

PLANNING AND CARRYING OUT INVESTIGATIVE UNDERWATER ROBOT'S MISSION BASED ON BEHAVIORAL METHODS

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ABSTRACT

Solving the problem of software engineering for the information and control system (ICS) of the investigative autonomous underwater vehicle (AUV) means developing and describing its behavioral functions of different difficulty levels. Some behavioral tasks of search and investigation are difficult to solve as their formation is not sufficiently universal. This is to a great extent due to the fact that the vehicle software is developed in testing mode and requires constant modifying. The methods of setting a mission are not declarative enough, thus being hard for potential AUV users and demanding the creators to take part in it. In the Institute for Marine Technology Problems, Far Eastern Branch of the Russian Academy of Sciences (IMTP FEBRAS) we apply three-level functional architecture for the information and control system software that allows to upgrade as new tasks and hardware facilities appear. Tactical level behaviors (agents) library makes the basis for the mission (programme task) declarative specification thus raising its level of abstraction and permitting AUV adjustment according to various types of investigation tasks. We studied one of the possible variants of solving this problem. As methodological procedures we applied the approach of behavior-based robotics which is embodied both in AUV information and control system software structure and the way of setting a mission. Our study is organized as follows. In the first part we discuss what share the behavioral paradigm has among the known paradigms of constructing robot control systems. Parts Two and Three report on implementation features of behavior-based approach in tactical and strategic levels of ICS structures applied in autonomous underwater vehicles created in IMTP FEBRAS. Part Four deals with examples of practical use of the above mentioned approach for different tasks solution.

Key words: autonomous underwater vehicle, information and control system, software architecture, behavioral control structures, agent, mission specification.

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