



STRONG MAR

Strengthening Maritime Technology
Research Center

Thematic Workshop on Deep Communications

Programme



The STRONGMAR project is funded by the European Commission under the H2020 EU Framework Programme for Research and Innovation (H2020-TWINN-2015, 692427).

6th October 2017
University of Algarve,
Faro, Portugal



STRONG
MAR

DEEP COMMUNI- CATIONS THEMATIC WORKSHOP

ORGANIZER



www.strongmar.eu

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1 – INTRODUCTION

Dear all participants, welcome to the Thematic Workshop series in the **STRONGMAR** project.

The aim of **STRONGMAR** is to create solid and productive links in the global field of marine science and technology between INESC TEC and established leading research institutions in Europe, that are capable of enhancing the scientific and technological capacity of INESC TEC and linked institutions, thereby helping raising research profile of its and its recognition as a European maritime research center of excellence.

Thematic workshops are designed to provide faster scientific exchange mechanisms, by bringing together small to medium groups of researchers around specific topics. The anticipated outcomes of the workshops are exchange of ideas, research collaborations, and submission of joint research proposals.

Let us picture a scenario of great biologic and oceanographic interest, as is the case of the “Mid Atlantic Ridge” close to the Azores, which comprises a series of seamounts and hydrothermal vents fostering a rich ecosystem of diverse aquatic plants, animal life and rich deposits of ore. A long-term scientific observation and monitoring of such a site requires a number of bottom and mid water permanent or semi-permanent sensors as well as autonomous vehicles for close visual inspection and information gathering which, as a whole, represents a challenge with current technology. The typology of the data communication system required for such purpose is diverse and specific: horizontal short range between bottom network nodes and long range vertical links to the surface; encompassing various data rates, bandwidths and modulations, aiming at high efficiency levels and high robustness, all together not available at present time.

This thematic workshop (Deep Communications) aims at discussing the challenges imposed by the deep oceanic environment to underwater communications, to address the ground truth of current solutions and to discuss future trends and limits. It aims to bring together a group of experienced experts with different backgrounds, interested in ocean monitoring and exploitation, and to provide a share of experiences and an open discussion on the needs and solutions for the deep-water data-accessibility problem.

The **STRONGMAR** team.

2 – VENUE

The Thematic Workshop (Deep Communications) will be held on 6th October 2017 at Teresa Gamito auditorium at Gambelas Campus of the University of Algarve.



Address: University of Algarve, Campus Gambelas, Faro Portugal

Maps: <https://goo.gl/maps/pM2seNnbkzx>

Website: www.ualg.pt



3 – PROGRAMME

Day: 6th October 2017

Venue: Teresa Gamito Auditorium

Time: 10:00 – 17:00

Session 1 (10:00 – 12:00)

“Underwater technology for deep ocean research: what are scientists looking for?”

Dr. Marina Carreiro-Silva, Associate Researcher at IMAR/MARE-Azores, Portugal

“Underwater robotics: communications and navigation requirements”

Dr. Aníbal Matos, Coordinator of the Centre for Robotics and Autonomous Systems at INESC TEC, Porto, Portugal

“Next generation of acoustic networks for AUV localisation: experience from the field.”

Dr. Andrea Munafò, Senior Scientist and Engineer in the Marine Autonomous and Robotics System (MARS), Southampton, UK

Session 2 (14:00 – 17:00)

“Architectures and algorithms for underwater acoustic communication systems”

Dr. João Gomes, Assistant Professor in the Instituto Superior Tecnico, Lisboa, Portugal

“Connecting the subsea world with sound and light”

Dr. Darryl Newborough, Technical Director at Sonardyne, U.K.

“Which waveform design for underwater acoustic communication? Why is it more difficult to provide an efficient underwater acoustic communication than a radio-mobile or satellite communication?”

Dr. Christophe Laot, (full) Professor, Signal and Communications department, IMT Atlantique, Brest, France

“Broadband underwater communications with polymeric acoustic transducers”

Dr. António Silva, Professor of the DEE of the University of Algarve, Faro, Portugal

5 – SPEAKERS



Marina Carreiro-Silva

Dr. Marina Carreiro-Silva, Associate Researcher at IMAR/MARE-Azores, Portugal.

Dr Marina Carreiro-Silva is a marine biologist with a PhD in "Marine, Estuarine and Environmental Sciences" by the University of Maryland, USA and a MSc degree on "Marine Environmental Protection" by the University of North Wales, UK. She works as an associate researcher at IMAR/MARE-Azores on the biology and ecology of deep-sea coral ecosystems. Her research activities focus on the (1) study of the impacts of climate change on cold-water coral physiology and of reef framework destruction by bioerosion processes, (2) cold-water coral biology (age, growth, reproduction); (3) taxonomy of corals and associated fauna, and (4) technological tools for coral habitat mapping. She has been involved in several national and international research projects on cold-water coral ecosystems (FCT, EU FP7, H2020) as a team member or coordinator.



