해양시추용 충돌방지시스템의 시각화에 관한 연구

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A Study on the Visualization of Anti-Collision System for Offshore Drilling

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ABSTRACT

An anti-collision system is installed on the drill floor of an offshore drilling facility to prevent collisions between moving machines. When the distance between two machines is under the threshold, the system forcefully stops the operation and prevents accidents. After the emergecy stop, one may need to review the situation related to the crash. That is inferred by analyzing the log files of CCTVs or machines. In the case of CCTV, visibility is limited due to a fixed location, and blind spots may occur because of obstacles and structures between the camera and machines. In addition, it is difficult to completely reconstruct the situation at the time with the log files of the machines. Some times separate SW may be required.

In this paper, we present a basic frame for the visualization of a collision avoidance system using the digital twin design concept. By applying the concept of digital twin, the elements necessary for the visualization of the collision avoidance system are derived and the method to arrange the display is designed. Using the drilling rigs modeled in 3D, it becomes possible to identify the bounding box required for the collision avoidance algorithm. Considering the operation and utilization range of machines, it is able to check whether the constructed hierarchy is appropriate. The movement information of the floating body is also displayed, and the database is subdivided so that the information required for replaying stored video can be efficiently retrieved.

Collision information is displayed as designed, and it is also confirmed that effectiveness of dual system by switching normally to the required time. Based on the collision avoidance system developed in this research, it is expected to be able to configure a digital twin for other systems required for offshore drilling.
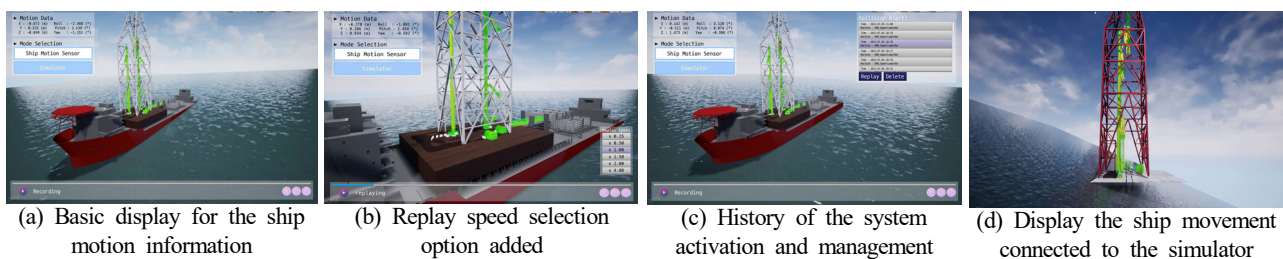

(a) Basic display for the ship motion information

(b) Replay speed selection option added

(c) History of the system activation and management

(d) Display the ship movement connected to the simulator

Fig. 1 Example of displaying necessary information to retrieve the activation history stored in the data base.

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