

# **3rd IFAC Workshop on Navigation, Guidance and Control of Underwater Vehicles 2012**

**Porto, Portugal  
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**Editors:**

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# NGCUV 2012 Program

## Plenary Lectures

### Plenary 1 - Tuesday, April 10, 2012

**[\*] Nonlinear observers for integration of position and IMU measurements**

Prof. Thor I. Fossen, Norwegian University of Science and Technology, NO

### Plenary 2 - Tuesday, April 10, 2012

**[\*] Robotic Cities: on Oceans Opportunities and Challenges**

Dr. João Fonseca Ribeiro, Director-General Maritime Policy Ministry of Agriculture, Sea, environment and Spatial Planning, PO

### Plenary 3 - Tuesday, April 10, 2012

**[\*] Autonomous Detection and Targeted Sampling of Oceanographic Features by AUVs**

Dr. Yanwu Zhang, Monterey Bay Aquarium Research Institute, US

### Plenary 4 - Wednesday, April 11, 2012

**[\*] Cooperative Navigation and Motion Control of Multiple Autonomous Marine Vehicles**

Prof. António Pascoal, ISR – Instituto Superior Técnico, PO

### Plenary 5 - Wednesday, April 11, 2012

**[\*] Challenges and limitations of high-resolution sea-floor optical mapping using UUVs**

Prof. Rafael Garcia, University of Girona, SP

### Plenary 6 - Thursday, April 12, 2012

**[\*] The Role of Artificial Intelligence based Inference for AUV Sampling, Command and Control**

Dr. Kanna Rajan, Monterey Bay Aquarium Research Institute, US

### Plenary 7 - Thursday, April 12, 2012

**[0063] Some Algorithms of AUV Positioning Based on One Moving Beacon**

Dr. Alexander Scherbatyuk, Institute for Marine Technology Problems, RU

**[\*] No article included in the proceedings**

## Technical session Tu1A - Vehicle Modelling and Control I - April 10, 2012

**[0005] Robust Control of a Micro-Autonomous Underwater Vehicle ( $\mu$ AUV) Using Low-Tolerance Components**

Simon A. Watson; Peter N. Green

**[0006] Strategies for Control of Energy on a Simplified Model of a Robotic Fish**

Roper, Daniel T; Sharma, Sanjay; Sutton, Robert; Culverhouse, Philip

**[0007] Simulation of an Under-actuated Fish-like Robot Controlled by an Adaptive Frequency Oscillator Inside a Karman Vortex Street**

Cecilia Tapia-Siles; Ryad Chellali

**[0028] Control of an Underactuated Underwater Vehicle in 3D Space under Field-of-View Constraints**

Dimitra Panagou; Spyros Maniatopoulos; Kostas J. Kyriakopoulos

**[0052] Controlling Minimally-Actuated Vehicles for Applications in Ocean Observation**

Ryan N. Smith; Van T. Huynh

**[0062] Phased Array Velocity Sensor Operational Advantages and Data Analysis**

Matt Burdyny

## Technical session Tu1B – Navigation - April 10, 2012

**[0015] Navigation Solutions for Low-Cost, Man-Portable AUVs: Iver2 Lightweight NSW AUV**

M. Incze

**[0035] Acoustically aided HMI for ROV navigation**

Antonio Vasilijevic; Edin Omerdic; Bruno Borovic; Zoran Vukic

**[0037] An Origin State Method for Lossy Synchronous-clock Acoustic Navigation**

Jeffrey M. Walls; Ryan M. Eustice

**[0043] Low Cost Navigation for Unmanned Underwater Vehicles Using Line of Soundings**

Liam Miller; Daniel Toal; Gerard Dooly; Edin Omerdic; Joseph Coleman; Garrett Duffy

**[0054] Navigation Scheme for the LSTS SEACON Vehicles: Theory and Application**

José Braga; Anthony J. Healey; João Borges de Sousa

**[0057] Complementary Terrain/Single Beacon-Based AUV Navigation**

Pramod Maurya; Francisco Curado Teixeira; António Pascoal

## Technical session W1A – Cooperation in Multi-Vehicle Systems- April 11, 2012

**[0002] On the Dependence of Cooperative Algorithms on Underwater Communication Performance**

Andrea Caiti; Vincenzo Calabro; Andrea Munafo

**[0013] Cooperative 3D Exploration under Communication Constraints**

Ravi Kulan Rathnam; Andreas Birk

**[0036] Fault Tolerant Area Coverage Using Underwater Vehicles**

José Braga; Pedro Calado; P. B. Sujit

**[0055] Implementation of a Control Architecture for Networked Vehicle Systems**

José Pinto; Pedro Calado; José Braga; Paulo Dias; Ricardo Martins; Eduardo Marques

