Throw in the i-Drone

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Abstract

Although many consider drones to be toys, multiple industries, such as the agriculture and mining industry, already know what advantages professional Unmanned Aerial Vehicles (UAVs) can offer. However, many companies in the construction industry do not seem to be familiar yet with the possible advantages of UAVs for their projects. In our 3TU Lighthouse project "Throw in the I-drone" we, the University of Twente, Delft University of Technology, and BeemFlights, would like to make the construction industry aware of the possibilities UAVs have by demonstrating possible usages, by providing a protocol on how to use them and by simplifying the interpretation of data collected.

Keywords

drone; construction industry; Unmanned Aerial Vehicles; UAV

Throw in the iDrone
The thermography gap

HAND-HELD THERMOGRAPHY
For assessable static objects, such as walls, in micro details

GAP:
the iDrone

AERIAL THERMOGRAPHY
For static objects, e.g. roofs from the top view in macro details

Challenge
How to track constructed objects (roofs and walls) in flexible amounts of detail? How to continuously measure ongoing construction processes?

ADVANTAGES:
360°
QUICK

FRAMEWORK INVESTIGATION
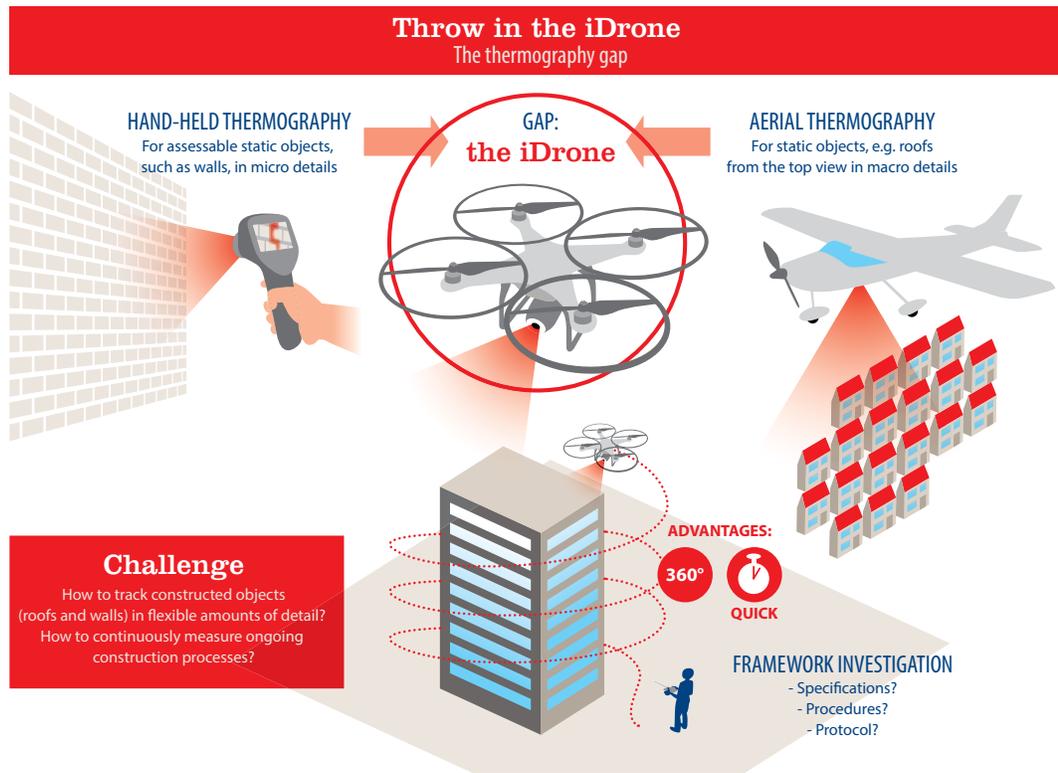- Specifications?
- Procedures?
- Protocol?

FIGURE 1 Graphical abstract

Background

Thermography enables us to distinguish surfaces with different temperatures. Temperature data from infrared cameras can, for instance, pinpoint flaws in the thermal shell of buildings or electric problems in the meter cup board. The application of thermography on buildings is already a well-known practice. Unfortunately, this process is tedious and time consuming. On the other hand, large-scale airborne temperature mapping is both applicable and useful to document temperature signatures on the scale of whole suburbs at once. Still, that method is expensive and less controllable. As a result, these micro- and macro-scale of temperature mapping solutions help specific niches, while the intermediate mesa-scale stays under explored.

Concept

The University of Twente, Delft University of Technology, and BeemFlights want to collaboratively challenge the current rules of temperature mapping by exploring this mesa-scale. We target to provide the

missing link for the micro to macro temperature mapping continuum. Specifically, we aim to leverage current advances in IR-technologies and remote control UAVs to fill this gap by utilising an "i-drone". The versatility of a UAV combined with enhanced IR vision enables new innovative type of temperature mapping, not available on micro and macro level.

This challenge has not widely been picked up by the construction industry, due to the risk of failing to repay the costs of the equipment. We expect it to open new horizons and enrich a number of practices. Among other tasks, the UAV will be very useful in monitoring building processes, studying the thermal losses of roof-systems, malfunctioning photovoltaic panels and for the inspection regarding building regulation. We will test the combination of UAV and IR cameras for constructions in use, e.g. dwellings, industrial buildings, and/or office buildings. In April, this already resulted in great footage to support our research and external communication. With the help of an UAV with a conventional camera a small movie, a so called teaser, was made to show the possibilities of drones with an infrared camera in the construction industry.

Method

In this project, we will plan to assess the potential impact of utilising drones in the construction industry by conducting interviews or taking questionnaires among construction companies, facility managers and building advisors. Furthermore, we will study how to integrate the data obtained by the UAV and the output of data analysis into standard automated assessment procedures, reducing the amount of time normally needed to select, prepare and analyse the data. We plan to test the i-drone and the new temperature mapping method for a building in use by the end of the year.

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