Guidance And Control Of Ocean Vehicles

This document contains the report of the workshop and the background papers commissioned for the meeting. The report, and in particular the 'Key Points' adopted by the workshop, will serve as basis for further work on developing technical guidelines for the design, implementation and review of MPAs.

This text covers fundamentals in navigation of modern aerospace vehicles. It is an excellent resource for both graduate students and practicing engineers.

The technology of hydrodynamic modeling and marine craft motion control systems has progressed greatly in recent years. This timely survey includes the latest tools for analysis and design of advanced guidance, navigation and control systems and presents new material on underwater vehicles and surface vessels. Each section presents numerous case studies and applications, providing a practical understanding of how model-based motion control systems are designed. Key features include: a three-part structure covering Modeling of Marine Craft; Guidance, Navigation and Control Systems; and Appendices, providing all the supporting theory in a single resource kinematics, kinetics, hydrostatics, seakeeping and maneuvering theory, and simulation models for marine craft and environmental forces guidance systems, sensor fusion and integrated navigation systems, inertial measurement units, Kalman filtering and nonlinear observer design for marine craft state-of-the-art methods for feedback control more advanced methods using nonlinear theory, enabling the user to compare linear design techniques before a final implementation is made. linear and nonlinear stability theory, and numerical methods companion website that hosts links to lecture notes and download information for the Marine Systems Simulator (MSS) which is an open source Matlab/Simulink® toolbox for marine systems. The MSS toolbox includes hydrodynamic models and motion control systems for ships, underwater vehicles and floating structures With an appropriate balance between mathematical theory and practical applications, academic and industrial researchers working in marine and control engineering aspects of manned and unmanned maritime vehicles will benefit from this comprehensive handbook. It is also suitable for final year undergraduates and postgraduates, lecturers, development officers, and practitioners in the areas of rigid-body modeling, hydrodynamics, simulation of marine craft, control and estimation theory, decision-support systems and sensor fusion. www.wiley.com/go/fossen_marine

Guidance and Control of Ocean VehiclesJohn Wiley & Sons Incorporated

The TransNav 2013 Symposium held at the Gdynia Maritime University, Poland in June 2013 has brought together a wide range of participants from all over the world. The program has offered a variety of contributions, allowing to look at many aspects of the navigational safety from various different points of view. Topics presented and discussed at the Symposium were: navigation, safety at sea, sea transportation, education of navigators and simulator-based training, sea traffic engineering, ship's manoeuvrability, integrated systems, electronic charts systems, satellite, radio-navigation and anti-collision systems and many others. This book is part of a series of four volumes and provides an overview of Education and Training, Human Resources and Crew Resource Management, Policy and Economics and is addressed to scientists and professionals involved in research and development of navigation, safety of navigation and sea transportation.

A comprehensive and extensive study of the latest research in control systems for marine vehicles. Demonstrates how the implementation of mathematical models and modern control theory can reduce fuel consumption and improve reliability and performance. Coverage includes ocean vehicle modeling, environmental disturbances, the dynamics and stability of ships, sensor and navigation systems. Numerous examples and exercises facilitate understanding.

For decades, Remotely Operated underwater Vehicles (ROVs) have been helping mankind explore the depths of the ocean, and build and maintain infrastructure on the seafloor. Since the first ROV was developed in 1953, the number of uses for these vehicles has exploded. They are now an essential part of maintaining the world's energy resources, collecting scientific data about our oceans, and performing underwater search and recovery. This research will discuss guidance, navigation, and control algorithms for use as a low-level position controller for ROVs, which will enable semi-autonomous behaviour for the vehicle. Semi-autonomous behaviour is when the pilot issues high-level position commands and the low-level controller handles station keeping and maneuvering between the commanded positions. In this configuration, the low level controller compensates for the environmental disturbances and unknown dynamics (such as current and tether dynamics), allowing the pilot to focus on other aspects of the task (such as manipulator control).In this work, the design,implementation,and testing of a complete guidance, navigation,and control system is presented. A Saab Sea-Eye Falcon ROV is augmented with a suite of navigation instruments. The augmented vehicle is characterized and a dynamic model is developed. This model is used in an extended Kalman filter, which will be shown to produce a position estimate for the vehicle with an error of less than ?6 cm. The navigation system is combined with a guidance system and adaptive controller to enable semi-autonomous behaviour. With this suite of software, the ROV can operate semi-autonomously. The resulting ROV system is a research platform, from which the underwater community can continue research into algorithms for optimal control, remote operations, and other performance enhancing technologies.

