A drone in everybody's pocket

Bart Remes

In 2013

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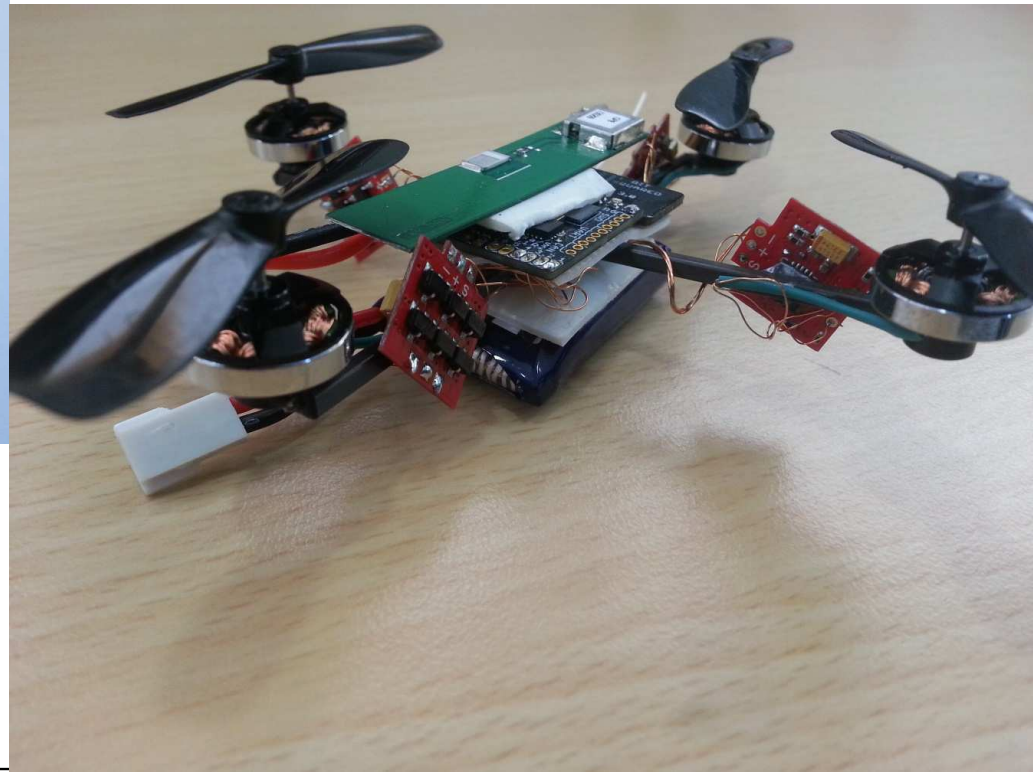

Properties Lisa S
http://paparazziuav.org/

Processing:
– 72MHz 32bit ARM Cortex M3 MCU with 16KB RAM and 512KB Flash

Sensing:
– 3-axis accelerometers, gyros, and magnetometer
– barometer
– uBlox GPS

Communication:
SuperbitRF

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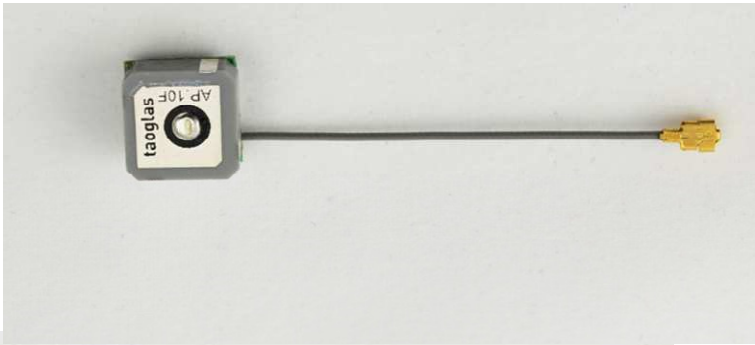

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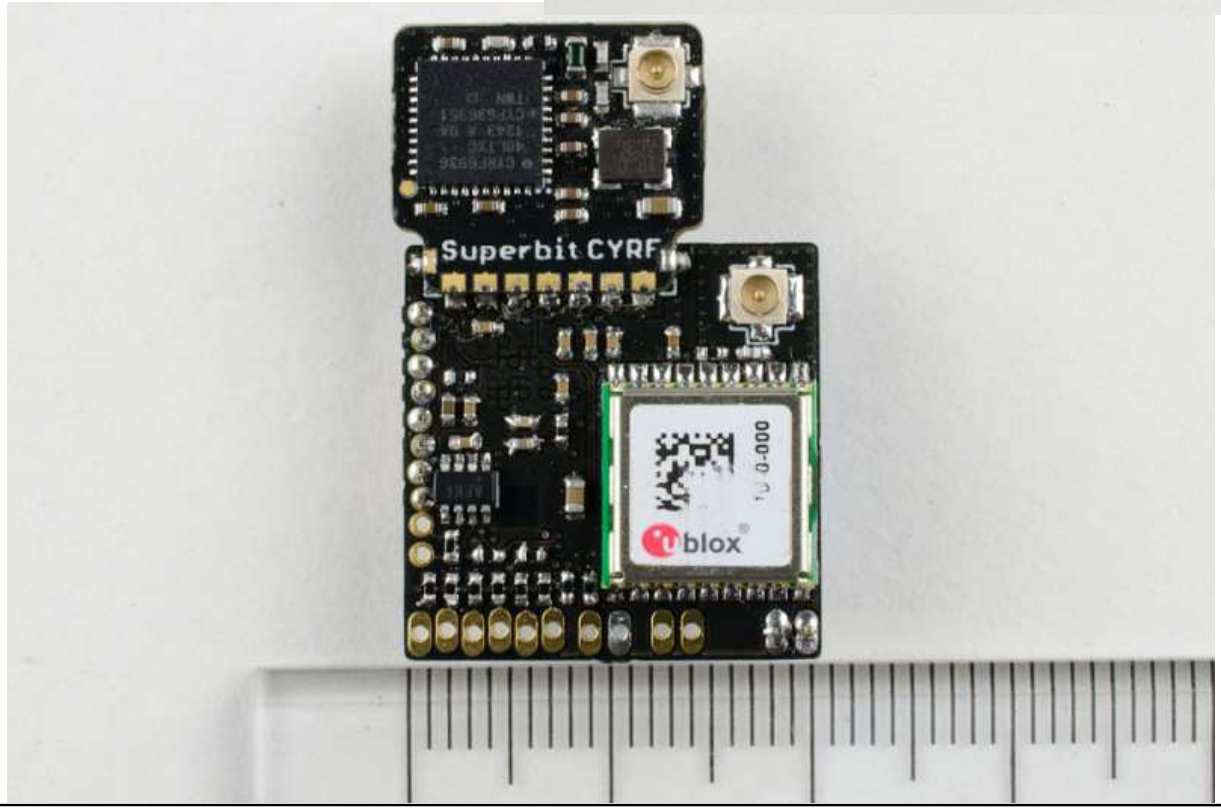

