

Accepted Manuscript

Title: Insect-inspired vision for autonomous vehicles

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PII: S2214-5745(18)30017-8
DOI: <https://doi.org/doi:10.1016/j.cois.2018.09.005>
Reference: COIS 515



To appear in:

Received date: 15-6-2018
Revised date: 11-9-2018
Accepted date: 14-9-2018

Please cite this article as: Julien R. Serres, Stéphane Viollet, Insect-inspired vision for autonomous vehicles, *Current Opinion in Insect Science* (2018), <https://doi.org/10.1016/j.cois.2018.09.005>

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Insect-inspired vision for autonomous vehicles

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September 21, 2018

Highlights:

- Compound eyes are an endless source of inspiration for developing visual sensors
- Visual stabilization of robot's flight attitude controlled by artificial ocelli
- Ultraviolet celestial cue-based navigation works efficiently under all weather conditions
- Combining blurry vision with retinal micro-movements makes robots' visual tracking hyperacute

Abstract: Flying insects are being studied these days as if they were agile micro air vehicles fitted with smart sensors, requiring very few brain resources. The findings obtained on these natural fliers have proved to be extremely valuable when it comes to designing compact low-weight artificial optical sensors capable of performing visual processing tasks robustly under various environmental conditions (light, clouds, contrast). Here we review some outstanding bio-inspired visual sensors, which can be used for either detecting motion in the visible spectrum or controlling celestial navigation in the ultraviolet spectrum and for attitude stabilisation purposes. Biologically inspired visual sensors do not have to comprise a very large number of pixels: they are able to perform both short and long range navigation tasks surprisingly well with just a few pixels and a weak resolution.

Keywords: Bio-inspired sensors; Biomimicry; Bionics; Biorobotics; Bio-inspired robotics.

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