Aníbal Matos

Dr. Aníbal Matos, Coordinator of the Centre for Robotics and Autonomous Systems at INESC TEC, Porto, Portugal.

Aníbal Matos received a PhD in Electrical and Computer Engineering from Porto University in 2001. He is currently coordinator of the Centre for Robotics and Autonomous Systems at INESC TEC and also assistant professor at the Faculty of Engineering of Porto University. His main research interests are related to perception, sensing, navigation, and control of autonomous marine robots, being the author or co-author of more than 80 publications in international journals and conferences. He has participated and lead several research projects on marine robotics and its application to monitoring, inspection, search and rescue, and defence.



Andrea Munafò

Dr. Andrea Munafò, Senior Scientist and Engineer in the Marine Autonomous and Robotics System (MARS) Group of the National Oceanography Center in Southampton, UK.

Dr. Andrea Munafò received the BSc in Computer Science Engineering, the MSc in Automation Engineering and the PhD in "Automation, Robotics and Bioengineering" from the University of Pisa, Italy, in 2002, 2005 and 2009, respectively. From 2009 to 2013 he worked as a post-doc student at the Inter-University Centre on Integrated Systems for the Marine Environment in Italy. He joined the NATO STO Centre for Maritime Research and Experimentation (CMRE), La Spezia, Italy from 2013 to 2016 as a Research Scientist, working in the field of cooperative underwater robotics and underwater communications. Since 2017, he is a Senior Scientist and Engineer in the Marine Autonomous and Robotics System (MARS) Group of the National Oceanography Center in Southampton, UK, where he is leading the development of novel on-board autonomy solutions. He has published more than 50 scientific papers and book chapters. His research interests include underwater robotics, underwater acoustics and sonar systems, adaptive planning and oceanographic sampling.



João Gomes

Dr. João Gomes, Assistant Professor in the Instituto Superior Técnico, Lisboa, Portugal.

João Gomes received the Diploma, M.S. and Ph.D. degrees in electrical and computer engineering from Instituto Superior Técnico (IST), Lisbon, Portugal, in 1993, 1996 and 2002, respectively. He joined the Department of Electrical and Computer Engineering of IST in 1995, where he is presently an Assistant Professor. Since 1994 he has also been a researcher in the Signal and Image Processing Group of the Institute for Systems and Robotics, in Lisbon. He currently serves as an

Associate Editor for signal processing and communications in the IEEE Journal of Oceanic Engineering. His research interests include channel identification and equalization in wireless communications, underwater communications and acoustics, fast algorithms for adaptive filtering, and sensor networks. He has been involved in the design of underwater acoustic communication and localization systems in several national and international research projects.



Darryl Newborough

Dr. Darryl Newborough, Technical Director at Sonardyne, UK.

Appointed in 2015, Darryl is the Technical Director at Sonardyne. Although new to the Board, Darryl's career with Sonardyne began in 2002 as a development engineer, after completing his Ph.D at Loughborough University in 2002. During his time with Sonardyne, Darryl has held a variety of senior engineering leadership positions

leading up to his appointment as Director of Subsea Development in 2010. Throughout this time, he has been instrumental in maintaining Sonardyne's enviable reputation for innovation and performance, a reputation that now extends far beyond acoustic navigation into inertial, optical and sonar technologies. Darryl holds a number of patents, a Ph.D, is a Bachelor of Engineering, is a Chartered Engineer, a Member of the Institute of Engineering Technology and Institute of Directors.



Christophe Laot

Dr. Christophe Laot, (full) Professor, Signal and Communications department, IMT Atlantique, Brest, France.

Christophe Laot (M'07-SM'12) was born in Brest, France, on March 12, 1967. He received the Eng. degree from the Ecole Francaise d'Electronique et d'Informatique (EFREI), Paris, France, in 1991 and the Ph.D degree from the University of Rennes, France, in 1997. In 1997, he joined the Signal and Communications department, IMT Atlantique,

Brest, France, as an Associate Professor. Since 2013, he has been (full) Professor in the same institution. His research interests lie in the areas of communications and signal processing, including equalization, turbo-equalization, iterative receivers for interference cancellation, synchronization and underwater acoustic communications. Dr. C. Laot is member of the IEEE communication society and vice-chair (Europe) of the technology committee "Underwater Communication, Navigation and Positioning" for the IEEE Oceanic Engineering Society.



António Silva

Dr. António Silva, Professor of the department of electric and electronic engineering of the University of Algarve, Faro, Portugal.

Eng. António Silva received a degree in Electronic Engineering from the University of Trás-os-Montes e Alto-Douro, Portugal, in 1992, an MSc in Digital Signal Processing from the University of Algarve, Portugal, in 1998 and PhD in Electrical and Computing Engineering from the Technical University of Lisbon – IST, Portugal, in 2008. Currently, he share his time between research in Underwater Acoustics (namely in Environmental Based Communications), developing hardware systems for underwater applications and as Assistant Professor at the University of Algarve.