A Template for Marine Information System using GPS, AIS, Digital Compass, Image and ENC Data

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Abstract. The design and development of a proposed marine information system template utilizing global positioning system (GPS), digital compass, automatic identification system (AIS) and electronic navigational chart (ENC) data is presented in this paper. This work was done to come-up with a template for developing a marine vehicle system that will serve as a reference or basis for future system developmental works. The template was designed to address the basic requirements needed for a marine information system that can be expanded to include possible collision avoidance, autopilot, vessel monitoring, etc. The map, map data details, directional, location and ship related information are readily available for display and further processing.

Keywords: Information system type template, navigation systems, GPS, AIS.

1 Introduction

The global positioning system(GPS) with automatic identification system(AIS)[1] are heavily used in navigation systems especially commercial shipping. They are utilized with digital compass and data from electronic navigational charts (ENC) in the design of a template for a marine information system. This study involves the design and development of a marine information system template which includes the methodology used, system design flow, data processing algorithms to the technical specifics and connectivity of the GPS and digital compass. The paper is broken down into several parts with the second section explaining the system design and development specifics while the third section details the implementation followed by the concluding remarks.

2 System design and development

A method called Rapid, Non-Formal and By-Customer-Demand Approach [2] was used in this study. The diagram (Fig. 1) shows the general system flow of the Marine Information System with the configuration of the serial device connection parameters (GPS and digital compass) for proper data retrieval. The image map and its
corresponding data are loaded into system memory and then displayed which gives several options in manipulating the display and its features. The user can toggle the GPS and digital compass data capture, system logging, display of ships and map details, grid lines and main display between compass bearing or a map. The key components of the system are: (1) Pre-development ENC Processing, (2) Map processing, (3) Ship representation and plotting, (4) GPS and digital compass data.

3 Implementation

Test of the template developed (Fig. 3) showed that the procedures and algorithm performed as designed for the system where there is simultaneous continuous polling of data from the digital compass and GPS. Any update in the values triggers a change in the orientation display of the bearing, map and data. The system was tested using actual ENC data files for the Republic of Korea purchased from the National Oceanographic Research Institute of the Republic of Korea and dummy AIS test data.

4 Conclusion

The use of robust algorithms and methods produced a template for actual application that performs satisfactorily and comply with all the requirements set. The system
utilized data and information from the global positioning system (GPS), digital compass (DC), automatic identification system (AIS) and electronic navigational chart (ENC). The modular design makes it even possible for the system to accept information and data from other systems such as underwater intruder detection [3] or from a situational awareness tool [4]. The authors believe that the algorithms and development method presented is a good reference for those who want to develop similar marine tracking system that might be web based [5] and running on other platforms [6].

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References