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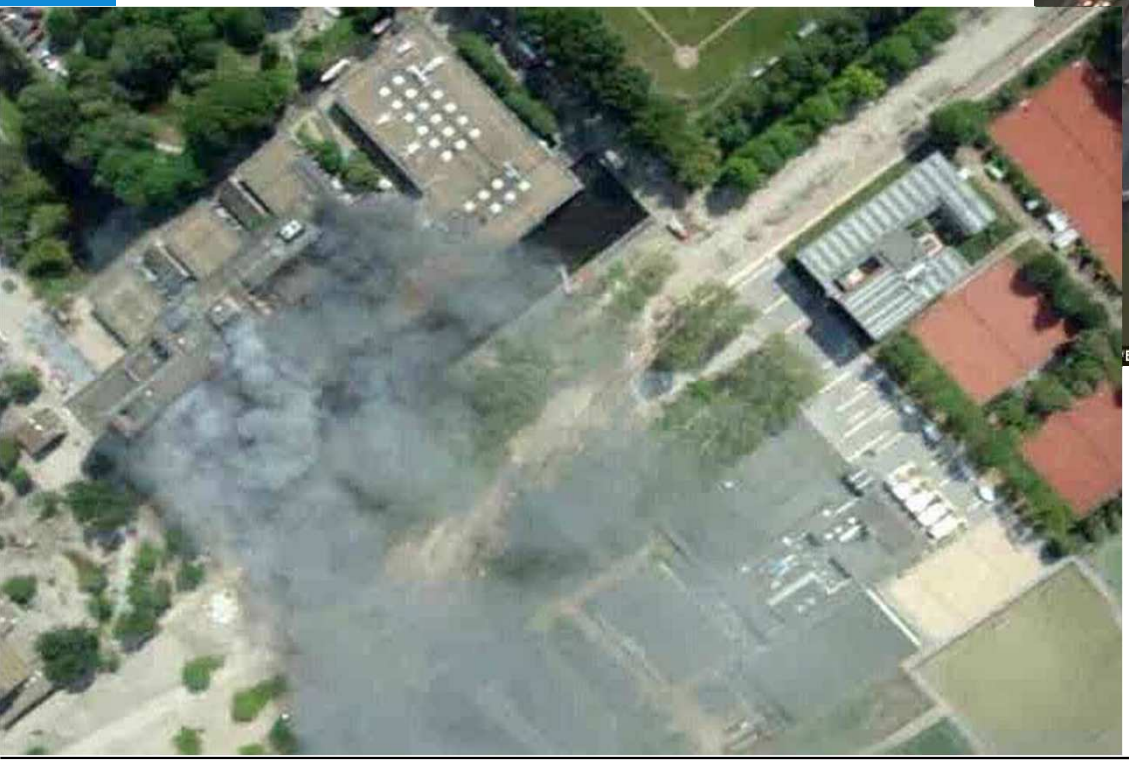

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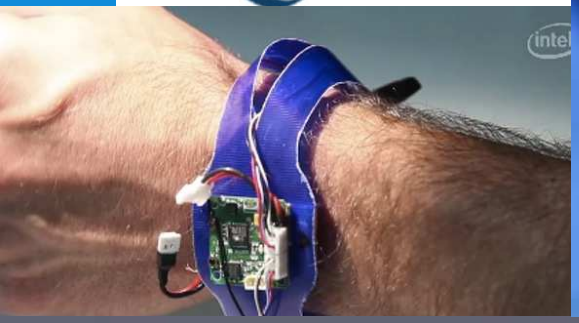

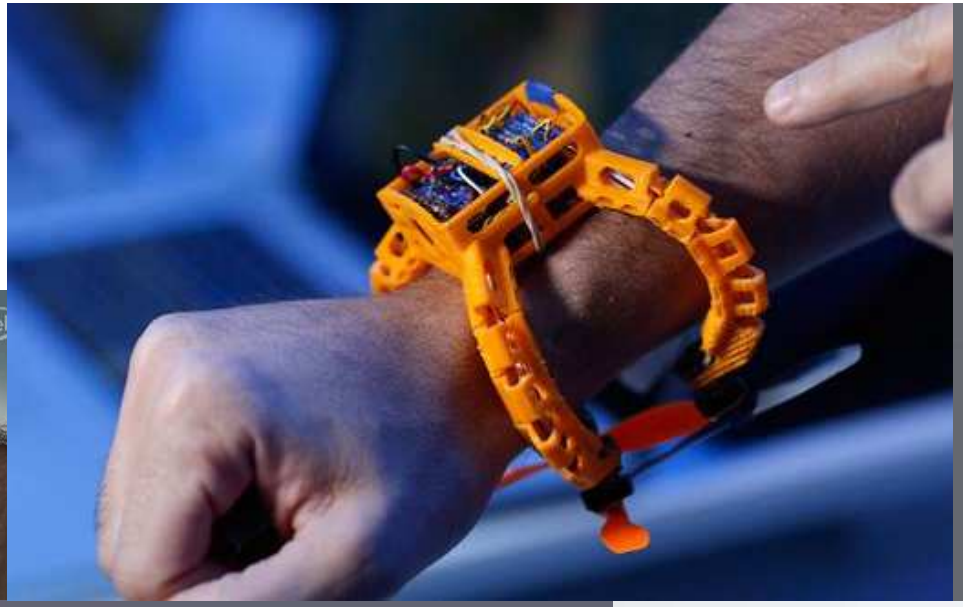

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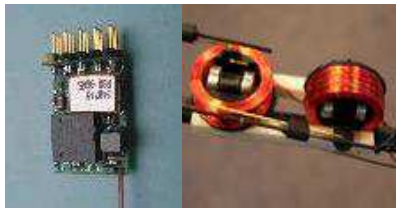
DelFly Introduction

- Evolved during the last 10 years
  - **September 2005** : DelFly I
    => 40cm span
  - **August 2006** : DelFly II
    => 28cm span
  - **July 2008** : DelFly Micro
    => 10cm span
  - **June 2010**: Autonomous
    => using camera and autopilot
  - **… 2015** Tail less
    => controlled only by wing deformation

