EIDGENÖSSISCHE TECHNISCHE HOCHSCHULE LAUSANNE
POLITECNICO FEDERALE DI LOSANNA
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FACULTE SCIENCES ET TECHNIQUES DE L'INGENIEUR

LABORATORY OF INTELLIGENT SYSTEMS (LIS)

CH - 1015 LAUSANNE

ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

SEMESTER PROJECT

Title: Bandwidth efficient object recognition for drone swarms

Student(s): Marco Zoveralli (IN)

Professor: Dario Floreano

Assistant 1: Giuseppe Cocco   **Assistant 2:** Fabian Maximilian Schilling

Project description:

The project aims at developing a bandwidth efficient distributed object detection system which can be flown on a drone swarm. The system exploits the different points of view of the drones in the swarm to improve object recognition, while keeping the amount of data that is transmitted to the ground station as low as possible. In this way a more efficient use of the limited wireless resources can be achieved. The projects will involve the use of both off-the-shelf neural network algorithms and WiFi communication protocols.

The first part of the project will focus on the setup of the communication network between the communication modules to be mounted on the drones and the ground station.

The second part of the project will focus on the setup of the image capture/object recognition system and some basic onboard image processing. The core part of the project will consist in the implementation and optimization of the detection and communication protocol, which will build upon the modules developed so far.This part will include the evaluation of the system performance in terms of both bandwidth efficiency and detection accuracy.

Remarks:

You should present a research plan (Gantt chart) to your first assistant before the end of the second week of the project. An intermediate presentation of your project, containing 8 minutes of presentation and 7 minutes of discussion, will be held on October 30, 2018. The goal of this presentation is to briefly summarize the work done so far and discuss a precise plan for the remaining of the project. Your final report should start by the original project description (this page) followed by a one page summary of your work. This summary (single sided A4), should contain the date, laboratory name, project title and type (semester project or master project) followed by the description of the project and 1 or 2 representative figures. In the report, importance will be given to the description of the experiments and to the obtained results. A preliminary version of your report should be given to your first assistant at the latest 10 days before the final hand-in deadline. 2 copies of your final version, signed and dated, should be brought to your first assistant before noon January 11, 2019. A 20 minute project defense, including 5 minutes for discussion, will take place between January 14 and January 25, 2019. You will be graded based on your results, report, final defense and working style. All documents, including the report (source and pdf), summary page and presentations along with the source of your programs should be handed in on a CD on the day of the final defense at the latest.

Responsible professor: Responsible assistant:

Signature: Signature:

                                    Dario Floreano   Giuseppe Cocco

Lausanne, 18 September 2018