

*Post-Doc position open*  
**Flash-Based visual SLAM for UAV**

<https://bit.ly/3qNuTeB>

## 1 Context

The ANR Dark-NAV project aims to make a multirotor to navigate in the darkness of subterranean facilities. We are willing to equip a multirotor UAV with flash-based photolocation system inspired by the flashlight fish. The flashlight fish illuminates its visual scene by triggering and modulating a striking bioluminescent flash as it swims through coral reefs (Fig 1-left).

The scientific objectives of this project will be the development of a flash-based stereo active photolocation sensor triggable on events. Then the idea is to use this stereo information to feed a new aperiodic visual *Simultaneous Localization And Mapping* (SLAM) algorithms. The key strategy will consist, in piloting the flashing frequency of the sensor according to the external illumination, the distance to obstacles, and the current speed of the UAV. The future targeted application carried by the industrial partner (SUEZ) is the autonomous inspection of empty water pipelines or tanks. This inspection is crucial for the maintenance of drinkable water infrastructures and to prevent unwanted pollution for example.

The Dark-NAV project is supported by a consortium of three laboratories (GIPSA-Lab in Grenoble, ISM in Marseille and ICube in Strasbourg) have strong experiences in vision and advanced robotics control. The project also include the industrial partner SUEZ-SERAMM that uses drones for inspection and maintenance of water pipes (Fig 1-right).



Figure 1: Left) Flashlight fish. Right) Inspection of water tunnel with UAV by SUEZ (typical application of the Dark-NAV project).

## 2 Objectives

This post-doc will focus on the aperiodic and self-triggerred SLAM part of this project.  
The main missions will be to :

- adapt and improve a RGB-D localization and mapping algorithm to maintain a robust and accurate pose of the drone despite temporally spaced image acquisitions;
- develop different strategies to make decisions on the capture of new flash images;
- experiment and evaluate the results on real drone with on board sensors and embedded computer.

### 3 Skills

The candidate must have a Ph.D. in robotics and computer vision. The following skills are required :

- Programming skills (mainly C++, knowledge in Cuda would be appreciated).
- Good knowledge in sensor fusion and image analysis.
- Writing skills and good level of English.
- Interest in teamwork, open-mindedness to dialogue with thematic experts from other disciplines.

### 4 Environment

The post-doc will be integrated to the COPERNIC team, in the GIPSA-Lab laboratory, in Grenoble and will have strong interaction with the BIOROB team, at the ISM laboratory (Marseille) and with all other partners of the Dark-NAV project. The COPERNIC team have these last years new SLAM algorithms based on supersurfel.

Grenoble is located at the heart of the French Alps, between the Chartreuses and Vercors mountains. The Grenoble area is at the forefront of urban ecology in France with new tramways and first-class bicycle facilities. The Grenoble site is today an important European research and innovation campus, but also a pleasant site for skiing and hiking.

### 5 Contract details

- Remuneration depending of the experience ; Gross salary : between 2'660 and 3'781 euros per month; Net salary : between 2'100 and 3'000 euros per month
- Duration : 12 months renewable for at least 12 months

#### Collaborators

- Amaury Nègre, CNRS Research Engineer, GIPSA-Lab, Grenoble, France
- Michèle ROMBAUT, Professor Univ. Grenoble Alpes, GIPSA-Lab, Grenoble, France
- Franck RUFFIER, CNRS senior research scientist, ISM, Marseille, France

### Application

To apply, click to the following link and fill the application form :

<https://bit.ly/3qNuTøB>