CLAIMS

1. A computing system for implementing a human machine interface (HMI) application, the computing system comprising:

a memory device; and

at least one processor configured to enable the display of a graphical user interface (GUI) comprising one or more graphical elements configured to implement, using the at least one processor, one or more software applications stored on one or more servers, the one or more software applications configured to:

initiate a session of the HMI application by receiving a user input on a user interface running or stored on a hardware device comprising at least one processor;

enable the display of a plurality of non-overlapping zones comprising an action zone and one or more of:

a high-level navigation zone comprising one or more selectable navigation options; and

a system header zone;

enable the display of a plurality of selectable action options in the action zone, the action zone comprising a plurality of non-overlapping subzones, the subzones comprising:

an interface control subzone,

an information subzone, and

a system control subzone;

enable the display of one or more selectable action options, the one or more selectable action options being displayed in predesignated subzones, wherein the plurality of selectable action options is modified based on a selection of the one or more selectable navigation options, wherein the selection is one or more of a user selection and a default selection;

receive, at the hardware device, data representing a user selection of one of the one or more selectable action options; and

control an operating state of one or more physical offshore drilling rig components based on the user selection.

2. The computing system of claim 1, where the HMI application is configured to implement one or more standard operating procedures applicable to one or more offshore drilling rigs.

3. The computing system of claim 2, the HMI application further configured to:

receive, at the hardware device, data representing one or more modifications to the one or more standard operating procedures;

apply the one or more modifications to the one or more standard operating procedures to create one or more modified standard operating procedures; and

apply the one or more modified standard operating procedures to the one or more offshore drilling rigs.

4. The computing system of claim 1, the one or more selectable navigation options comprising one or more of:

a blowout preventer (BOP) stack control option;

a diagnostics option;

a testing option;

a settings option;

an alarms option;

a diverter option;

a surface system option;

an electronic riser angle option; and

an emergency disconnect option.

5. The computing system of claim 4, the one or more software applications being further configured to, after receiving a user selection of the BOP stack control option:

enable the display of a layout diagram comprising one or more selectable components in the information subzone, the layout diagram representing a current stack arrangement of the one or more physical offshore drilling rig components; and

enable the display of one or more control options in the interface control subzone, the one or more control options comprising one or more of: one or more control procedures, and one or more destructive function control modes.

6. The computing system of claim 5, the one or more software applications being further configured to:

enable the display of one or more visual status displays in the system control subzone; and

after receiving a user selection of one of the selectable components or control options, enable the display of one or more function control options in the system control subzone, the one or more function control options corresponding to the user selection of one of the selectable components or control options.

7. The computing system of claim 5, the one or more software applications being further configured to:

enable the display of a flowpath within the layout diagram;

enable the display of one or more colors for the flowpath, the one or more highlighted colors corresponding to one or more predicted flowpath states of the flowpath, wherein the one or more predicted flowpath states comprise:

a predicted fluid flow state;

a predicted fluid non-flow state; and/or

a predicted fluid pressure buildup state; and

after receiving a user selection of one of the selectable components or control options, enable the display of one or more function control options in the system control subzone, the one or more function control options corresponding to the user selection of one of the selectable components or control options.

8. The computing system of claim 5, the one or more software applications being further configured to:

receive a user input activating one or more destructive function control modes;

receive a user selection of one or more destructive functions;

enable the display of a destructive function confirmation option; and

upon receipt of a user selection of the destructive function confirmation option, perform one or more actions on one or more physical rig components corresponding to the selected one or more destructive functions.

9. The computing system of claim 5, the one or more software applications being further configured to, after receipt of a user selection of one of the selectable components, control options, or destructive function confirmation option, perform an audible feedback function, the audible feedback function comprising providing an audible confirmation of the user selection before a function corresponding to the user selection is initiated.

10. The computing system of claim 8, where the one or more destructive functions comprise one or more of:

a pipe cutting action; and

a BOP disconnect action.

11. The computing system of claim 4, the one or more software applications being further configured to, after receiving a user selection of the settings option:

enable the display of a drag-and-drop interface comprising one or more component icons located in the interface control subzone, the component icons representing one or more physical rig components; and

enable the display of metadata, the metadata describing the one or more physical rig components.

