



Automation in marine systems

This special issue on automation in marine systems includes 6 papers of different groups that took part in the thematic network AUTOMAR (Automation in the maritime sector). AUTOMAR is a special action of the Ministry of Science and Education in order to form groups from different institutions (universities and research centers) whose members are interested in control theory, robotics, and artificial intelligence and their applications to maritime activities.

Before introducing the papers in this Special Issue it is useful to briefly describe the background to AUTOMAR. As stated above, the main sponsor of AUTOMAR was the Ministry of Science and Education of Spain. Under the auspices of CEA, the Spanish committee of IFAC (International Federation of Automatic Control), a workshop on Automation and Marine Systems was held on November 24, 2004 at the CSIC (“Consejo Superior de Investigaciones Científicas”, Spanish Council for Scientific Research). This workshop was conceived as a meeting place for professionals from universities and all branches of industry who are interested in research and development as well as technological innovation in the maritime sector. The conference represents the culmination of a series of previous meetings held in Santander, Barcelona, El Ferrol and Cádiz. A book (Aranda et al., 2004) was published with a collection of chapters about the works of each group. In the meeting, we planned a special issue in relation with this workshop.

The aim of this issue is to present a panoramic vision of the activities of the research groups working in Spain in the field of Automation and Control of

Naval and Marine Systems at the present time. Our goal is to diffuse information about their work to all actors in this strategic sector in order to promote further research and cooperation not only within Spain but also with groups from the rest of Europe.

Six papers about robots, modelling, simulation and control was chosen for this issue.

The first paper, Armada et al. "On the Design and development of climbing and walking robots for the maritime industries" gives an overview of the development of mobile robots (climbing and walking) with examples taken from the maritime industries applications, coming mostly from the experience of the Industrial Automation Institute of the Spanish Council for Scientific Research (IAI-CSIC).

The second paper, Antich et al. "A PFM-based control architecture for a visually guided underwater cable tracker to achieve navigation in troublesome scenarios" shows a architecture of control based on Potential Field Methods for visually guiding an Autonomous Underwater Vehicle to detect and track a cable or pipeline laid on the seabed is presented. A simulation environment with a hydrodynamic model of the real GARBI robot has been used.

In "An analysis of models identification methods for high speed crafts" (Aranda et al.) two different approaches of system identification has been proposed in order to analysis and identify models for the heave, pitch and roll dynamics of a high speed craft. The study is focused on a ship advancing at constant mean forward speed with arbitrary heading in a train of regular sinusoidal waves.

The four paper, "Application of a Robust QFT Linear Control Method to the Course Changing Manoeuvring of a Ship" (Rueda et al.) describes a robust controller for the control of the changing of a ship's course by the QFT methodology.

The next paper, Ferreiro et al., "Trends on modelling techniques applied on ship's propulsion system monitoring" shows some aspects about modelling techniques using analytical redundancy usually applied in fault detection, fault isolation, decision making and system recovery in order to achieve fault tolerant control system.

The final paper, Lopez-Piñeiro et al., “Simulation of passengers movement on ship emergencies. Tools for IMO regulations fulfilment” shows the conceptual design, models and user oriented software tools development inside the SIFBUP project. A summary of the main ship evacuation problems, related regulations and different numerical model types for the study of passengers movements are presented.

This special issue gives a representative sample of the breadth of applications and research in the area of automation in marine systems. We would like to express gratitude to the authors and the reviewers for their efforts in making this special issue possible.

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