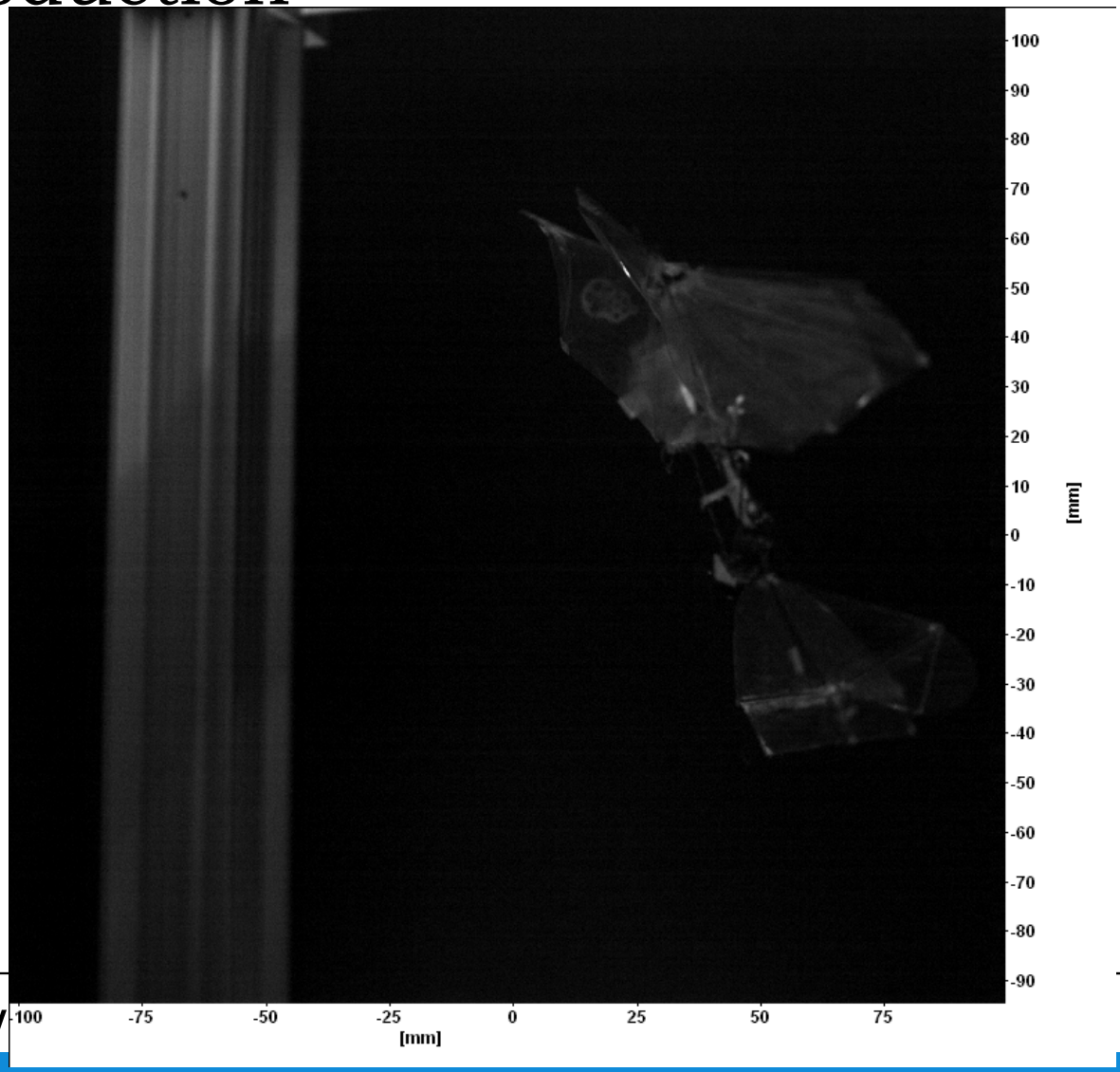
DelFly Components

Battery	Receiver & Actuators	Motor & Controller	Camera & Transmitter
			
3.0 gr.	0.9 + 2.3 gr.	1.5 + 1.0 gr.	1.0 + 1.3 gr.
High power	Fast data link smooth control	High efficiency High power	Color 380 lines / Low voltage 5 mW

