2020 TRAINING
Mission Studies for Space Applications

Training title: Mission planning for Earth observation constellations
Field: Research and Development, Applied Mathematics, Modelling and Simulation, Data Processing
Diploma: Engineering degree, Master of Science

Company background
Airbus Defence & Space, Space Systems, is the European leader in the field of optical Earth Observation systems. It is the pioneer company responsible for the development of the first Earth Observation space systems in Europe, starting with the SPOT family. Since this time, it has led the major European developments in those fields, through programs for space agencies, export solutions, or Airbus's own very-high resolution (VHR) earth observation satellites.

This evolution has allowed Airbus to develop a strong expertise in Mission Planning and Mission Analysis through the Mission Chain Department (TESUM). The department has grown significantly in recent years and now relies on about a hundred engineers.

Subject
The mission of Earth Observation satellites is to acquire images in response to requests coming from various users. Mission planning consists in computing the set of actions to be performed by the satellite at all times, according to the request properties and the systems limitations: agility, on-board memory, download capacity...

Mission planning algorithms therefore consist in optimizing the number and quality of acquired images (according to cloud coverage, depointing angles...), while taking into account all these physical constraints.

Thanks to lower costs for both satellite manufacturing and launchers, we can now consider relying on multiple satellites constellations in order to reduce significantly delays for shooting high resolution image requests from space (typically from several days to a couple of hours).

This trend leads to new challenges for efficiently operating a complex system made of a large number of satellites.

Internship description
Depending on the context and trainee profile, the internship will explore, prototype and validate new algorithms to optimize mission planning for Earth observation constellations:

- management of periodic requests (ensure a stable acquisition frequency with multiple opportunities but also conflicts with other requests)
- management of video acquisitions (including handovers between satellites)
AIRBUS
2020 TRAINING
Mission Studies for Space Applications

- Evolution towards continuous mission planning (for extreme tasking reactivity)
- Intertasking between satellites (for instance: reactivity optimization in the context of change detection)

Tasks and accountabilities
After having familiarized with the context, the trainee shall:

- Understand and assess existing algorithms,
- Search in literature for state of the art algorithms and possible alternatives,
- Prototype the selected solution(s),
- For each use-case, define rigorously the methodology before starting simulation campaigns:
  - Build a reference dataset
  - Define key performance indicators.
- Organize, plan and report the activities – work in connection with Mission experts and engineers – communicate results to the other team members.

Required skills
- Background in applied mathematics, in statistics, in simulation and modeling.
- Software development Skills: python and/or java.
- Good capacity to take initiative.
- French or English: negotiation level.
- Background or strong interest in space systems.

You are a good team player and have excellent interpersonal skills.

Desired education
- Engineering school or Master

Training duration 6 months in 2020 – Ideally starting between February and May
Training Location Airbus Defence & Space
31 rue des Cosmonautes – 31402 Toulouse Cedex 4
Contact Thibaut WENGER Thibaut.wenger@airbus.com

HASTA 3-11-2019