

Original article

Advanced Navigation Aids System based on Augmented Reality*

*Jaeyong OH*¹, *Sekil PARK*², *Oh-Seok KWON*^{3†}

¹ Korea Research Institute of Ships and Ocean Engineering, Korea, ojyong@kriso.re.kr

² Korea Research Institute of Ships and Ocean Engineering, Korea, skpark@kriso.re.kr

^{3†} Dept. of Computer Engineering, Chungnam National University, Korea, oskwon@cnu.ac.kr, Corresponding Author

Abstract

Many maritime accidents have been caused by human-error including such things as inadequate watch keeping and/or mistakes in ship handling. Also, new navigational equipment has been developed using Information Technology (IT) technology to provide various kinds of information for safe navigation. Despite these efforts, the reduction of maritime accidents has not occurred to the degree expected because, navigational equipment provides too much information, and this information is not well organized, such that users feel it to be complicated rather than helpful. In this point of view, the method of representation of navigational information is more important than the quantity of that information and research is required on the representation of information to make that information more easily understood and to allow decisions to be made correctly and promptly. In this paper, we adopt Augmented Reality (AR) technologies for the representation of information. AR is a 3D computer graphics technology that blends virtual reality and the real world. Recently, this technology has been widely applied in our daily lives because it can provide information more effectively to users. Therefore, we propose a new concept, a navigational system based on AR technology; we review experimental results from a ship-handling simulator and from an open sea test to verify the efficiency of the proposed system.

Keywords: navigational aids system, augmented reality, IBS(Integrated Bridge System)

I. Introduction

The marine traffic environment has recently witnessed significant increases in traffic and trends toward larger and faster ships, resulting in a greater risk of marine accidents. Data from the Korean Maritime Safety Tribunal has revealed a steady rise in marine accidents over the last five years, with 80% of such accidents being caused by errors during operation. Among all accidents, collision accidents were highest in number and mainly caused by human error such as negligence, and the number of marine accidents continues to increase along with the resulting damages (Ministry of Oceans and Fisheries, 2015). In order to prevent or help mitigate this, real-time support is provided to ship navigators through the Vessel Traffic Services System (VTS) and the Aids to Navigation System, and related legislation around the world is being carried out to prevent marine accidents. Additionally, navigation systems with advanced IT technologies are being developed to provide various data to navigators for safer operation; however, such complex equipment could be more of a burden for navigators and interfere with safe operation. It cannot be assumed that all navigation equipment provides useful information to navigators, and thus there is a need to analyze the current limitations of different types of navigation equipment and solutions to such limitations from the perspective of the navigators.

According to the bridge operations analysis results by STCW (The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers), the largest problem with currently operating navigation equipment is the provision of excessive and unnecessary information or inappropriate methods of data provision. In particular, the alert functionality with respect to emergency situations is currently provided through RADAR and ECDIS, but such alert messages are delivered through text messages or alarm sounds which are ineffective and not intuitive, so this aspect requires further improvement. Additionally, an effective means of information delivery for limited screen space needs to be further studied (Jeong J.S, 2012). In this respect, this paper proposes an AR (Augmented Reality) technology-based navigational aid system that can be utilized in bridge environments as an intuitive means of information delivery. Experimentation was conducted to examine the application potential of the proposed system.

II. Analysis of Previous Study

As mentioned above, the complexity of the navigation equipment in the bridge can interfere with safe operation; thus, navigational aid systems developed in the future need to support the decision-making process of the navigator through effective information provision methods rather than by simply increasing the amount of information delivered. Moreover, the intuitiveness of the navigation data provided is a critical element that can resolve issues caused by excessive information. This paper aims to improve upon this by utilizing augmented reality technology.

Augmented Reality is a field of VR (Virtual Reality) that fuses virtual objects or information to the real environment through computer graphics technology so that virtual objects appear to originate from the existing environment. This technology allows the display of information by overlapping the information upon images of the real world. Considering that data obtained

Download English Version:

<https://daneshyari.com/en/article/7115988>

Download Persian Version:

<https://daneshyari.com/article/7115988>

[Daneshyari.com](https://daneshyari.com)