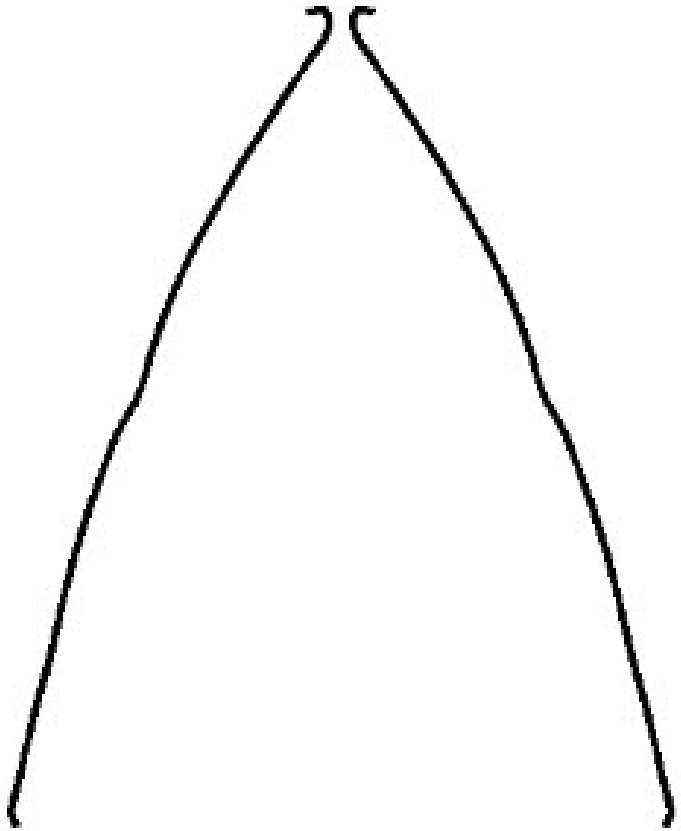
Total weight all components: 11 gram

Total weight of complete MAV: 15 gram

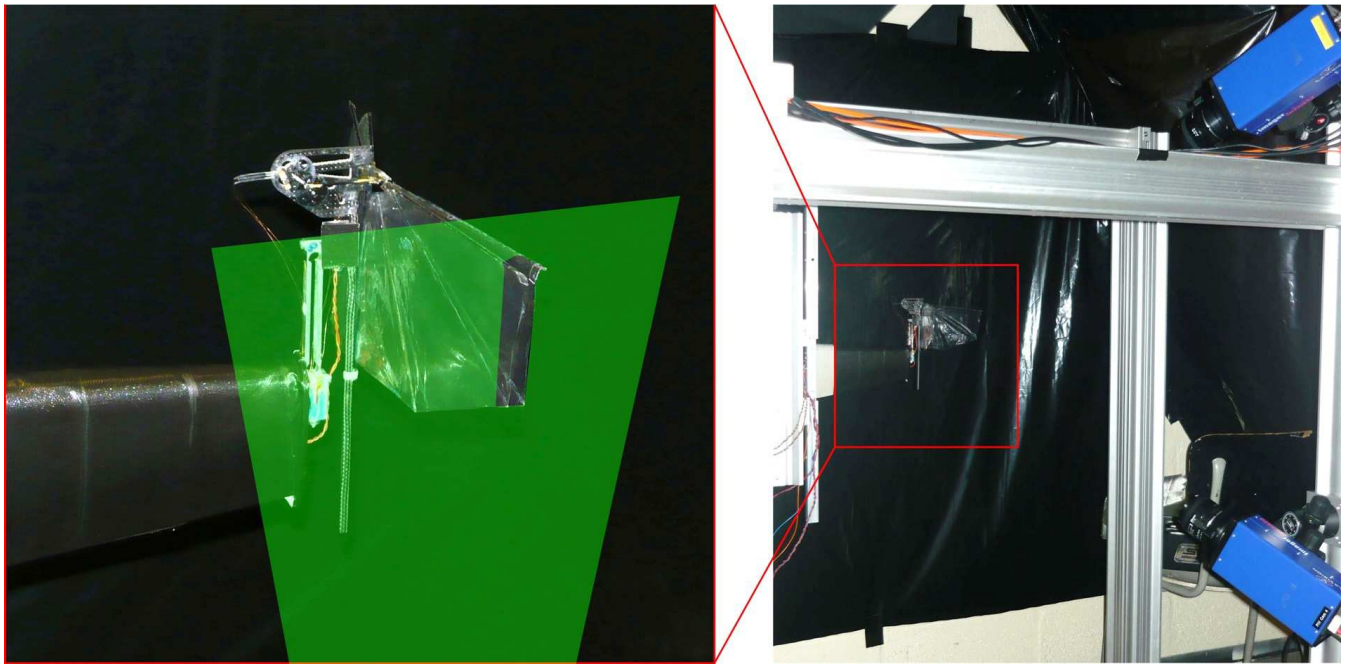
DelFly Introduction



Kristien De Clercq
TU Delft, 2008

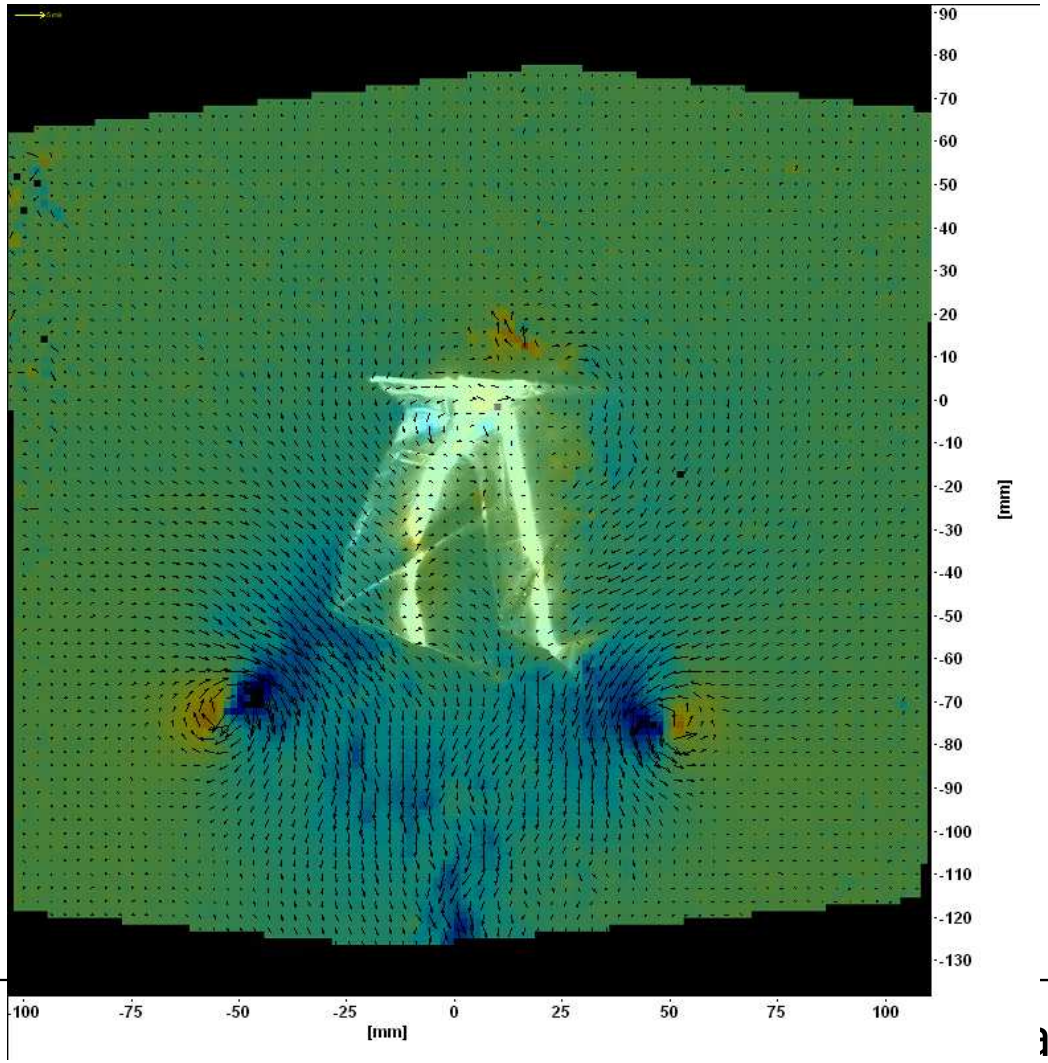


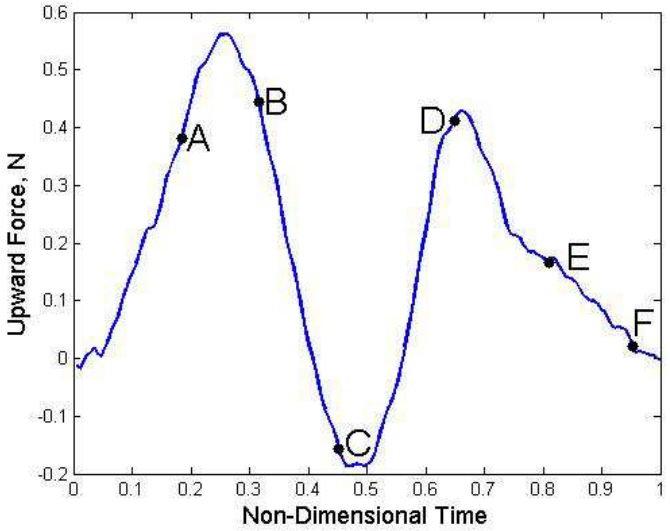
Aerodynamic and Aeroelastic study



