

SUPERVISOR: Ir. Roberto Suarez Raspopov

Background:

The port of Rotterdam is home to a very large number of industries such as oil&gas, maritime, chemicals and energy. These industries are large energy consumers and generate a substantial amount of contaminants. Many of these contaminants are sent directly into the atmosphere via stack emissions. Contaminants such as CO, CO2 and NOx represent a health hazard and cause acid rain. Due to the ports proximity to the city of Rotterdam, some of these pollutants can migrate into the city.

In a previous internship, an Inholland student developed a working prototype of a quadcopter which is capable to survey the CO2 concentration levels remotely (See figure 1).

The purpose of the present internship project is to improve various aspects of the first prototype and particularly the control system. One of the setbacks of the first prototype is that it requires a pilot for remote operation. The main goal of the student will be to develop control and operation schemes which allow the vehicle to safely fly on pre-established trajectories without operator intervention.

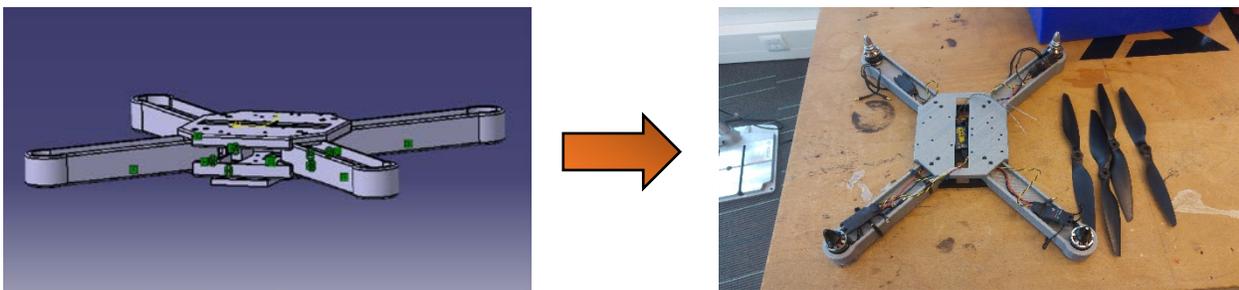


Figure 1: First prototype of the pollution survey drone created by an Inholland student.

Proposed activities:

- 1) Literature study and familiarization with previous project **(0.5 month)**
 - a. Literature survey on autonomous flying and control theory applied to quadcopters
 - b. Review of previous work and characteristics of the first prototype
- 2) Autonomous flying **(3 months)**
 - a. Investigate available control schemes for autonomous flight
 - b. Investigate available sensor technologies for autonomous flight
 - c. Program pre-established trajectories using GPS into the control unit of the drone
 - d. Test the drone performance
- 3) Improve design of the first prototype **(1.5 months)**
 - a. Frame/structure optimization
 - b. Weight and range optimization
 - c. Motor/propeller optimization
- 4) Write report & present results **(In parallel with the other activities)**

Observations:

Testing of the drone will be performed outside Inholland premises for safety.

Student requirements:

- 1) Solid theoretical background in **programming, math and control theory**
- 2) Good grades and sufficient credits for starting an internship
- 3) Proactive and capable to work independently
- 4) Good presentation & communication skills.

Interested students please contact Roberto Suarez for an interview/discussion.

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