

## **SS19: Human Centered Transportation Systems**

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The aim of this special session is to bring together specialists from the all areas of Human-Transportation systems, especially ship, and to promote interdisciplinary study on human factor in the transportation system. The special session discusses to improve compatibility in Human and User Interface (UI) of navigation systems, and to provide effective educational training system for their operators.

This special session, especially, has relevance to the advanced and applied system in the soft computing and intelligent system of maritime field, and the research is looking forward to find a new aspect to the fuzzy systems in information technology.

This session introduces 4 kinds of aspect research in maritime science- 1) team work in the mixed culture, 2) mental workload, 3) intelligent system for maneuvering support, 4) corrosion avoidance support system for information processing.

A detail is the following:

### 1. "Toward Evaluation of Mixed Culture's Team Works - Case Study of Ship Bridge Simulator-based Training for Cadets -"

The seafarer of ocean-going vessel works together with multiple nationalities. There is individual culture and custom for each, and the difference among them is perhaps mental stress. The mental stress and the difference of custom is sometime a reason for human errors. In this paper, we challenge to evaluate the mixed culture's team works for ship's bridge teammates for cadets. The index is physiological index which evaluates the mental workload. If we are able to evaluate the stress comes from the mixed culture using the physiological index, we can consider the optimum mixed pot, and prevent human errors by miss much people. We show the results of

mental workload among mixed culture.

2. “Evaluation of Mental Workload for a Newly- Appointed Pilot Using Salivary NO<sub>3</sub>- Concentration and LF/HF Values, Compared with Port-Coordinators”

This paper aims to acknowledge the trend of mental workload of a newly-appointed marine pilot compared with that of a veteran pilot, using the physiological index, salivary NO<sub>3</sub>- and LF/HF values, and confirm the effectiveness of salivary NO<sub>3</sub>- as a physiological index. This paper also aims to confirm that the pilots and port-coordinators’ trends of mental workload respond risky situations including collision with other vessels in their duty. Pilots handle vessels for the captain in a specific port or harbor and pilots contribute the safety of the sea area. That is why to verify pilots’ mental workload is essential for the purpose of preventing the risky situations. On the other hand, port-coordinators play a role of sea-safe controller at a port, and their advices by wireless radio support pilot’s duty. To confirm and verify port-coordinators’ mental workload is also essential. From this experiment we confirm the salivary NO<sub>3</sub>- and LF/HF values are useful to evaluation pilots’ mental workload, and are also useful for a newly-appointed pilot’s drill on board.

3. “Development of Maneuvering Support System for Ship Docking”

A dock master who was specialist of docking maneuvered a ship to a dock. The dock master was required high maneuvering skill, then, retired captain became the dock master. However, Japanese shipyard started to employ young seafarers as the dock master because of lack of human resource. It took a long time young dock master may acquire the maneuvering skill for the docking. Therefore, this study proposed a maneuvering support system for ship docking by using augmented reality technique.

4. “Effectiveness of the OZT taking into account with the Other Ships’ Waypoints Information”

Obstacle Zone by Target (OZT) is a method to support ship’s navigator of making decision that visually expresses areas in which there are high possibilities of colliding with other ships. Previous studies have shown that OZT is effective to avoid collision safely. However, the OZT used in previous studies had a problem that its positions changed greatly when the other ships altered their courses. Therefore, in this study, the authors considered the construction of OZT which’s taken into account with the other ships’ waypoints information and investigated its effectiveness.