# Proposal 2015-2016

## Topic #1 - Development of a parametric aerodynamic model of a micro-drone and performance optimization

### Contacts


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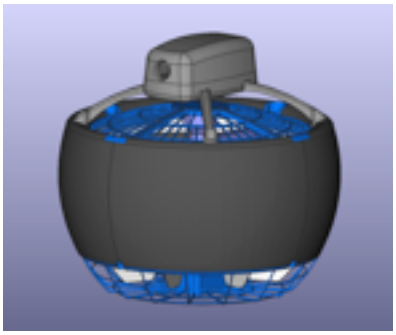
### Context

Fleye is a spherical micro-drone weighing approximately 350g, having a diameter of around 220 mm. It is intended for short-duration aerial filming at low altitudes and speeds. It is made of single propeller within a protective duct. Attitude controls is realized thanks to four controls vanes located below the propeller. A first prototype has been built and tested in the wind-tunnel (March-April 2015). The R&D activities on that prototype are being finalized and the airframe design is frozen.



### Objectives

The objective of this final year project is to draw the main lines of Fleye 2.0, the next generation, which will be faster and smaller. It will be coupled with a long internship (min 80 days). The bulk of the work will be carried out at the company site and at the wind tunnel laboratory of University of Liège.

The internship includes the following tasks:

- Design of the support for the drone and 6-components force-moment sensor in the wind-tunnel, including a electromechanical system to adjust quickly the tilt angle of the drone during the test.
- Realization of an automatized test process to be able to perform numerous test quickly: writing software and interface activities between the sensor acquisition system and the tilt control actuator.
- Design with CAO tools of the required interfaces parts and modification to the prototype to increase stiffness.
- Carrying out of the test in the wind-tunnel.

The TFE will consist in:

- Literature research about ducted fan model and performances
- Building a parametric aerodynamic model of the drone
- Processing of the wind tunnel data
- Fitting of the model with the measured data
- Optimization of the model (size of the propeller, length of the duct, surface of the flaps, position of battery, etc..) to meet given criteria (max cruise speed, maximum gust wind) and minimize the size.