compared and processed by the decision function in view of platform data and some vital signs data.

[0023] According to some embodiments of the present invention, system **200** may further include a database **220** configured to store pilot-specific data indicative of historical vital signs and head-related behavior *vis à vis* platform data recorded over previous flights (herein: pilot-specific data). Computer processor **210** may be further configured to receive as an input the pilot-specific data that may be in the form of historical data **60** and generate the indication associated with pilot incompetence, further based on pilot-specific data as presented by historical data **60**. It should be noted that historical data **60** may further include platform-specific data pertaining to previous flights, on top of the aforementioned pilot-specific data.

[0024] According to some embodiments of the present invention, computer processor **210** may further be configured to provide updates **70** to database **220** based on: platform data, head-related data, and vital signs data obtained in real time.

[0025] According to some embodiments of the present invention, the indication of pilot incompetence may include an early detection of preconditions that appear before the pilot incompetence has occurred. Additionally, the indication of pilot incompetence may include a real-time detection once the pilot incompetence has occurred. In both cases, computer processor **210** may be further configured to determine an action to be taken based on a type of the detected pilot incompetence. The action may also be taken outside of system **200** (e.g., a remote control center).

[0026] Figure 3 is graph diagram illustrating an aspect according to embodiments of the present invention. Graph **300** illustrates an actual DLS signal recovered from a helmet of a pilot in a centrifuge test with an increased G-force applied over time (represented by the horizontal axis of graph **300**). The DLS signal is indicative of perfusion level of the blood of the pilot (represented by the vertical axis of graph **300**). Over time, the graph shows first normal perfusion levels and later a decrease in the perfusion level when higher G-level is applied. Specifically, some anti-G straining maneuvers are attempted by the pilot and illustrated by peak **310** as can be seen, prior to peak **310**¸a relatively long plateau which ends at point **320** is detected and may be indicative of Hypoxia. Embodiments of the present invention may use the above pattern to detect Hypoxia condition via DLS signals.

CLAIMS

1. A system comprising:

a head mounted device mountable to a head of a pilot;

at least one vital signs sensor couplable to a body part of said pilot and configured to repeatedly obtain in real time, vital signs data associated with said pilot;

at least one head sensor coupled to said head mounted device and configured to repeatedly obtain in real time head-related data associated with at least one of: inertia, position, and orientation of the head of said pilot; and

a computer processor configured to simultaneously receive the vital signs data and the head-related data as an input to a decision function and generate a prediction of pilot incompetence, based on predefined criteria.

2. The system according to claim 1, wherein the vital signs data is indicative of at least one: heartbeat rate, saturation of peripheral oxygen, perfusion level, and Electroencephalogram (EEG), associated with said pilot.

3. The system according to claim 1, wherein the head-related data comprises at least one of: head inertial data, head position and orientation, eye dynamics, eye gaze direction of the pilot, pilot eyelid position, and muscle tone level of a neck of the pilot.

4. The system according to claim 1, wherein the computer processor is further configured to receive as an input real-time platform data indicative of the platform controlled by said pilot and generate said prediction further based on the real-time platform data to the decision function which is configured to take into account head related data in view of the real-time platform data.

5. The system according to claim 1, wherein the real-time platform data comprises at least one of: cockpit pressure, platform altitude, platform attitude, and platform accelerations.

6. The system according to claim 1, further comprising a database configured to store pilot- specific data indicative of historical vital signs and head behavior

of the pilot vis a vis platform data recorded over previous flights, and wherein the computer processor is further configured to receive as an input said pilot- specific data and generate said prediction further based on said pilot- specific data.

7. The system according to claim 1, wherein the computer processor further receives as an input G-affected flights history of said pilot, and further generates said pilot incompetence prediction based on said G-affected flights history.

8. The system according to claim 6, wherein the computer processor is further configured to update the database based on data obtained in real time that comprises at least one of: platform data, head-related data, and vital signs data.

9. The system according to claim 1, wherein the prediction of pilot incompetence comprises an early detection of preconditions that appear before the pilot incompetence has occurred, wherein the preconditions are indicative of a partial pilot incompetence.

10. The system according to claim 1, wherein the prediction of pilot incompetence comprises a real-time detection once the pilot incompetence has occurred.

11. The system according to claim 10, wherein the computer processor is further configured to determine an action to be taken based on a type of the detected pilot incompetence.

12. The system according to claim 1, wherein the pilot incompetence comprises at least one of: Hypoxia, loss of consciousness (LOC), G-force induced pilot incompetence, and drowsiness.

13. The system according to claim 1, wherein the head mounted device comprises a head or helmet mounted display (HMD).

14. The system according to claim 1, wherein the at least one vital signs sensor comprises at least one Dynamic Light Scattering (DLS) sensor and at least one reflective photoplethysmograph (PPG) sensor.

15. A method comprising:

obtaining repeatedly and in real time, vital signs data associated with a pilot;

obtaining repeatedly and in real time, head-related data associated with at least one of: inertia, position, and orientation of the head of said pilot;

receiving simultaneously the vital signs data and the head-related data as an input to a decision function; and

generating as an output by the decision function, a prediction of pilot incompetence, based on said input and predefined criteria.

16. The method according to claim 15, wherein the vital signs data is indicative of at least: heartbeat rate, saturation of peripheral oxygen, perfusion level, and Electroencephalogram (EEG), associated with said pilot.

17. The method according to claim 15, wherein the head-related data comprises at least one of: head inertial data, head position and orientation, eyelid position, and eye gaze direction of the pilot.

18. The method according to claim 15, further comprising receiving as an input, real-time platform data indicative of the platform controlled by said pilot and generating said prediction further based on the real-time platform data by applying the real-time platform data to the decision function which is configured to take into account head related data in view of the real-time platform data.

19. The method according to claim 15, further comprising storing pilot- specific data indicative of historical vital signs and head behavior of the pilot vis a vis platform data recorded over previous flights, and further receiving as an input the pilot-specific data and generating said prediction further based on said pilot- specific data.

20. The method according to claim 15, further comprising receiving as an input G-affected flights history of said pilot, and generating said pilot incompetence prediction based on said G-affected flights history.

21. The method according to claim 19, further comprising updating the stored data based on: platform data, head-related data, and vital signs data obtained in real time.

22. The method according to claim 15, wherein the prediction of pilot incompetence comprises an early detection of preconditions that appear before the pilot incompetence has occurred, wherein the preconditions are indicative of a partial pilot incompetence.

23. The method according to claim 15, wherein the prediction of pilot incompetence comprises real-time detection once the pilot incompetence has occurred.

24. The method according to claim 15, further comprising determining an action to be taken based on a type of the detected pilot incompetence.

25. The method according to claim 15, wherein the pilot incompetence comprises at least one of: Hypoxias, loss of consciousness (LOC), G-force induced pilot incompetence, and drowsiness.

26. The method according to claim 15, wherein the obtaining of vital signs data comprises at least one of: applying Dynamic Light Scattering (DLS), applying reflective photoplethysmo graphing (PPG).

27. The system according to claim 1, wherein in a case that pilot incompetence has already occur, the computer processor is configured to indicate an occurrence of pilot incompetence.