Unmanned marine vehicles (UMVs) include autonomous underwater vehicles, remotely operated vehicles, semi-submersibles and unmanned surface craft. Considerable importance is being placed on the design and development of such vehicles as they provide cost effective solutions to a number of littoral, coastal and offshore problems. This new book highlights the advanced technology which is evolving to meet the challenges being posed in this exciting and growing area of research. Geoff Roberts is with Coventry University. Robert Sutton is with The University of Plymouth.

Describes the individual capabilities of each of 1,900 unique resources in the federal laboratory system, and provides the name and phone number of each contact. Includes government laboratories, research centers, testing facilities, and special technology information centers. Also includes a list of all federal laboratory technology transfer offices. Organized into 72 subject areas. Detailed indices.

The long-term goal of this program is to provide an acoustic communications system suitable for multiple fast-moving platforms to support the guidance and control function of current and future weapons (Figure 1). The technological objective is the development and testing of single and multi-user acoustic communications solutions suitable for use on weapons systems. The advantage of an acoustic link is that it does not rely upon the wire which is currently used. The wire may break (either accidentally or on purpose) and it restricts the motion of the launching platform. The acoustic link allows multiple platforms to provide the weapon with information, and also allows weapons to communicate in order to coordinate salvo attacks.

Most ocean vessels are underactuated but control of their motion in the real ocean environment is essential. Starting with a review of the background on ocean-vessel dynamics and nonlinear control theory, the authors’ systematic approach is based on various nontrivial coordinate transformations coupled with advanced nonlinear control design methods. This strategy is then used for the development and analysis of a number of ocean-vessel control systems with the aim of achieving advanced motion control tasks including stabilization, trajectory-tracking, path-tracking and path-following. Control of Ships and Underwater Vehicles offers the reader: - new results in the nonlinear control of underactuated ocean vessels; - efficient designs for the implementation of controllers on underactuated ocean vessels; - numerical simulations and real-time implementations of the control systems designed on a scale-model ship for each controller developed to illustrate their effectiveness and afford practical guidance.

This volume contains forty papers from the 1st IFAC Workshop on Guidance and Control of Underwater Vehicles. The aim of the Workshop was to bring together academic practitioners and industrialists involved in this important and expanding area of interest in order to exchange experiences on recent advances in this field. Topics covered by the papers in this proceeding include UUV Control Applications, System Identification, UUV Architectures, Navigation, Modelling, Fault Detection and Reconfiguration. Contributors from Italy, Ireland, Japan, Portugal, Spain, Turkey, USA and the United Kingdom were represented at the workshop.The Workshop was voted a resounding success by all delegates and in the light of this vote of confidence the Technical Committee on Marine Systems is planning to run this event again in 2005, with the slightly amended title of Navigation, Guidance and Control of Underwater Vehicles

Automatic navigation makes ocean-going and flying safer and less expensive: Safer because machines are tireless and always vigilant; inexpensive because it does not use human navigators who are, unavoidably, highly trained and thus expensive people. What is more, unmanned deep space travel would be impossible without automatic navigation. Navigation can be automated with the radio systems Loran, Omega, and the Global Positioning System (GPS) of earth satellites, but its most versatile form is completely self-contained and is called inertial navigation. It uses gyroscopes and accelerometers (inertial sensors) to measure the state of motion of the vehicle by noting changes in that state caused by accelerations. By knowing the vehicle's starting position and noting the changes in its direction and speed, one can keep track of the vehicle's present position. Mankind first used this technology in World War n, in guided weapons where cost was unimportant; only 20-30 years later did it become cheap enough to be used commercially. The electronics revolution, in which vacuum tubes were replaced by integrated circuits, has dramatically altered the field of inertial navigation. Early inertial systems used complex mechanical gimbal structures and mechanical gyroscopes with spinning wheels. The gimbals allowed the gyroscopes to stabilize a mass (called a "platform") so that it remained in a fixed attitude relative to a chosen coordinate frame, even as the vehicle turned around any or all of its three major axes.

This journal-like book series includes edited volumes to rapidly report and spread the latest technological results, new scientific discovery and valuable applied researches in the fields concerning offshore robotics as well as promote international academic exchange. We aim to make it one of the premier comprehensive academic publications of world offshore vehicle and robotics community. The audience of the series will include the scholars, researchers, engineers and students who are interested in fields of autonomous marine vehicles and robotics, including autonomous surface vehicles, autonomous underwater vehicles, remote operation vehicles, marine bionics, marine vehicle modeling, guidance, navigation, control and cooperation and so on.