**[0030] On the Limit Behavior for Multi-Agent Dynamical Systems**

Ionela Prodan; Georges Bitsoris; Sorin Olaru; Cristina Stoica; Silviu-Iulian Niculescu

**[0048] Triangular Formation Control Using Range Measurements: An Application to Marine Robotic Vehicles**

Jorge M. Soares; A. Pedro Aguiar; António M. Pascoal; Marco Gallieri

## **Technical session W1B – SLAMs and Localization - April 11, 2012**

**[0012] Navigational Error Reduction of Underwater Vehicles with Selective Bathymetric SLAM**

Roger A. Stuckey

**[0027] MBpIC-SLAM: Probabilistic Surface Matching for Bathymetry Based SLAM**

Simone Zandara; Pere Ridao; Angelos Mallios; David Ribas

**[0047] A Novel Particle Filter Formulation with Application to Terrain-Aided Navigation**

Francisco Curado Teixeira; António Pascoal; Pramod Maurya

**[0003] Fixed Target 3D Localization Based on Range Data Only: a Recursive Least Squares Approach**

Giovanni Indiveri; Paola Pedone; Michele Cuccovillo

**[0009] Accurate Ranging in a Stratified Underwater Medium with Multiple Isogradient Sound Speed Profile Layers**

Hamid Ramezani; Geert Leus

**[0040] Location System for Autonomous Underwater Vehicle during Operations in Lakes of Hydroelectric Dams**

Breno Carneiro Pinheiro; Ubirajara Franco Moreno; Carlos Henrique Farias dos Santos

## **Technical session W2A – Vehicle Modelling and Control II- April 11, 2012**

**[0049] Evaluation of Three Dynamic Ship Positioning Controllers: from Calm to Extreme Conditions**

Vahid Hassani; Asgeir J. Sorensen; António M. Pascoal

**[0059] Experimental results with value function based control of an AUV**

Jorge Estrela da Silva; João Borges de Sousa; Fernando Lobo Pereira

**[0034] A Task & Subsystem Priority Based Control Strategy for Underwater Floating Manipulators**

G. Casalino; E. Zereik; E. Simetti; S. Torelli; A. Sperindé; A. Turetta

**[0008] Action-Perception Trade-Offs for Anguilliform Swimming Robotic Platforms with an Electric Sense**

Yannick Morel; Mathieu Porez; Auke J. Ijspeert

**[0024] Topics on Current Compensation for Path Following Applications of Underactuated Underwater Vehicles**

Walter Caharija; Kristin Y. Pettersen; Jan Tommy Gravdahl; Asgeir J. Sørensen

**[0016] PCH-Based L<sub>2</sub> Disturbance Attenuation and Control of Autonomous Underwater Vehicle.**

Sami El Ferik; Muhammad Fuady Emzir

**Technical session W2B Planning, Guidance and Cooperation - April 11, 2012**

**[0025] AUV Guidance System for Dynamic Trajectory Generation**

Francesco Scibilia; Ulrik Jørgensen; Roger Skjetne

**[0032] Homotopic Path Planning for an AUV on Maps Improved with Scan Matching**

Emili Hernández; Marc Carreras; Pere Ridao; Angelos Mallios

**[0039] Trajectory Optimization for Data Retrieval Applications: It Is All About Where/Who Loads the Mule**

Jorge Estrela da Silva; Daniel E. Lucani; Sujit Baliyarasimhuni; João Borges de Sousa

**[0001] Reference Model for High Performance and Low Energy Consumption Motions**

Daniel de Almeida Fernandes; Fredrik Dukan; Asgeir Johan Sørensen

**[0050] Robust Mission Planning for Underwater Applications: Issues and Challenges**

Mangal Kothari; José Pinto; Vinayak S. Prabhu; Pedro Ribeiro; João Borges de Sousa; P. B. Sujit

**[0038] Attitude Filter for Intervention-AUVs Working in Tandem with Autonomous Surface Craft**

Marco Morgado; Pedro Batista; Paulo Oliveira; Carlos Silvestre

**Technical session Th1A – Industry Developments - April 12, 2012**

**[0014] Obstacle Avoidance of Autonomous Underwater Vehicle by Using Streamline Function**

Jooni Sur; Yongook Lee; Hyun-Taek Choi

**[0021] Interesting (?) Applications for Acomms**

Dale Green; Justin Manley

**[0045] Experimental Performance of a Hydro-Acoustic USBL-Aided LBL Positioning and Communication System**

Konstantin Kebkal; Oleksiy G. Kebkal; Sergei G. Yakovlev; Rudolf Bannasch

**[0046] Communications Architecture of the Liquid Robotics Wave Glider**

Robert A. Olson

**[0061] Lowered ADCP Techniques Applied to Real-Time Navigation of a Descending UUV**

Brandon Strong; Blair Brumley

**[0060] Acoustic Guidance for Gavia Inertial Navigation System**

Helgi Thorgilsson; Eggert Jon Magnusson

**[0056] LAUV: The Man-Portable Autonomous Underwater Vehicle**

Alexandre Sousa; Luis Madureira; Jorge Coelho; José Pinto; João Pereira; João Borges de Sousa; Paulo Dias

