Chapter 18
Research on the Construction of Underwater Platform Combat Deduction System Based on Service-Oriented and Multi-Agent Technology

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ABSTRACT

Object-oriented intelligent modeling, model management, etc. are difficult problems in the designing and development of underwater platform combat deduction system. The command and control description model based on OODA loop depicted the business process of underwater platform combat deduction using service-oriented and agent modeling technology and established an underwater platforms deduction system architecture, effectively solving the problem of intelligence, reusing, and extensibility in combat deduction modeling. The chapter has reference value in the designing and development of underwater platforms deduction systems.

INTRODUCTION

Combat deduction refers to: "Imitation of combat processes according to known or intended situations and data. Including the simulation of actual military exercises and computer combat simulation. It is usually used to research and test the combat plan, evaluate the effectiveness of combat equipment, and explore new combat theories. By means of combat deduction, both the rationality and feasibility of combat strategies and combat plans can be verified, the ability of commanders to analyze problems and deal with incidents can be trained, and new tactics can be explored in the context of combat scenarios. Therefore, research and build an underwater platform combat deduction system that is close to actual

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combat, model intelligence, reasonable structure and flexible use, and carry out combat plan exercises for underwater platforms such as underwater unmanned vehicles and submarines, plays an important role in optimizing the underwater platform combat plan and training the commander's combat ability.

Based on the OODA ring command and control description model, this paper briefly describes the business process of underwater platform combat deduction, combines service-oriented technology and Agent modeling technology, and builds an architecture of underwater platform combat deduction system based on service-oriented and multi-Agent, and discusses the implementation method of agent modeling technology.

Definition of Combat Deduction Function of Underwater Platform

The definition of the underwater platform combat deduction function is the basis for constructing the underwater platform combat deduction system. At present, different types and uses of combat deduction systems have been developed and applied domestic and abroad (Bello, 2006; Wei, Song, & Kim, 2014; Jin et al., 2017; Alexander & Kelly, 2013; Tavcar, Kaluza, Kvassay, Schneider, & Gams, 2014, August; Xiaofeng, Siguangya, Lin, 2000; Yan, Zhang, & Sun, 2008, October; Zhao, Zhang, Sun, & Yan, 2012). Among them, the Joint Warfare System (JWARS) is a simulation system supported by the US military to support joint combat operations, mainly including the problem domain, simulation domain and platform domain. The problem domain provides software for analysis purposes and describing combat functions; the simulation domain provides "engine" that drives the simulation run; and the platform domain provides system hardware and human-computer interaction interface (Chengjing & Jianing, 2015; Li, Yi, Sun, & Gong, 2012). With the function definition method of the joint war system, the typical OODA ring command and control description model (Pan Guanhua, 2015; Fusano, Sato, & Namatame, 2011, March) is adopted for the underwater platform combat process and its characteristics. The business process analysis of the underwater platform combat process is carried out, and the underwater platform combat deduction function is described.

The general working process of the underwater platform combat system is as follows: the intelligence sub-system collects the battlefield information, completes the comprehensive processing of intelligence, and forms a unified tactical situation; the command sub-system carries out underwater acoustic environment and tactical situation analysis, assists the commander to complete the offensive and defensive decision-making, and clarifies the attack and defense plan. That is to determine the type of attack and defense weapons, channels, platform occupying maneuver schemes, etc; weapon subsystems launch for shooting solution, launch control, complete weapons attack and integrated defense and other combat activities.

Taking the underwater platform as an example, according to the Observation (O) –Orientation (O) - Decision (D) - Action (A) process (Jiang, Wei, Xuanhua, 2015), the operation process of the underwater platform is mainly divided into the following stages: information collection and processing, battlefield situation generation and display, combat assistant decision-making, weapon attack and defense application, and combat effectiveness evaluation (Minghui, 2014), as shown in Figure 1.