

Mosaicking of ROV underwater video

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
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Web site	www.labsticc.fr
Name of the supervisor	Isabelle QUIDU
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Internship offer

Topic of the internship (title)	Mosaicking of ROV underwater video			
Proposed dates of the internship*	Start	2020-10-04	End	2021-03-31

* The supervisors have indicated the dates proposed are flexible and are able to be postponed subject to COVID-19 border closures.

Scientific and academic objectives of the internship (detailed description of the internship content, work expected from the intern and expected outcomes):

The Underwater Systems business line of Thales DMS develops innovative systems for detection, classification, localization and identification of underwater threats like mines or IED. Deployment of unmanned systems into operational forces, required to address new type of mission, generates a multiplication of payloads and huge quantity of data. This data need to be analyzed as quickly as possible. Remotely Operated Vehicle fitted with underwater cameras are used to relocalize and identify underwater objects. The goal of this internship is to design and implement a Prof Of Concept of ROV video Mosaicking function in order to the cognitive workload of operators. There will be 2 mains activities :

- Transform the video flux into a 2D map to be displayed in a GIS in order to help operator to establish the global situation and relocalize the suspicious object.
- Process the data in order to realize a 3D reconstruction of the suspicious object to make the identification simpler. The candidate will spend is time both at laboratory and industrial places. During the industrial time, the candidate will be integrated in the Digital eXperience laboratory composed of software developer & data scientists.

Main steps will be:

- Appropriation of data format (video and vehicle attitude data)
- Denoising and improvement of video quality
- Projection of sonar images in order to generate a 2D map
- Integration of the map in the existing GIS
- Prof of Concept of local 3D reconstruction based on video data.
- Estimation of limitation & accuracy of reconstruction

Name of industrial partner	Thales Defence Mission Systems France- UWS
Role of the industrial partner in the internship project	Thales will provide real data sets of underwater ROV videos and expertise in deep learning systems development. Thales will also participate to the management/coaching of the internship.
Main contact at the French industrial partner	Julien Ferrand
Email of contact at French industrial partner	Julien.ferrand@fr.thalesgroup.com

Expected profile of applicant

Level of study	Master, Bachelor with Honours
Discipline	Computer Science, machine learning, 3D development
Required qualities, knowledge and skills	Knowledge : Required: Python, Machine Learning, image processing Desirable: Java development, Dockerisation Behavior : Curiosity, Motivation, Autonomy Keywords : Deep learning, image processing, User Experience