a graphics processing unit (GPU), or a system on a chip (SoC).
6. The system for processing user input according to claim 1, wherein the low-latency subsystem is implemented in logic integrated into an existing component of a computing system.
7. The system for processing user input according to claim 6, wherein the existing component of the computing system comprises at least one selected from the group of a graphics processing unit (GPU), input device controller, central processing unit (CPU), microcontroller, or system on a chip (SoC).
8. The system for processing user input according to claim 1, wherein the high-latency subsystem includes state information reflecting at least one state of the high-latency subsystem, and the low-latency subsystem is dependent upon the state information.
9. The system for processing user input according to claim 8, wherein data passed from the first graphical processing and output system to the second graphical processing and output system is comprised of one or more pieces of data describing one or more of the graphical elements in the user interface, and wherein the data passed is selected from the group consisting of: the size, the location, the appearance, alternative appearances, response to user input, and the type of graphical elements in the user interface.

10. The system for processing user input according to claim 8, wherein data passed from the first graphical processing and output system to the second graphical processing and output system describes appearance or behavior of a button, a slider, a draggable or resizable GUI element, a scrollable list, a spinner, a drop-down list, a menu, a toolbar, a combo box, a movable icon, a fixed icon, a tree view, a grid view, a scrollbar, a scrollable window, or a user interface element.

11. The system for processing user input according to claim 1, wherein the low-latency subsystem comprises user interface element logic.

12. The system for processing user input according to claim 11, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the low-latency subsystem is adapted to perform hit testing based on information in the UI elements data.

13. The system for processing user input according to claim 1, wherein the low-latency subsystem is adapted to delete one or more of the signals from the stream, preventing such deleted signals from being part of the at least a portion of the stream of signals corresponding to at least some of the received data that are received by the high-latency subsystem.

14. The system for processing user input according to claim 13, wherein the input processing system performs decimation on user input signals before they are received by one or both of the first or second graphical processing and output systems.

15. The system for processing user input according to claim 1, wherein the at least a portion of the stream of signals corresponding to the high-latency data differ from the at least a portion of signals corresponding to the low-latency data.

16. The system for processing user input according to claim 1, wherein the at least some of the emitted signals corresponding to the high-latency data for use by the display differ from the at least some of the emitted signals corresponding to the low-latency data.

17. The system for processing user input according to claim 1, wherein user input signals received by the first and second graphical processing and output systems have been differentially processed.

18. The system for processing user input according to claim 1, further comprising an additional output device, and wherein in response to one or more signals in the at least a portion of the stream of signals, the low-latency subsystem generates additional output data for use by the additional output device.

19. The system for processing user input according to claim 18, wherein the additional output device and additional output data are selected from the group comprising: an audio output device and audio data, and a haptic feedback device and haptic feedback data.

20. The system for processing user input according to claim 1, wherein at least some of the low-latency data that can affect the visualization of the user interface and at least some of the corresponding high-latency data that can affect the visualization of the user interface is blended in a manner that is not noticeable by a user.

21. The system for processing user input according to claim 1, configured to provide a low-latency system response in a form that is dictated by application logic.

22. The system for processing user input according to claim 1, configured to provide a low-latency system response in a form that is dictated by system logic.

23. The system for processing user input according to claim 1, wherein the form of low-latency system response comprises a response or set of responses selected from the group consisting of: an auditory response, a visual response, and a haptic response.

24. The system for processing user input according to claim 1, wherein the user input device comprises a direct-touch input device employing at least one of the technologies selected from the group consisting of: resistive, direct illumination, frustrated total-internal reflection, diffuse illumination, projected capacitive, capacitive coupling, acoustic wave, and sensor-in-pixel.
25. The system for processing user input according to claim 2, wherein the low-latency subsystem comprises at least one pre-rendered visual, and wherein the low-latency data corresponds to one or more of the at least one pre-rendered visual.
26. The system for processing user input according to claim 25, wherein the high-latency data and the low-latency data have unequal fidelity.
27. The system for processing user input according to claim 25, wherein the high-latency subsystem includes state information reflecting at least one state of the high-latency subsystem, and the low-latency subsystem's response is dependent upon the state information.
28. The system for processing user input according to claim 27, wherein data passed from the first graphical processing and output system to the second graphical processing and output system is comprised of one or more pieces of data describing one or more of the graphical elements in the user interface, and wherein the data passed is selected from the group consisting of: the size, the location, the appearance, alternative appearances, response to user input, and the type of graphical elements in the user interface.
29. The system for processing user input according to claim 27, wherein data passed from the first graphical processing and output system to the second graphical processing and output system describes appearance or behavior of a button, a slider, a draggable or resizable GUI element, a scrollable list, a spinner, a drop-down list, a menu, a toolbar, a combo box, a movable icon, a fixed icon, a tree view, a grid view, a scroll bar, a scrollable window, or a user interface element.

30. The system for processing user input according to claim 25, further comprising:

UI elements data containing data regarding the visual hierarchy and properties of visible UI elements; and

wherein the low-latency subsystem is adapted to perform hit testing based on information in the UI elements data.

31. The system for processing user input according to claim 25, wherein the emitted signals are sent in a stream to the high- and low-latency subsystems, and the low-latency subsystem is adapted to delete one or more of the emitted signals from the stream, preventing such deleted signals from being part of the at least some of the emitted signals corresponding to the received data that are received by the high-latency subsystem.

32. The system for processing user input according to claim 25, further comprising an additional output device, and wherein in response to the at least some of the emitted signals, the low-latency subsystem generates additional output data for use by the additional output device.

33. The system for processing user input according to claim 32, wherein the additional output device and additional output data are selected from the group comprising: a visual output device and visual data, an audio output device and audio data, and a haptic feedback device and haptic feedback data.

34. The system for processing user input according to claim 1, wherein the user input device is configured to receive user input in at least one form selected from the group consisting of: touch, multi-touch, pen, eye movement, eye tracking, in-air gesture, audio, mouse, keyboard, an input from a 2D sensor, an input from a 3D sensor, and varying pressure.

35. The system for processing user input according to claim 1, wherein high- and low-latency visualizations are combined on a single display by at least one of: overlapping two projected images, logically combining the visualizations in a display buffer, overlapping two transparent layers each capable of displaying one of the high- and low-latency visualizations, interlacing pixels of the display such that some are filled from the low-latency visualizations and some are filled from the high-latency visualizations, or interlacing the frames of the display such that some are filled from the low-latency visualizations and some are filled from the high-latency visualizations.

36. The system for processing user input according to claim 1, wherein:

the input device is part of an input subsystem, the subsystem adapted to output signals in response to a plurality of user inputs to the input device, the signals comprising information concerning the input; and,

the low-latency subsystem is adapted to receive the signals and to generate a low-latency response in response to one or more of the signals, and to send at least one of the signals to a high-latency subsystem.