12. The computing system of claim 11, the one or more software applications being further configured to, after receiving a user selection of the at least one component operation option:

receive a user selection of the one or more component icons;

enable a user to drag the selected one or more component icons onto a layout diagram located in the information subzone, the layout diagram representing a current stack arrangement of the one or more physical rig components; and

upon receipt of the selected one or more component icons onto the layout diagram, modify the layout diagram; and

control a movement operation of the one or more physical rig components into a modified current stack arrangement to match the one or more component icons comprising the modified layout diagram.

13. The computing system of claim 4, the one or more software applications being further configured to, after receiving a user selection of the diagnostics option:

enable the display of one or more system diagnostic options in the interface control subzone, the one or more system diagnostic options comprising one or more of:

a component diagnostic option,

a function diagnostic option, and

an event diagnostic option; and

enable the display of one or more control options in the system control subzone, the one or more control options corresponding to the user selection of one of the one or more system diagnostic options.

14. The computing system of claim 13, the one or more software applications further configured to, after receiving a user selection of the event diagnostic option:

enable a display of an event timeline in the information subzone, the event timeline comprising a linear display of one or more events corresponding to one or more events logged by the HMI application and showing a causal relationship between the one or more events and one or more user actions;

enable a display of an event log in the information subzone, the event log comprising a list of the one or more logged events.

15. The computing system of claim 13, the one or more software applications further configured to:

enable a display of a component timeline in the information subzone, the component timeline comprising a linear display of one or more component statuses corresponding to one or more component status events logged by the HMI application; and

enable a display of a component log in the information subzone, the component log comprising a list of the one or more logged component status events.

16. The computing system of claim 13, the one or more software applications further configured to:

enable a display of a pressure and temperature timeline in the information subzone, the pressure and temperature timeline comprising a linear display of one or more pressure and temperature statuses corresponding to one or more fluid flow status events logged by the HMI application; and

enable a display of a pressure and temperature log in the information subzone, the pressure and temperature log comprising a list of the one or more logged fluid flow status events.

17. The computing system of claim 4, the one or more software applications being further configured to, after receiving a user selection of the testing option:

enable the display of one or more system testing type options in the interface control subzone, the one or more system testing type options comprising one or more of:

a function testing option, and

a pressure testing option;

enable the display of one or more test information fields in the information subzone, the one or more test information fields comprising one or more of:

test status information, and

test history information; and

after receiving a user selection of one of the one or more system testing type options, enable the display of one or more selectable test options.

18. The computing system of claim 17, the one or more software applications being further configured to, after receiving a user selection of one or more of the one or more selectable test options:

perform one or more tests corresponding to the selected one or more selectable test options; and

delay performing one or more tests corresponding to the unselected one or more selectable test options.

19. The computing system of claim 1, where the GUI comprises a single active interface window or a plurality of active interface windows and where the GUI displays:

the action zone in a central portion of the GUI;

the interface control subzone on a right side portion of the action zone;

the information subzone in a central portion of the action zone; and/or

the system control subzone on a left side portion of the action zone.

20. The computing system of claim 1, the HMI application further configured to:

enable a display of a color palette comprising a red color and a green color;

display a red color to indicate one or more abnormal component states; and

display a green color to indicate one or more of an error-free operating status and a physical rig configuration having all rig components correctly configured for a particular rig operation.

21. The computing system of claim 14, where the one or more events comprise one or more of a component failure and an alarm.

22. The computing system of claim 1, where the GUI comprises a touch screen interface configured to enable a user to select one of the one or more selectable navigation options and one of the one or more selectable action options by touching an icon corresponding to the one or more selectable navigation options or the one or more selectable action options.

23. The computing system of claim 4, the one or more software applications being further configured to, after receiving a user selection of the diagnostics option, enable the display of one or more system diagnostic options comprising one or more of:

a regulatory compliance option;

an operational status option; and

an event log option.

24. The computing system of claim 23, the one or more software applications being further configured to, after receiving a user selection of the regulatory compliance option, enable the display of a diagnostic decision path tree comprising one or more levels, one or more nodes, and one or more pathways connecting the one or more nodes, each of the one or more nodes comprising an icon representing a current diagnostic state of one or more rig components.

25. The computing system of claim 24, where the one or more icons comprises a first symbol to indicate one or more abnormal component states and a second symbol to indicate one or more error-free component states.

26. The computing system of claim 24, where the one or more levels correspond to one or more rig components and the one or more nodes correspond to one or more component functions.

27. The computing system of claim 26, where the one or more rig components comprise:

an integrated manifold assembly;

a regulator assembly;

a common rail; and/or

a rigid conduit and hot line valve package.

