AERIAL ROBOTICS

Manoeuvres on the fly

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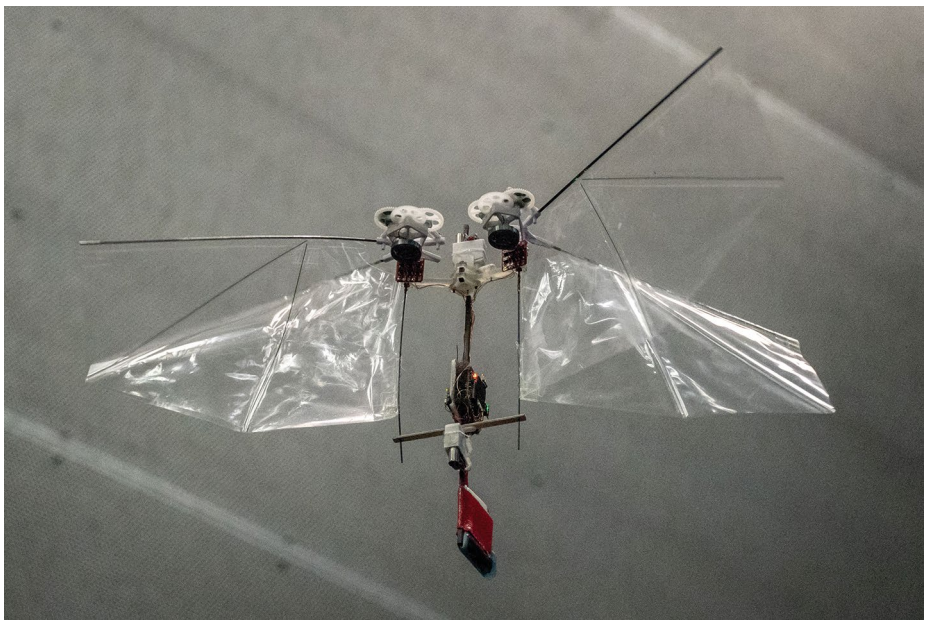

Credit: image courtesy of Matěj Karásek, TU Delft

Detailed insight into how flying insects are able to manoeuvre remains limited, and a better understanding of their sensory–motor control and aerodynamic properties is a key research focus for both biologists and roboticists. Bio-inspired flying robots that power and control flight using flapping wings are considered a potentially useful platform to evaluate flight control mechanisms in insects. However, the need for tethering — a wired link to provide power, and sometimes control, to the robot — has so far restricted their ability to accurately mimic the agile flight of small insects.

Matěj Karásek and colleagues at Delft University of Technology and Wageningen University and Research have now developed a tailless flapping-wing robot that can fly autonomously for five minutes untethered. The robot also generates flapping counter-forces during flight, similar to winged insects. The extended flight time and bio-like motion allows the researchers to make quantitative comparisons between the flight of fruit flies during evasive banking manoeuvres and the flight of the robot as it mimics this behaviour. In doing so, they discovered a mechanism in which the yaw (rotation around a vertical axis) torque and the roll and pitch torques are passively coupled, providing insight into how the flies are able to effectively make such agile manoeuvres when evading predators.

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