## **Technical session Th1B – Operations - April 12, 2012**

**[0020] Experimental Verification of a Depth Controller Using Model Predictive Control with Constraints Onboard a Thruster Actuated AUV**

Leo V. Steenson; Alexander B. Philips; Eric Rogers; Maaten E. Furlong; Stephen R. Turnock

**[0010] Smart ROV LATIS in Action: Sea Trials**

Edin Omerdic; Daniel Toal; Gerard Dooly; Liam Miller; Joseph Coleman

**[0044] AUV Based Multi-vehicle Collaboration: Salinity Studies in Mar Menor Coastal Lagoon**

J. González; I. Masmitjà; S. Gomáriz; E. Molino; J. del Río; A. Mànuel; J. Busquet; A. Guerrero; F. López; M. Carreras; D. Ribas; A. Carrera; C. Candela; P. Ridaó; J. Borges de Sousa; P. Calado; J. Pinto; A. Sousa; R. Martins; D. Borrajo; A. Olaya; B. Garau; I. González; S. Torres; K. Rajan; M. McCann; J. Gilabert

**[0017] Joystick in Closed-loop Control of ROVs with Experimental Results**

Fredrik Dukan; Asgeir Johan Sørensen

**[0053] Triennial Appraisal of the ROV LUSO Project**

A. Calado; A. Afonso; Nuno Lourenço; M. Abreu

**[0023] A Real-time Underwater Object Detection Algorithm for Multi-beam Forward Looking Sonar**

Enric Galceran; Vladimir Djapic; Marc Carreras; David P. Williams

## **Technical session Th2A – Vision and Estimation - April 12, 2012**

**[0004] Limitations of Vision Guided Underwater Navigation**

Maria E. Angelopoulou; Chourmouziou Tsotsios; Maria Petrou

**[0011] Texture Segmentation Applied to P. Oceanica Beds' Upper Boundary Tracking by ROVs**

Matko Barisic; Dula Nad; Antonio Vasilijevic

**[0029] A Comparison between Different Feature-based Methods for ROV Vision-based Speed Estimation**

Fausto Ferreira; Gianmarco Veruggio; Massimo Caccia; Gabriele Bruzzone

**[0033] Optimal Number of Image Keypoints for Real Time Visual Odometry**

Nannen, Volker; Oliver, Gabriel

**[0018] GAS Ocean Current Estimation with Limited Velocity Readings**

Pedro Batista; Carlos Silvestre; Paulo Oliveira

**[0041] Analysis of a Multi-Objective Observer for UUVs**

Mauro Candeloro; Fabio Dezi; Asgeir J. Sørensen; Sauro Longhi

**Technical session Th2B – EU FP7 Projects in Marine Robotics - April 12, 2012**

**[0019] The European R&D-Project MORPH: Marine Robotic Systems of Self-organizing, Logically Linked Physical Nodes**

Joerg Kalwa; António Pascoal; Pere Ridao; Andreas Birk; Mike Eichhorn; Lorenzo Brignone

**[0031] TRIDENT: Recent Improvements about Autonomous Underwater Intervention Missions**

Pedro J. Sanz; Pere Ridao; Gabriel Oliver; Giuseppe Casalino; Carlos C. Insaurralde; Carlos Silvestre

**[0042] Cooperative Cognitive Control for Autonomous Underwater Vehicles (CO3AUVs): Overview and Progresses in the 3<sup>rd</sup> Project Year**

Andreas Birk; Antonio Pascoal; Gianluca Antonelli; Andrea Caiti; Giuseppe Casalino; Giovanni Indiveri; Andrea Caffaz

**[0058] PANDORA: Persistent Autonomy through Learning, Adaptation, Observation and Re-planning**

David M. Lane; Francesco Maurelli; Tom Larkworthy; Darwin Caldwell; Joaquim Salvi; Maria Fox; Konstantinos Kyriakopoulos

**[0051] The NOPTILUS Project: Autonomous Multi-AUV Navigation for Exploration of Unknown Environments**

S.Chatzichristofis; A. Kapoutsis; E. B. Kosmatopoulos; L. Doitsidis; D. Rovas; João Borges de Sousa

**[0026] Further Results on Selective Tidal Stream Transport for Lagrangian Profilers**

Dongwei Han; Jerome Jouffroy

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