28. The computing system of claim 26, the one or more software applications being further configured to:

receive a user selection of a level from the one or more levels;

enable the display of one or more diagnostic details corresponding to the selected level; and

enable the display of one or more functions, each of the one or more functions corresponding to the one or more rig components represented by the selected level.

29. A method of implementing a human machine interface (HMI) application, the method comprising:

initiating a session of the HMI application by receiving a user input on a user interface running or stored on a hardware device comprising at least one processor;

enabling the display of a plurality of non-overlapping zones comprising an action zone and one or more of:

a high-level navigation zone comprising one or more selectable navigation options; and

a system header zone;

enabling the display of a plurality of selectable action options in the action zone, the action zone comprising a plurality of non-overlapping subzones, the subzones comprising:

an interface control subzone,

an information subzone, and

a system control subzone;

enabling the display of one or more selectable action options, the one or more selectable action options being displayed in predesignated subzones, wherein the plurality of selectable action options is modified based on a selection of the one or more selectable navigation options, wherein the selection is one or more of a user selection and a default selection; and

receiving, at the hardware device, data representing a user selection of one of the one or more selectable action options; and

controlling an operating state of one or more physical offshore drilling rig components based on the user selection.

30. The method of claim 29, further comprising implementing one or more standard operating procedures applicable to one or more offshore drilling rigs.

31. The method of claim 30, further comprising:

receiving, at the hardware device, data representing one or more modifications to the one or more standard operating procedures;

applying the one or more modifications to the one or more standard operating procedures to create one or more modified standard operating procedures; and

applying the one or more modified standard operating procedures to the one or more offshore drilling rigs.

32. The method of claim 29, the one or more selectable navigation options comprising one or more of:

a blowout preventer (BOP) stack control option;

a diagnostics option;

a testing option;

a settings option;

an alarms option;

a diverter option;

a surface system option;

an electronic riser angle option; and

an emergency disconnect option.

33. The method of claim 32, further comprising, after receiving a user selection of the BOP stack control option:

enabling the display of a layout diagram comprising one or more selectable components in the information subzone, the layout diagram representing a current stack arrangement of the one or more physical offshore drilling rig components; and

enabling the display of one or more control options in the interface control subzone, the one or more control options comprising one or more of: one or more control procedures, and one or more destructive function control modes.

34. The method of claim 29, further comprising:

enabling the display of one or more visual status displays in the system control subzone; and

after receiving a user selection of one of the selectable components or control options, enabling the display of one or more function control options in the system control subzone, the one or more function control options corresponding to the user selection of one of the selectable components or control options.

35. The method of claim 33, further comprising:

enabling the display of a flowpath within the layout diagram;

enabling the display of one or more colors for the flowpath, the one or more highlighted colors corresponding to one or more predicted flowpath states of the flowpath, wherein the one or more predicted flowpath states comprise:

a predicted fluid flow state;

a predicted fluid non-flow state; and/or

a predicted fluid pressure buildup state.

after receiving a user selection of one of the selectable components or control options, enabling the display of one or more function control options in the system control subzone, the one or more function control options

corresponding to the user selection of one of the selectable components or control options.

36. The method of claim 33, further comprising:

receiving a user input activating one or more destructive function control modes;

receiving a user selection of one or more destructive functions;

enabling the display of a destructive function confirmation option; and

upon receipt of a user selection of the destructive function confirmation option, performing one or more actions on the one or more physical rig components corresponding to the selected one or more destructive functions.

37. The method of claim 33, further comprising, after receipt of a user selection of one of the selectable components, control options, or destructive function confirmation option, performing an audible feedback function, the audible feedback function comprising providing an audible confirmation of the user selection before a function corresponding to the user selection is initiated.

38. The method of claim 36, where the one or more destructive functions comprise one or more of:

a pipe cutting action; and

a BOP disconnect action.

39. The method of claim 32, further comprising, after receiving a user selection of the settings option:

enabling the display of a drag-and-drop interface comprising one or more component icons located in the interface control subzone, the component icons representing the one or more physical rig components; and

enabling the display of metadata, the metadata describing the one or more physical rig components.

40. The method of claim 39, further comprising, after receiving a user selection of the at least one component operation option:

receiving a user selection of the one or more component icons;

enabling a user to drag the selected one or more component icons onto a layout diagram located in the information subzone, the layout diagram representing a current stack arrangement of the one or more physical rig components; and

upon receipt of the selected one or more component icons onto the layout diagram, modifying the layout diagram; and

controlling a movement operation of the one or more physical rig components into a modified current stack arrangement to match the one or more component icons comprising the modified layout diagram.