Hovering set-up
Stereoscopic PIV

Aerodynamic and Aeroelastic study





Kristien De Clercq
TU Delft, 2008

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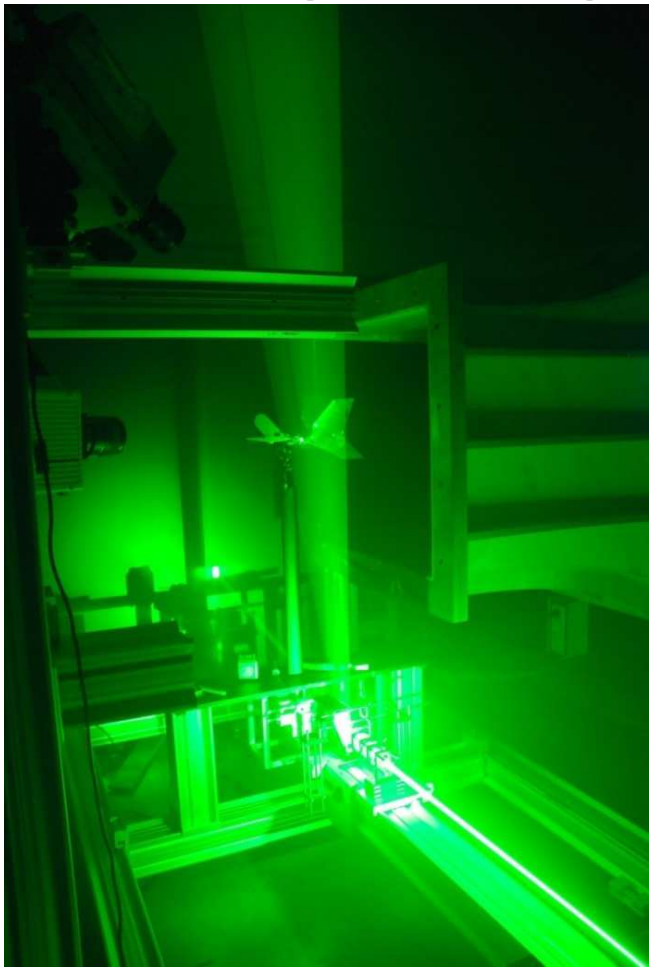
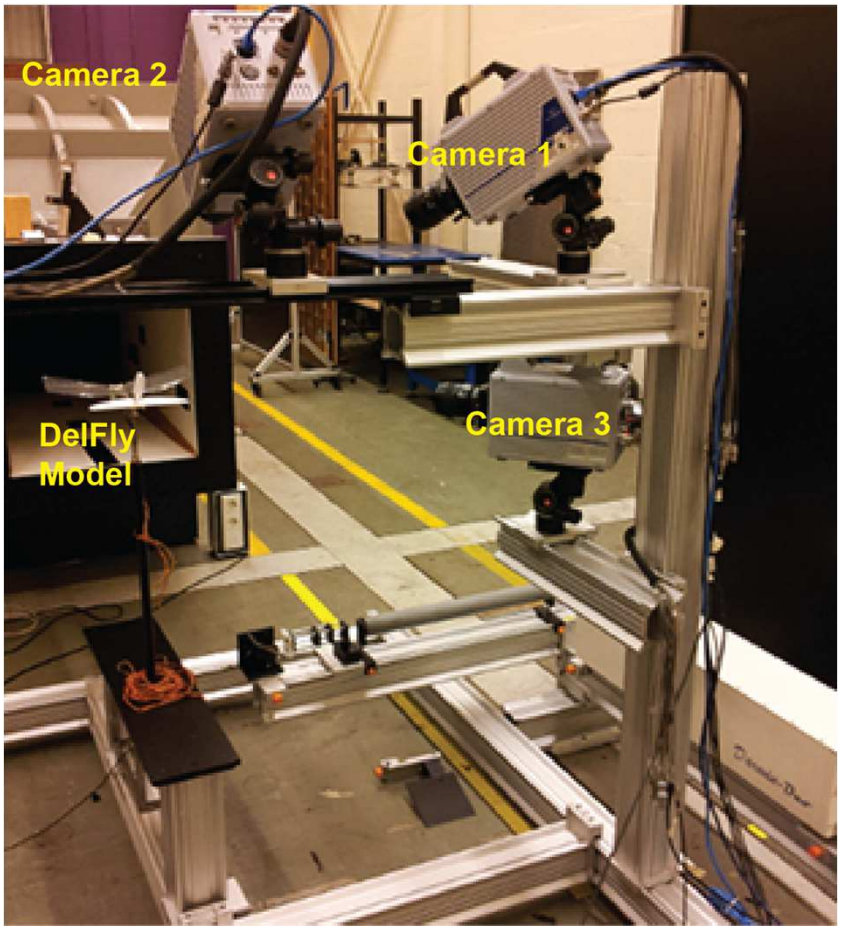
Wake flow visualization of the DelFly II in forward flight configuration

