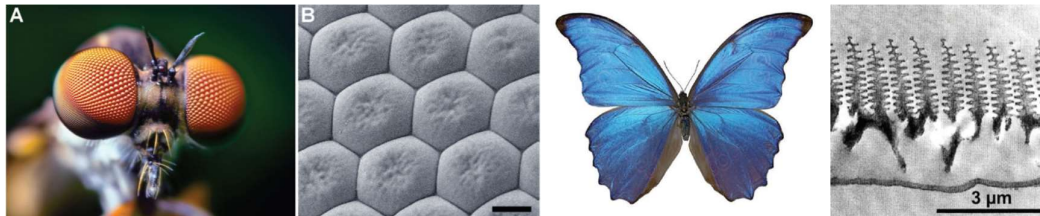


Learning from nature: Insects-inspired sensors

Background:

By gaining insights from millions of years of natural selection and evolution, biomimetics (also referred to as biomimicry) applies principles and strategies abstracted from biological systems to solve engineering and technological problems [1, 2]. One of the emerging trends in biomimetics focuses on the ability of organisms to sense and react to their environment which can be applied for instance in the development of novel sensors.

In particular, with a total number of species estimated at between six and ten million and found in nearly all environments, insects provide a unique source of inspiration for innovative sensors to transduce mechanical, acoustic, optical, thermal, and chemical signals [3].



Problem statement:

The proposed project seeks to explore the potential of biomimetics to develop innovative sensor solutions. The aim of this bachelor thesis is to investigate sensing mechanisms across the insect world and to translate this knowledge into new sensor concepts. This project will give students the opportunity to draw on knowledge from their respective undergraduate disciplines, to analyze natural systems from different perspectives and to cooperatively develop new technological solutions.

Workflow:

The work will be carried out through a comprehensive literature study, and the use of a biomimetic methodology to abstract and translate biological functions into technical solutions.

Group size: 3-6 students

Suitable for: all engineering bachelor programmes

Literature tips:

[1] J. Vincent *et al.* (2006) "Biomimetics: its practice and theory", *J. R. Soc. Interface* 3, 471

[2] B. Bhushan (2009) "Biomimetics: lessons from nature", *Phil. Trans. R. Soc. A* 367, 1445

[3] T.B.H. Schroeder *et al.* (2018) "It's Not a Bug, It's a Feature: Functional Materials in Insects", *Adv. Mater.* 30, 1705322

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