

2015 SIDRA PhD School on
Underwater Robotics
 Bertinoro, Italy, July 16-18 2015
www.automatica.it/dottorato_scuole.htm

coordinator: Gianluca Antonelli **lecturers:** Pedro Aguiar
 Filippo Arrichiello
 Andrea Caiti
 Giuseppe Casalino
 Alessio Turetta
 David Scaradozzi

School objectives and program

The school has been designed with the aim to give to the PhD student a background in underwater robotics following a control perspective. The main aspects that characterize the underwater environment are presented both from the theoretical and technological aspect.

The introduction covers the current state of the art in underwater applications, how operations such as exploring or intervention are currently implemented by the industry and research centres. Then, the projects running in Europe under FP7 and H2020 funding schemes are briefly presented in order to give a bird's eye of the topics of interest under the research perspective. A quick overview of a couple of national projects is also given.

Modeling of a rigid body submerged in a fluid is presented together with the main hydrodynamic effects. The terms of interest within the operative ranges of automatic control applications will be illustrated. The mathematical model of a vehicle carrying a manipulator is then discussed. In order to better appreciate the control issues, the actuation and sensing devices are shown with the aim to appreciate their role within a feedback loop.

Given those basis, the methodological part follows a classical Navigation, Guidance and Control division. This will represent the theoretical core of the school.

The school also schedules some applicative talks concerning multiple vehicles, underwater photogrammetry and the witness of a successful university spin-off working in marine robotics.

Legend	
blue	technical/applicative content
yellow	break
white	methodological

Day 1 - Thursday 16 July 2015		
9.00-10.30	Introduction	Antonelli
coffee break		
11.00-12.30	Modeling	Casalino
lunch		
15.00-16.30	Modeling	Casalino
coffee break		
17.00-18.30	A successful industrial experience	Turetta

Day 2 - Friday 17 July 2015		
9.00-10.30	Sensing & communication	Caiti
coffee break		
11.00-12.30	Navigation	Caiti
lunch		
15.00-16.30	Guidance	Aguiar
coffee break		
17.00-18.30	Control	Aguiar

Day 3 - Saturday 18 July 2015		
9.00-10.30	Multiple vehicles	Arrichiello
coffee break		
11.00-12.30	Photogrammetry	Scaradozzi