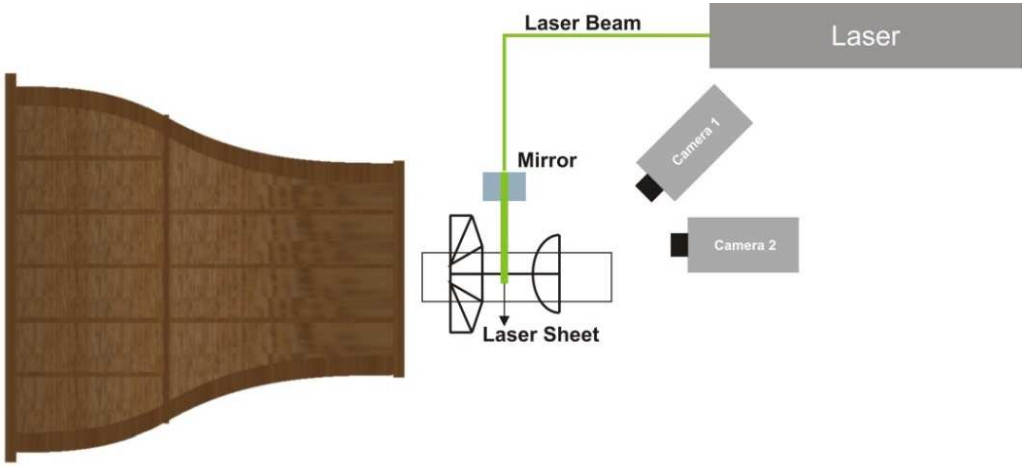


- W wind tunnel with open test section (600 × 600 mm)
- Full DelFly II model on a 6-component ATI Nano-17 force sensor
- Three high speed cameras (1024 × 1024 pixels)
- Quantronix Darwin Duo Nd:YLF high speed laser
- Fog of droplets with 1μm diameter

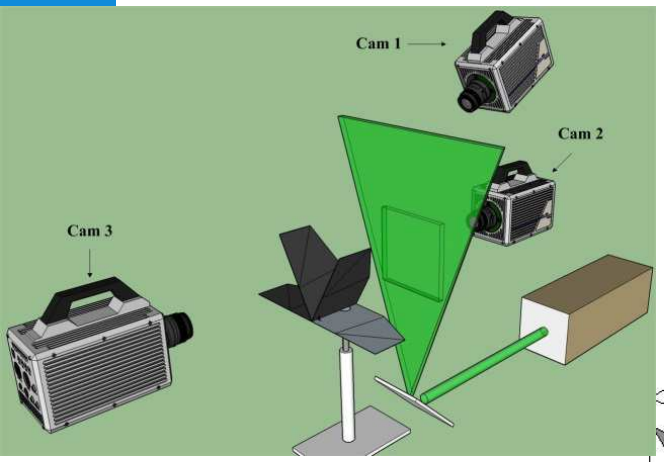
Wake flow visualization of the DelFly II in forward flight configuration

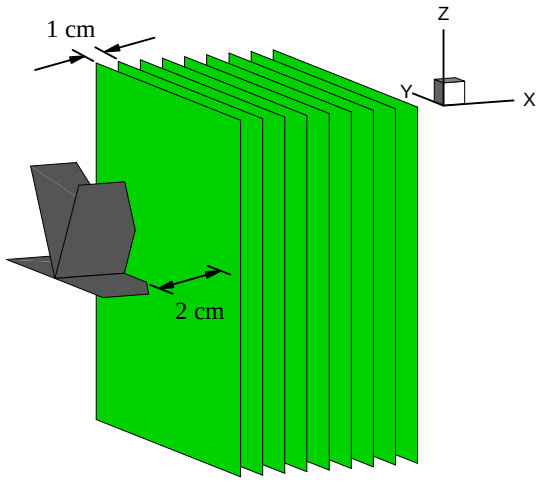


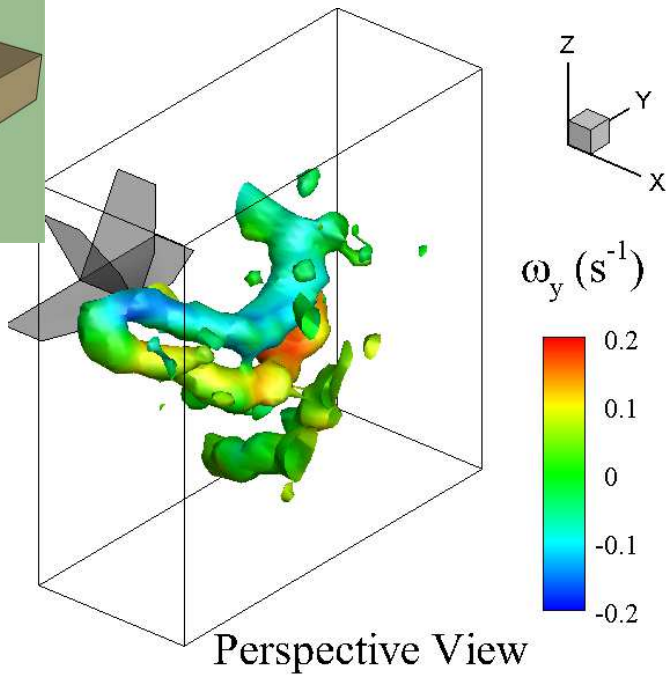
- Measurements at different spanwise planes at 10 mm distance between each other
- Image acquisition at 250 Hz and force measurements at 25 kHz
- Field of view of 200 × 200 mm
- Synchronization between PIV images, force data and wing stroke via a microcontroller system and a Hall sensor

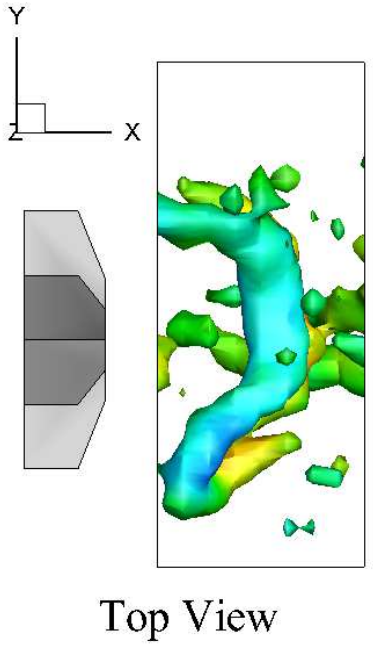


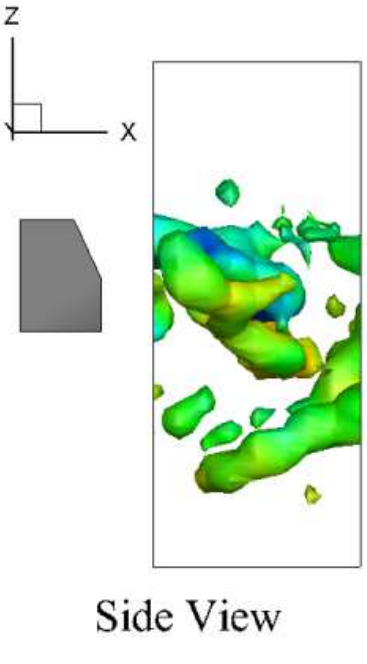
Wake flow visualization of the DelFly II in forward flight configuration





