Feathers in flight inspire anti-turbulence technology

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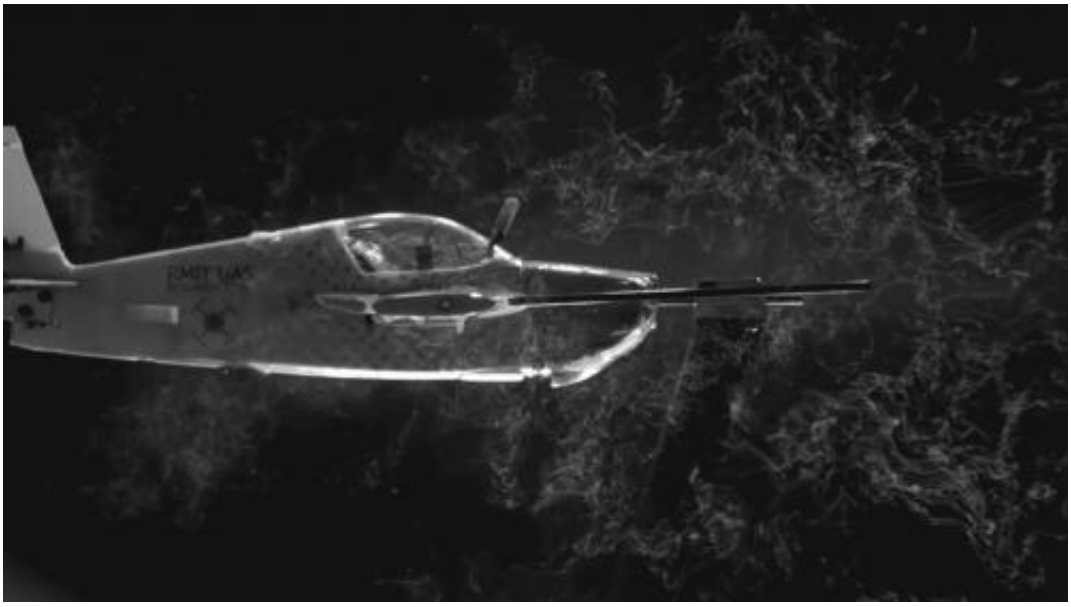

The prototype anti-turbulence system developed at RMIT University, in wind tunnel tests.

Inspired by nature's own anti-turbulence devices – feathers – researchers have developed an innovative system that could spell the end of turbulence on flights.

Researchers from the Unmanned Systems Research Team at RMIT University in Melbourne, Australia, have lodged a provisional patent on the system, which mimics the way feathers help birds detect disturbances in the air.

Research supervisor Professor Simon Watkins, said flight testing on a micro plane showed the system significantly reduced the effects of turbulence.

"By sensing gusts and disturbances in air flow through their feathers, birds are able to fly gracefully rather than bouncing around in turbulent air," he said.

"The system we have developed replicates this natural technology, with the aim of enabling planes to fly smoothly through even severe turbulence – just like birds."

The system is based on the concept of phase-advanced sensing, in which flow disturbance is sensed before it results in aircraft movement.

This can be achieved by early sensing of the pressures from gust effects on the leading parts of the wing or by measuring the gusts ahead of the wing.

Professor Watkins said the system had great potential for all sizes of aircraft and could not only reduce the effects of turbulence on passengers but also reduce loads on plane wings, leading to lower fatigue and hence longer life.

"While we need to explore new sensor arrangements to apply this technology to larger and faster aircraft, we have proven the idea on the most challenging problem of keeping small, lightweight planes steady – since these are the ones that get bounced around the most," he said.

The patent submission for a turbulence mitigation system for aircraft represents the successful outcome of PhD research by Abdulghani Mohamed, supervised by Professor Watkins and Dr Reece Clothier in RMIT's School of Aerospace, Mechanical and Manufacturing

Engineering.

Mr Mohamed's theoretical contributions in the field of turbulence and its effects on flight vehicles, aided the development of this invention.

More information: "Fixed-wing MAV attitude stability in atmospheric turbulence—Part 2: Investigating biologically-inspired sensors." *Progress in Aerospace Sciences*, Volume 71, November 2014, Pages 1–13. DOI: 10.1016/j.paerosci.2014.06.002

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