SUMMARY

[0006] This disclosure includes embodiments of a computing system for implementing a human machine interface (HMI) application. In a first aspect, the computing system may include a memory device and at least one processor configured to enable the display of a graphical user interface (GUI). The GUI may include 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 may be 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. The one or more software applications may be configured to enable the display of a plurality of non-overlapping zones that may include an action zone and one or more of: a high-level navigation zone including one or more selectable navigation options; and a system header zone. The one or more software applications may be configured to enable the display of a plurality of selectable action options in the action zone including a plurality of non-overlapping subzones. The subzones may include an interface control subzone, an information subzone, and a system control subzone. The one or more software applications may be configured to enable the display of one or more selectable action options that may be displayed in predesignated subzones, wherein the plurality of selectable action options may be modified based on a selection of the one or more selectable navigation options, wherein the selection may be one or more of a user selection and a default selection. The one or more software applications may be configured to: receive, at the hardware device, data representing a user selection of one of the one or more selectable action options; and may control an operating state of one or more physical offshore drilling rig components based on the user selection.

[0007] In some embodiments, the HMI application may be configured to implement one or more standard operating procedures applicable to one or more offshore drilling rigs. The HMI application may be 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. In some embodiments, the one or more selectable navigation options may include one or more of a

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. The one or more events may include one or more of a component failure and an alarm. In some embodiments, the GUI may include 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.

[0018] In some embodiments, the one or more software applications may be further configured to, after receiving a user selection of the diagnostics option, enable the display of one or more system diagnostic options including one or more of a regulatory compliance option, an operational status option, and an event log option. In some embodiments, the one or more software applications may be further configured to, after receiving a user selection of the regulatory compliance option, enable the display of a diagnostic decision path tree having 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 having an icon representing a current diagnostic state of one or more rig components. The one or more icons may show a first symbol to indicate one or more abnormal component states and a second symbol to indicate one or more error-free component states. The one or more levels may correspond to one or more rig components and the one or more nodes may correspond to one or more component functions.

[0019] In some embodiments, the one or more rig components may comprise one or more of an integrated manifold assembly, a regulator assembly, a common rail, and a rigid conduit and hot line valve package. In some embodiments, the one or more software applications may be 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.

[0020] In a second aspect, a method of implementing a human machine interface (HMI) application may comprise 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. The method may further comprise enabling the display of a plurality of non-overlapping zones including 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. The method

may further comprise enabling the display of a plurality of selectable action options in the action zone. The action zone may include a plurality of non-overlapping subzones having an interface control subzone, an information subzone, and a system control subzone. The method may further comprise enabling the display of one or more selectable action options being displayed in predesignated subzones, wherein the plurality of selectable action options may be 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. The method may further comprise: 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.

[0021] In a third aspect, an apparatus for implementing a human machine interface (HMI) application may include at least one processor 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. The at least one processor may be 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 offshore rig components corresponding to the selected one or more destructive functions.

[0022] The terms "a" and "an" are defined as one or more unless this disclosure explicitly requires otherwise. The term "substantially" is defined as largely but not necessarily wholly what is specified (and includes what is specified; e.g., substantially 90 degrees includes 90 degrees and substantially parallel includes parallel), as understood by a person of ordinary skill in the art. In any disclosed embodiment, the terms "substantially," "approximately," and "about" may be substituted with "within [a percentage] of" what is specified, where the percentage includes 0.1, 1, 5, and 10 percent.

[0023] The terms "comprise" (and any form of comprise, such as "comprises" and "comprising"), "have" (and any form of have, such as "has" and "having"), "include" (and any form of include, such as "includes" and "including") and "contain" (and any form of contain, such as "contains" and "containing") are open-ended linking verbs. As a result, a system, or a component of a system, that "comprises," "has," "includes" or "contains" one or