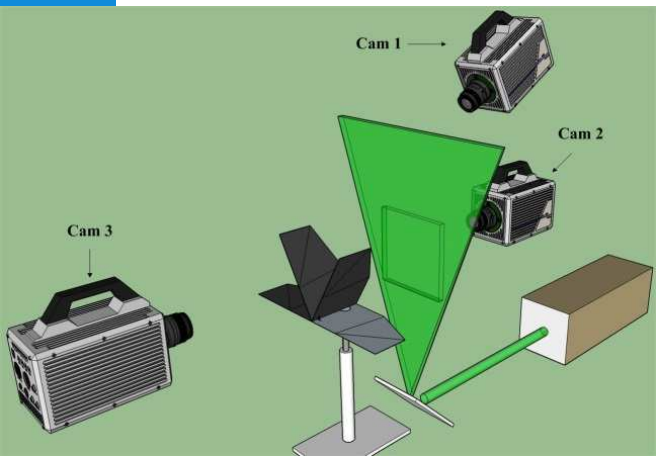


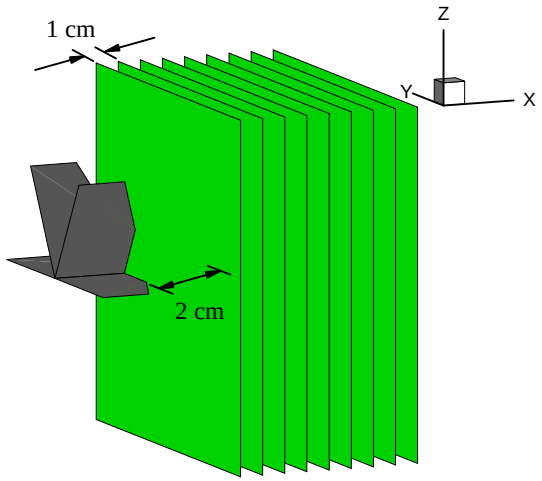


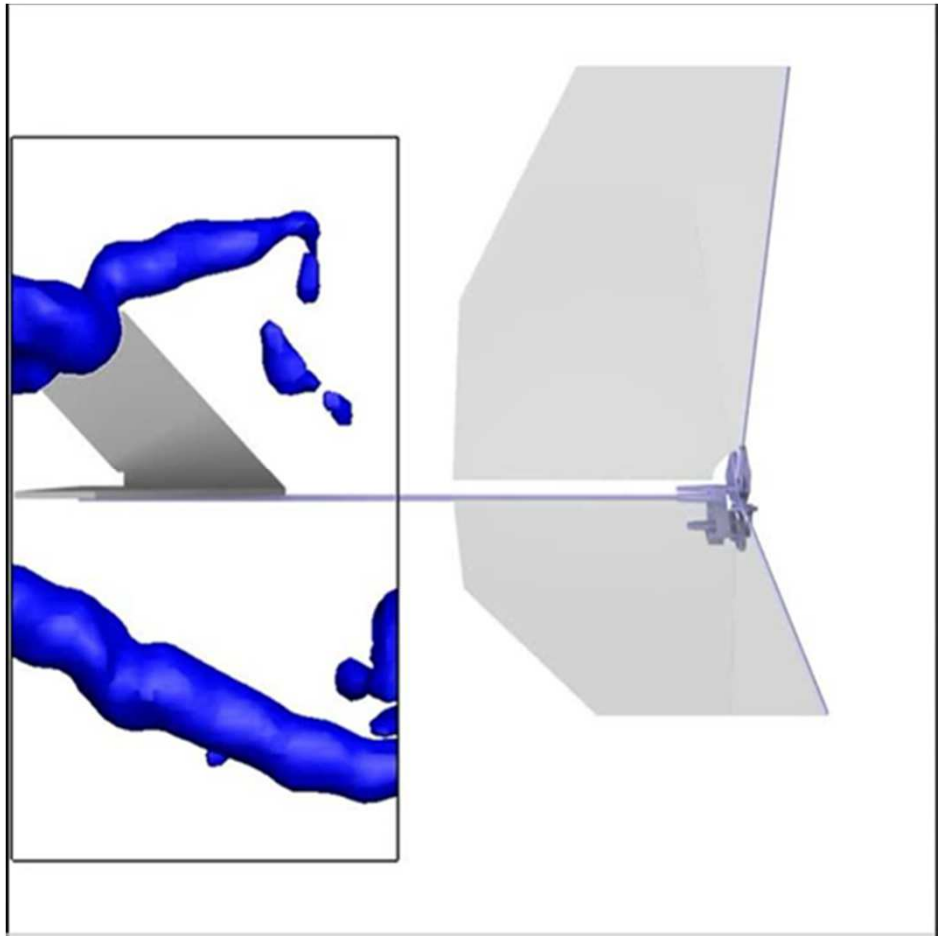


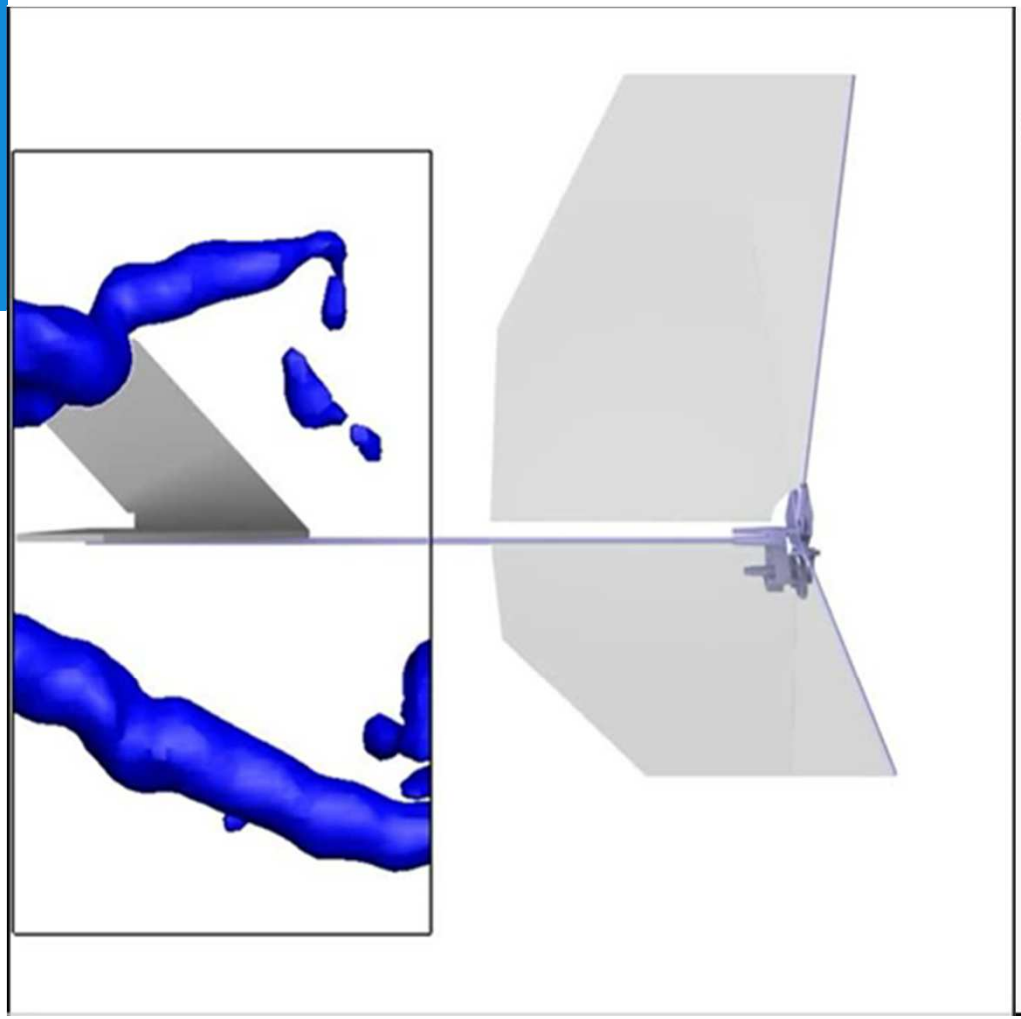
Kriging regression with **local error estimate**

