

Monitoring pilot alertness for solar impulse (w/ Video)

December 23 2013, by Hillary Sanctuary

Pilot and psychiatrist Bertrand Piccard just "landed" after 72 hours of simulated flight across the Atlantic Ocean in Solar Impulse, a solar airplane which is equipped with advanced renewable technology. This second virtual flight, which started Tuesday morning and took place at the military base in Dübendorf, Switzerland, was the chance for Piccard to test his mental and physiological boundaries during strenuous flight conditions. EPFL technology monitored his mental states and cardiac rhythm throughout the flight, both in real-time and for post-flight data analysis.

In a collaboration between EPFL, Hirslanden and the Lausanne University Hospital (CHUV), twenty-seven electrodes placed on Piccard's head measured the [electrical activity](#) of his brain, also known as electroencephalogram (EEG). Mental states like sleep, fatigue and thinking can be detected in the fluctuations of these electrical signals. This information will be compared with a series of vigilance tests that were done during the 72 hour [flight](#) to evaluate Piccard's alertness and his ability to perform tasks.

EPFL scientists also measured the electrical activity of the pilot's heart, also known as an electrocardiogram (ECG). The obvious reason is to detect an unusual heartbeat, or a cardiac arrest. But cardiac rhythms also contain information about mental alertness.

"We are developing smart technology that can evaluate [mental states](#) in real-time by monitoring the heart alone," explains EPFL scientist

Francisco Rincon at the Embedded Systems Laboratory. "The 72 hours of data collected here – from the heart, the brain activity and the vigilance tests – will be helpful for developing this technology."

The flight simulator took Solar Impulse on one possible trajectory across the Atlantic Ocean, from Norfolk (US) to Almeria (ES), although it did not simulate all of the possible conditions one would experience in Solar Impulse's cockpit. "Atmospheric pressure and temperature changes were not incorporated into the simulation at this stage, although both have an impact on human physiology," explains Solar Impulse pilot André Borschberg, "not to mention the excitement of really flying Solar Impulse."

Provided by Ecole Polytechnique Federale de Lausanne

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