41. The method of claim 32, further comprising, after receiving a user selection of the diagnostics option:

enabling the display of one or more system diagnostic options in the interface control subzone, the one or more system diagnostic options comprising one or more of:

a component diagnostic option,

a function diagnostic option, and

an event diagnostic option; and

enabling the display of one or more control options in the system control subzone, the one or more control options corresponding to the user selection of one of the one or more system diagnostic options.

42. The method of claim 41, further comprising, after receiving a user selection of the event diagnostic option:

enabling a display of an event timeline in the information subzone, the event timeline comprising a linear display of one or more events corresponding to one or more events logged by the HMI application and showing a causal relationship between the one or more events and one or more user actions;

enabling a display of an event log in the information subzone, the event log comprising a list of the one or more logged events.

43. The method of claim 41, further comprising:

enabling a display of a component timeline in the information subzone, the component timeline comprising a linear display of one or more component statuses corresponding to one or more component status events logged by the HMI application; and

enabling a display of a component log in the information subzone, the component log comprising a list of the one or more logged component status events.

44. The method of claim 41, further comprising:

enabling a display of a pressure and temperature timeline in the information subzone, the pressure and temperature timeline comprising a linear display of one or more pressure and temperature statuses corresponding to one or more fluid flow status events logged by the HMI application; and

enabling a display of a pressure and temperature log in the information subzone, the pressure and temperature log comprising a list of the one or more logged fluid flow status events.

45. The method of claim 32, further comprising, after receiving a user selection of the testing option:

enabling the display of one or more system testing type options in the interface control subzone, the one or more system testing type options comprising one or more of:

a function testing option, and

a pressure testing option;

enabling the display of one or more test information fields in the information subzone, the one or more test information fields comprising one or more of: test status information, and test history information; and

after receiving a user selection of one of the one or more system testing type options, enabling the display of one or more selectable test options.

46. The method of claim 45, further comprising, after receiving a user selection of one or more of the one or more selectable test options:

performing one or more tests corresponding to the selected one or more selectable test options; and

delaying performing one or more tests corresponding to the unselected one or more selectable test options.

47. The method of claim 29, where the GUI comprises a single active interface window or a plurality of active interface windows and where the GUI displays:

the action zone in a central portion of the GUI;

the interface control subzone on a right side portion of the action zone;

the information subzone in a central portion of the action zone; and/or

the system control subzone on a left side portion of the action zone.

48. The method of claim 29, further comprising:

enabling a display of a color palette comprising a red color and a green color;

displaying a red color to indicate one or more abnormal component states; and

displaying a green color to indicate one or more of an error-free operating status and a physical rig configuration having all rig components correctly configured for a particular rig operation.

49. The method of claim 42, where the one or more events comprise one or more of a component failure and an alarm.

50. The method of claim 29, where the GUI comprises a touch screen interface configured to enable a user to select one of the one or more selectable navigation options and one of the one or more selectable action options by touching an icon corresponding to the one or more selectable navigation options or the one or more selectable action options.

51. The method of claim 32, further comprising, after receiving a user selection of the diagnostics option, enabling the display of one or more system diagnostic options comprising one or more of:

a regulatory compliance option;

an operational status option; and

an event log option.

52. The method of claim 51, further comprising, after receiving a user selection of the regulatory compliance option, enabling the display of a diagnostic decision path tree comprising one or more levels, one or more nodes, and one or more pathways connecting the one or more nodes, each of the one or more nodes comprising an icon representing a current diagnostic state of one or more rig components.

53. The method of claim 52, where the one or more icons comprises a first symbol to indicate one or more abnormal component states and a second symbol to indicate one or more error-free component states.

54. The method of claim 52, where the one or more levels correspond to one or more rig components and the one or more nodes correspond to one or more component functions.

55. The method of claim 54, where the one or more rig components comprise:

an integrated manifold assembly;

a regulator assembly;

a common rail; and/or

a rigid conduit and hot line valve package.

56. The method of claim 54, further comprising:

receiving a user selection of a level from the one or more levels;

enabling the display of one or more diagnostic details corresponding to the selected level; and

enabling the display of one or more functions, each of the one or more functions corresponding to the one or more rig components represented by the selected level.