

Simulation tools for Autonomous Docking

ENSTA Bretagne



NICOLAS BAUDIN
INTERNSHIPS IN FRANCE INITIATIVE

Name of the hosting institution in France	ENSTA Bretagne
Name of the host laboratory / research team	Lab-STICC UMR 6285
Address	ENSTA Bretagne/Lab-STICC, 2 rue François Verny, 29806 Brest Cedex9
Website	www.labsticc.fr
Name of the supervisor	Benoît CLEMENT
Function	Professor
Email	benoit.clement@ensta-bretagne.fr
Phone number	+33 (0)2 98 34 89 70

Internship offer

Topic of the internship (title)	Simulation tools for Autonomous Docking			
Proposed dates of the internship	Start	01/12/2021	End	30/04/2022

Scientific and academic objectives of the internship:

Autonomous underwater vehicles (AUVs) are increasingly being used for underwater survey and exploration missions. The expanding mission scope for AUVs highlights the need for a long-endurance operational capability, which mainly depends on propulsion system efficiency and battery capacity. The use of submerged docking stations permitting battery recharge and data download/upload offers a means of enabling persistence without compromising propulsion and payload power budgets, while also reducing associated deployment recovery costs and risks. Autonomous docking with an underwater station is, however, complicated by the presence of currents and obstacles in the water, and by the relative dynamic differences in pose between the dock and the vehicle. A robust docking guidance system is identified as a core and crucial component for ensuring successful AUV docking. This project aims to increase robustness for these systems.

The proposed internship objective is to provide:

- 1/ a state-of-the-art of the commonly used algorithms
- 2/ various realistic scenarii and their translation into optimal control
- 3/ some simulations providing pros and cons

Industrial partner

Name	Thales
Role of the industrial partner in the internship project	Thales, Flinders University and ENSTA Bretagne are collaborating on the development of control and guidance algorithms for the docking issue. The three groups have complementary expertise in maritime autonomy. The development of docking algorithms would be desirable to support the research cooperation.
Main contact	Andreas ARNORLD
Email	andreas.arnold@fr.thalesgroup.com

Australian partner

Name of the Australian partner institution	Flinders University
Lab/department/team involved in the collaboration	Centre for Maritime Engineering
Main contact in the Australian partner institution	Prof. Karl SAMMUT
Function	Professor
Email	karl.sammud@flinders.edu.au
Outside of this ongoing collaboration, will students from other Australian universities be considered by the hosting institution in France?	Yes

Expected profile of applicant

Level of study	Master or Bachelor with honours
Discipline	Physics and/or Robotics
Prerequisite knowledge, qualities and skills	Required (Programming in Matlab and C++, Control Systems), Desirable(programming in Python and ROS)