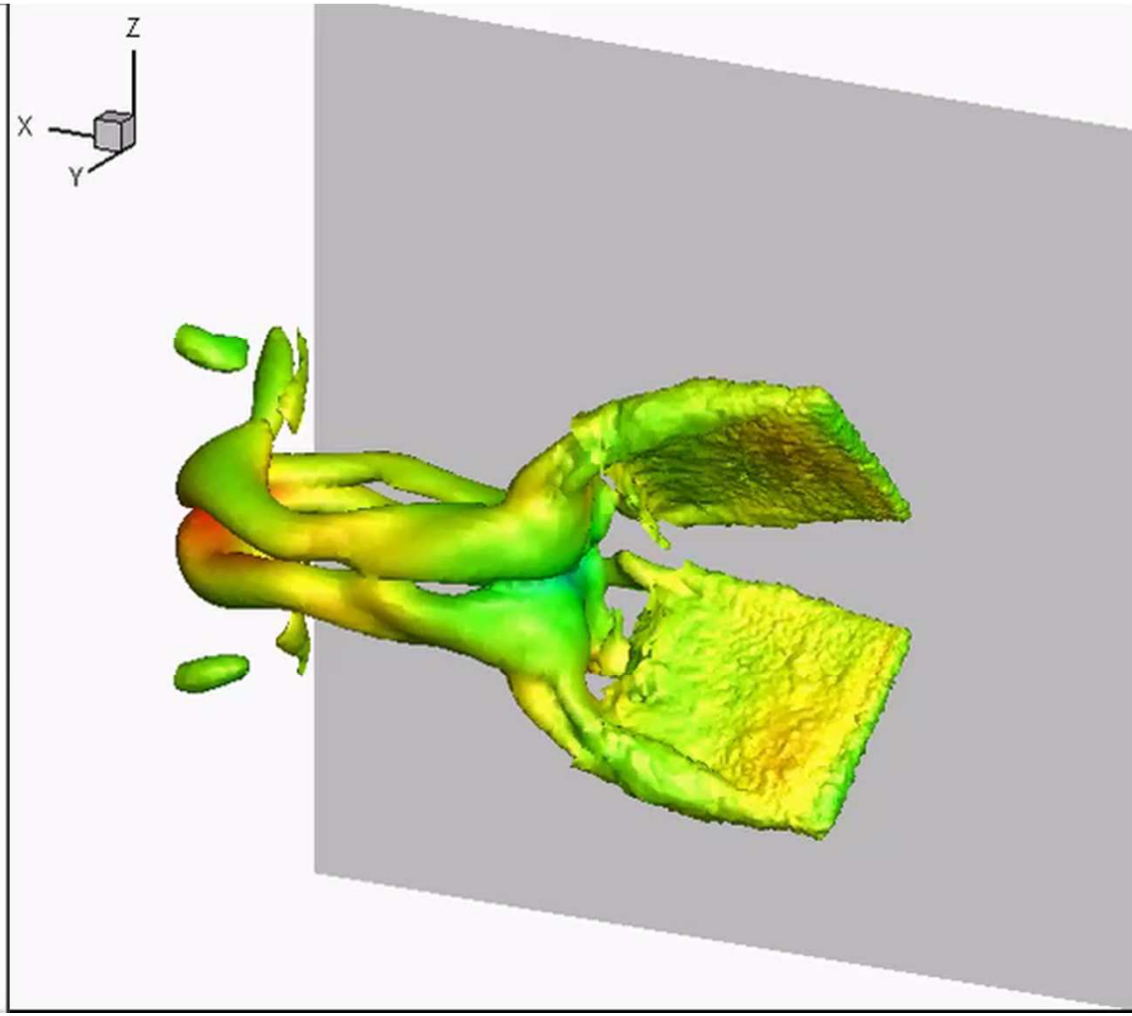
Wake video










Z
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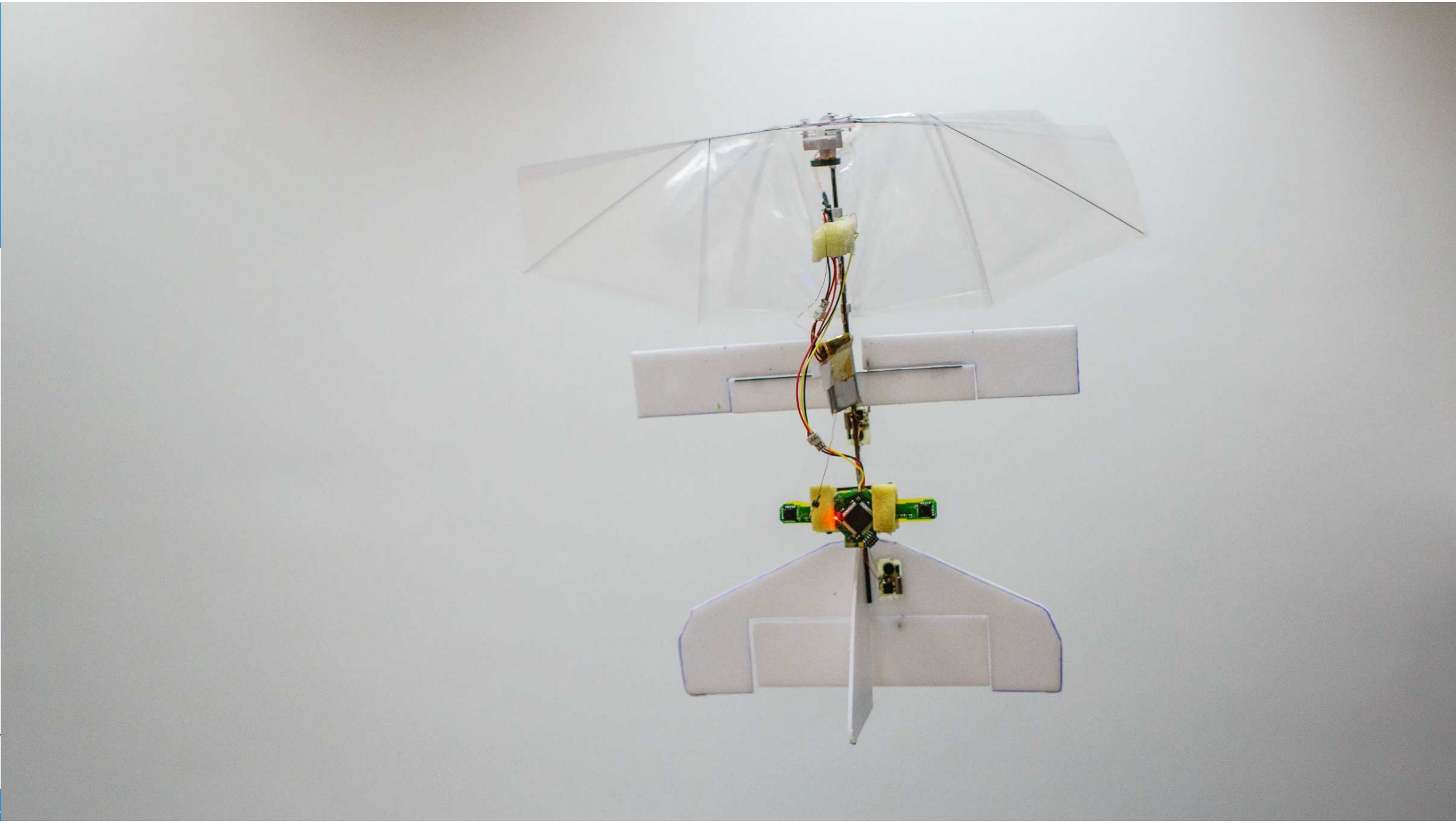
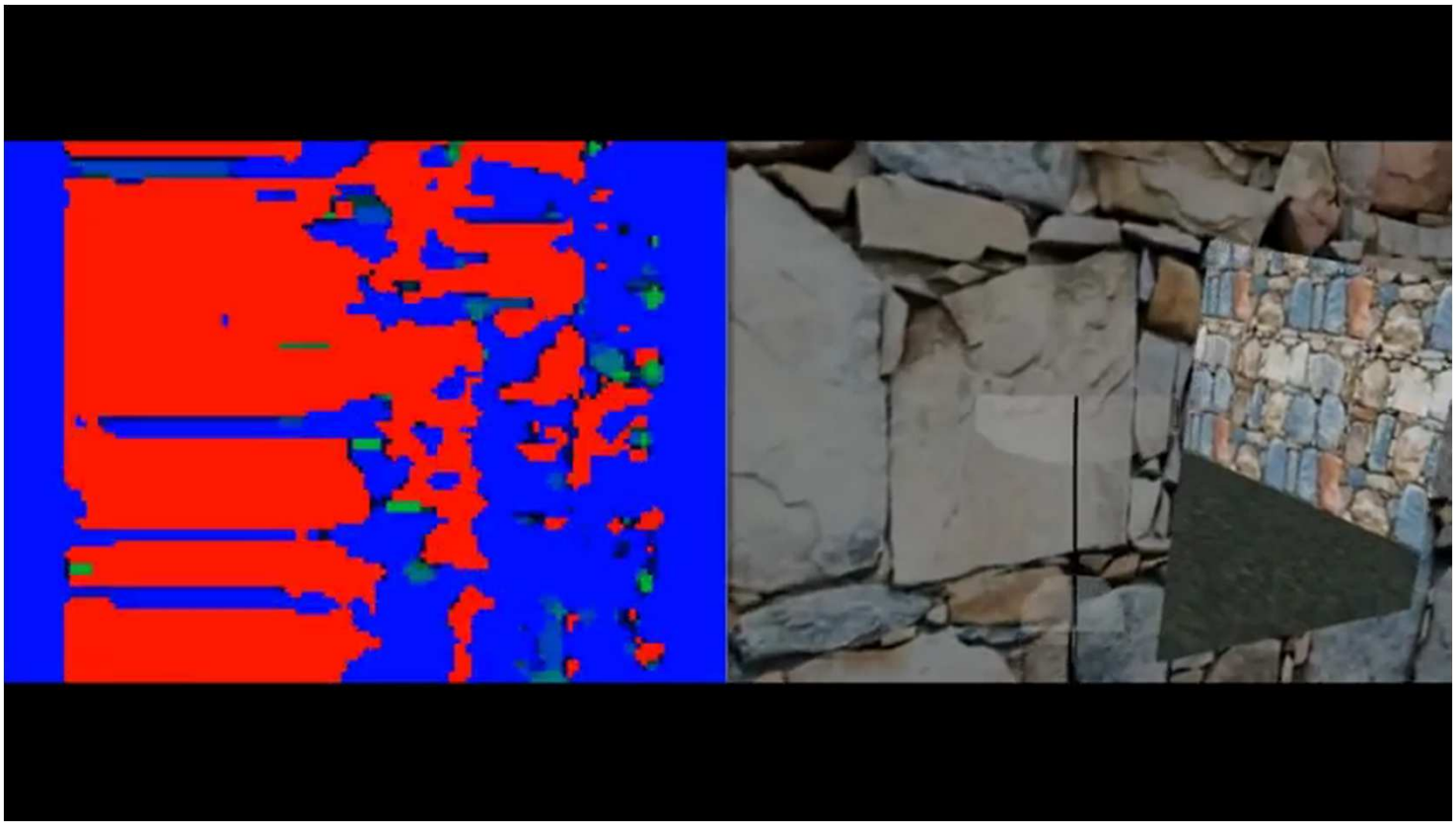


DelFly explorer

DelFly explorer



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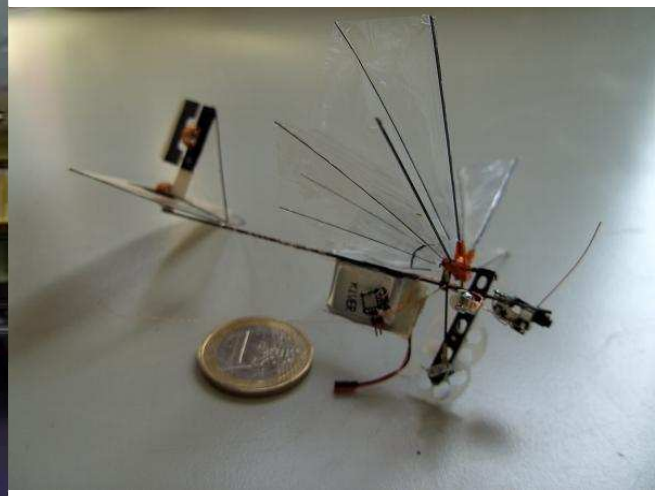

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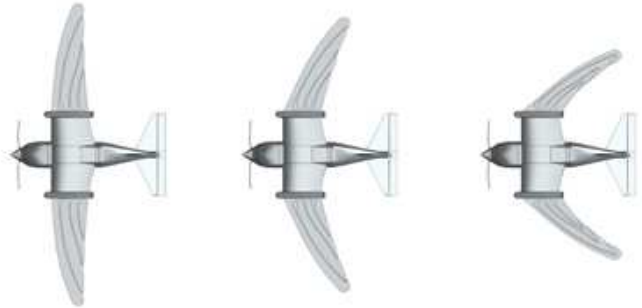
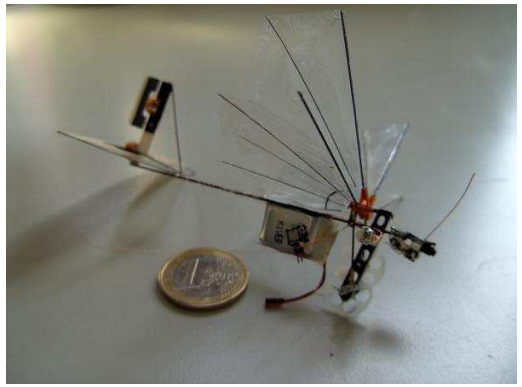
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