

Research project offer

Location : ISAE SUPAERO, Toulouse, France

Department : DISC

Research group : Decisional Systems / Embedded Systems Engineering

Supervisor : Eric Razafimahazo (PhD Student), Pierre de Saqui-Sannes, Rob Vingerhoeds

Email : rob.vingerhoeds@isae-sup aero.fr

OFFER DESCRIPTION

Title : Modelling of Drones for Building Inspection

Proposed duration and period : 6 months, e.g. March-August 2021

Context
(max 10 lines)

At the time of the Building Information Methodology (BIM) and digital twins, the digitization of the existing is today of capital importance both on its geometrical and semantic aspects, to optimize knowledge and management of the building (or even a park of buildings, or a city), and offer support for the uses of today and tomorrow. However, these operations are still tedious and time consuming today. They are subject to an abundance of service offers based on very diverse precision, resolution and quality materials. There are many manual or semi-automatic steps, in particular as regards the recognition of entities and their useful characteristics within point clouds, 3D meshes or resulting photos. Finally, the knowledge acquired is often insufficient to address the demanding expectations of energy and environmental imperatives (linked to climate change) and more generally the revolution in uses linked to the digital transition, in line with the concept of BaaS (Building as a Service). This project aims at contributing to solutions for these challenges.

Objectives and work
(max 20 lines)

Inter-institute, inter-disciplinary topic in cooperation with a PhD student: Application of model-based systems engineering for the development of a building inspection drone.

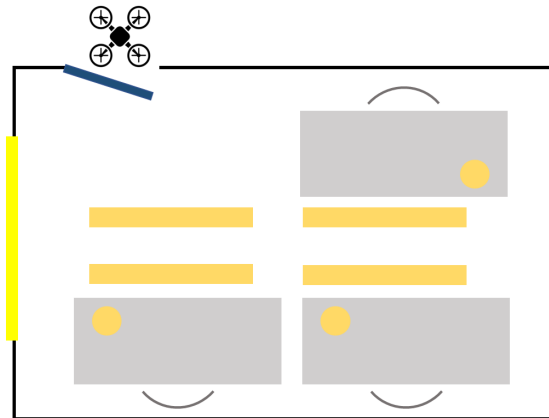
Uses of drones for building inspection can be for example:

- The automatic production of digital models for the operation / maintenance or renovation of the building.
- Detection of disorders (cracks, infiltration, pests, etc.)
- Estimating energy performance and building comfort: recording of acoustic / outdoor (indoor / outdoor), thermal, hygrometric, light performance / nuisance ...
- Operations aimed at guaranteeing the safety and security of residents: evacuation plans, exploration within the framework of search / rescue operations, inspection of buildings in danger order, etc.

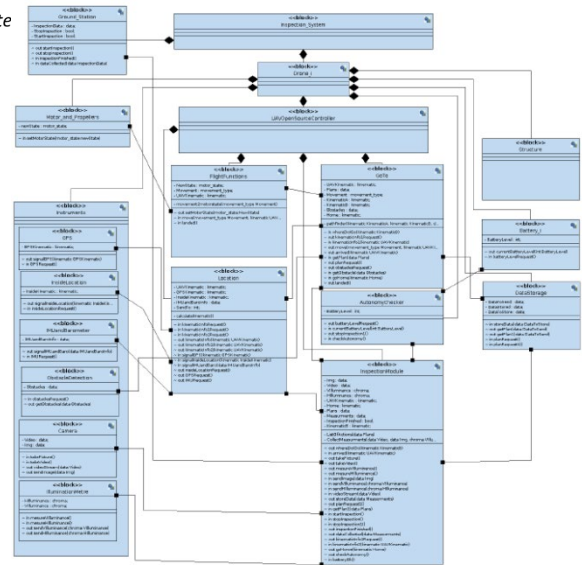
Besides challenges on the data and its treatment that such a drone captures and on the drones themselves (how to move in unknown and confined environments, etc.), there are also challenges on the associated systems engineering methods (impact design and operation of such autonomous drones, models and their methods, languages and modeling tools, impact on the safety and security, and trade-offs for drones and / or their subsystems).

Within the framework of the internship, a contribution is expected as to the modelling of the drone and/or its subsystems, starting from the requirements expressed by the stakeholders. Use will be made of SysML as modelling language, language that can be learned as part of the internship.

Etude de cas:



- Mobilier
- Sources artificielles
- Sources naturelles
- Porte



Possibility to continue with a PhD (Yes/No) : Yes (funding to be discussed)

REQUIRED APPLICANT PROFILE AND SKILLS

Study level
(tick possible choices)

- Undergraduate students (3rd or 4th year)
- Master students (1st or 2nd year)
- PhD students

Required profile and skills

Design
Systems Engineering and Computer Science
Some knowledge on systems modelling is a plus (but not mandatory)

Other useful information

None