

BRIEF SUMMARY

[0004] A blow-out preventer (BOP) may be improved by having a subsea processing unit located underwater with the blow-out preventer. The processing unit may enable the blow-out preventer to function as a blow-out arrestor (BOA), because the processing unit may determine problem conditions exist that warrant taking action within the blow-out preventer to prevent and/or arrest a possible blow-out condition.

[0005] According to a first aspect, a system may include one or more processor units, each comprising: a housing; a processor disposed within the housing; and an inductive power receiving device coupled to the processor and disposed within the housing, the inductive power receiving device configured to receive power for the processor through the housing; an underwater drilling component, in which the underwater drilling component may include one or more receptacle, each: configured to removably receive a respective one of the one or more processor units; including an inductive power transmitting device configured to transfer power to the inductive power receiving device of the respective processor unit, and positioned on the underwater drilling component to permit coupling of the respective processor unit to the receptacle from an exterior of the underwater drilling component; and at least one sensor; and a wireless communications system configured to enable communication between the at least one sensor and at least one of the one or more processor units; wherein at least one of the one or more processor units is configured to control the underwater drilling component based, at least in part, on data generated by the at least one sensor.

[0006] As disclosed, an apparatus may include a processor unit configured to be coupled to an underwater drilling component, the processor unit having: a housing; a processor disposed within the housing; an inductive power receiving device coupled to the processor and disposed within the housing, the inductive power receiving device configured to receive power for the processor from the underwater drilling component and through the housing; and a wireless communications system coupled to the processor and configured to communicate with an underwater drilling component.

[0007] According to a second aspect, a method of controlling an underwater drilling component may include coupling one or more processor units to respective ones of one or more receptacles of the underwater drilling component from an exterior of the underwater drilling component; powering each of the one or more processor units through an inductive coupling with its respective receptacle, receiving, at at least one of the one or more processor units, data generated by at least one sensor of the underwater drilling component; and controlling, with at least one of the one or more processor units, the underwater drilling component based, at least in part, on data generated by the at least one sensor. the subsea processor unit being coupled to a receptacle of the underwater drilling component, and communicating wirelessly, from the subsea processor unit, with the underwater drilling component to control the underwater drilling component and decoupling the subsea processor unit from the receptacle without decoupling the receptacle from the underwater drilling component.

[0008] There is also disclosed an apparatus may include at least one subsea component of an underwater drilling tool; and at least one subsea processor configured to wirelessly communicate with the subsea component, in which the at least one subsea component and the at least one subsea processor are configured to communicate according to a time division multiple access (TDMA) scheme.

CLAIMS

What is claimed is:

1. A system comprising:

one or more processor units, each comprising:

a housing;

a processor disposed within the housing; and

an inductive power receiving device coupled to the processor and disposed within the housing, the inductive power receiving device configured to receive power for the processor through the housing;

an underwater drilling component comprising:

one or more receptacle, each:

configured to removably receive a respective one of the one or more processor units;

including an inductive power transmitting device configured to transfer power to the inductive power receiving device of the respective processor unit; and

positioned on the underwater drilling component to permit coupling of the respective processor unit to the receptacle from an exterior of the underwater drilling component; and

at least one sensor; and

a wireless communications system configured to enable communication between the at least one sensor and at least one of the one or more processor units;

wherein at least one of the one or more processor units is configured to control the underwater drilling component based, at least in part, on data generated by the at least one sensor.

2. The system of claim 1, wherein:

the one or more processor units includes three or more processor units; and

the one or more receptacles includes three or more receptacles, each configured to receive a respective one of the three or more processor units.

3. The system of claim 2, in which the three or more processor units are configured to control the underwater drilling equipment according to a majority voting scheme.

4. The system of claim 1, in which the underwater drilling component comprises a blow-out preventer (BOP).

5. The system of claim 1, comprising a memory configured to store data generated by the at least one sensor.
6. The system of claim 1, in which the wireless communications system is configured to receive commands from at least one of an offshore network and an onshore network.
7. The system of claim 6, in which the wireless communications system is configured to transmit the commands to the underwater drilling component to control the underwater drilling component.
8. The system of claim 1, in which at least one of the one or more processor units is configured to control the underwater drilling component according to a model.
9. The system of claim 1, in which at least one of the one or more processor units is configured to receive an identifier from the underwater drilling component, and control the

underwater drilling component according to a model corresponding to the received identifier.

10. The system of claim 1, in which the wireless communications system is configured to enable communication between at least two of the one or more processor units.

11. The system of claim 1, in which, for at least one of the one or more processor units, the housing is a single-piece seamless unit.
12. The system of claim 1, wherein the at least one sensor is configured to monitor a composition of mud, monitor a volume of mud, detect a kick, monitor pressure in a well, monitor hydrostatic pressure, monitor hydraulic fluid flow, and/or monitor temperature.
13. The system of claim 1, wherein the wireless communications system is distinct from the inductive power receiving device(s) and the inductive power transmitting device(s).
14. The system of claim 1, wherein the wireless communications system is configured to enable communication between the at least one sensor and at least two of the one or more processor units.
15. The system of claim 4, wherein at least one of the one or more processor units is configured to open a ram of the blowout preventer and/or close a ram of the blowout preventer.
16. A method of controlling an underwater drilling component, the method comprising:
 - coupling one or more processor units to respective ones of one or more receptacles of the underwater drilling component from an exterior of the underwater drilling component
 - powering each of the one or more processor units through an inductive coupling with its respective receptacle;

receiving, at at least one of the one or more processor units, data generated by at least one sensor of the underwater drilling component; and

controlling, with at least one of the one or more processor units, the underwater drilling component based, at least in part, on data generated by the at least one sensor.

17. The method of claim 16, wherein controlling the underwater drilling component is performed according to a model.

18. The method of claim 16, further comprising:

receiving, at at least one of the one or more processor units, an identifier of the underwater drilling component;

wherein controlling the underwater drilling component is performed according to a model corresponding to the identifier.

19. The method of claim 16, wherein:

the one or more processor units includes three or more processor units; and

controlling the underwater drilling component is performed by at least three of the three or more processor units according to a majority voting scheme.

20. The method of claim 16, wherein the underwater drilling component comprises a blow-out preventer (BOP).