

Aircraft 'central nervous system' could reduce structural fatigue accidents

March 2 2021



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The human central nervous systems provide us with the first hint that we're not well. Now, UNSW Canberra researchers are one step closer to developing aircraft that can 'feel' with similar sensory perception.

This technology would allow early detection of structural fatigue issues, alerting engineers that an aircraft is in need of a health check.

Aerospace and Aviation researcher Dr. Graham Wild said the development of Structural Health Monitoring (SHM) systems could significantly reduce the number of aircraft fatigue accidents, such as the catastrophic engine failure on a Boeing 777 over Denver in February 2021.

"Early findings from the investigation into the Boeing 777 flight over Denver last week suggest that a fan blade may have sheared, causing significant damage to the rest of the engine," Dr. Wild said.

"Aircraft engines are the number one location of fatigue failure with significant temperature and rotational or wear forces impacting parts.

With most individual components only inspected by sight every 100 hours of flying time it can be very difficult to understand when underlying fatigue issues are happening, Dr. Wild said.

"Our research is exploring how [acoustic technology](#), interpreted by [machine learning](#), can 'listen' for minor changes in the sound signatures components create, giving real-time insights and feedback into a holistic health [monitoring](#) system.

"The core of our research is to develop a system where the [aircraft](#) is proactively monitoring its own health and can tell us when it is not 'feeling well,' removing the need for human inspection and increasing aviation safety.

Dr. Wild believes that the large-scale implementation of Structural Health Monitoring technology in aviation could commence within the next decade, citing the emergence of new industries such as Urban Air

Mobility (UAM) as a driving force.

"The introduction of Urban Air Mobility in our cities will dramatically increase the number of flying vehicles. The large number of flying hours and proximity to populations demand the best in safety, which in part will rely on these vehicles having Structural Health Monitoring systems," Dr. Wild said.

The research, a collaboration between UNSW at ADFA and Edith Cowan University, was supported by the US Office of Naval Research Global, and was published in the *International Journal of Prognostics and Health Management*.

More information: *International Journal of Prognostics and Health Management*, [DOI: 10.36001/IJPHM.2021.v12.i3.2368](https://doi.org/10.36001/IJPHM.2021.v12.i3.2368)

Provided by University of New South Wales Canberra

Citation: Aircraft 'central nervous system' could reduce structural fatigue accidents (2021, March 2) retrieved 1 May 2024 from

<https://techxplore.com/news/2021-03-aircraft-central-nervous-fatigue-accidents.html>

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