

On the Position Determination of Docking Station for AUVs Using Optical Sensor and Neural Network

Thieu Quang Minh Nhat¹, Hyeung-Sik Choi^{1,*}, Mai The Vu², Joono Sur³, Jin-Il Kang², Hyun-Joong Son¹

¹Department of Mechanical Engineering, Korea Maritime and Ocean University, Busan, Korea

²School of Intelligent Mechatronics Engineering, Sejong University, Seoul, Korea

³Chief of Marine Unmanned System Center, Korea Maritime and Ocean University, Busan, Korea

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Abstract

Detecting the relative position of the docking station is a very important issue for the homing of AUVs (Autonomous Unmanned Vehicles). To detect the position of the light source, a pinhole camera model structure was proposed like the camera model. However, due to the sensor resolution and the distortion errors of the pinhole camera system, the application of the camera of docking the under turbid sea environments is almost impossible.

In this paper, a new method detecting the position of the docking station using a light source is presented. Also, a newly developed optical sensor which makes it much easier to sense the light source than the camera system for homing of the AUV under the water is performed. In addition, to improve the system, a neural network (NN) algorithm constructing a model relating the light inputs and optical sensor which are developed in this study is proposed.

To evaluate the performance of the NN algorithm, the experiments were performed in the air beforehand. The result shows that the NN algorithm with AUV docking system using the NN model is better than the pinhole camera model.

Keywords: optical sensor, neural network, pinhole camera, navigation

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* Corresponding author. E-mail address: hchoi@kmou.ac.kr

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