

NUS scientists develop artificial nervous system

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The new electronic skin system has ultra-high responsiveness and robustness to damage



Robots and prosthetic devices may soon have a sense of touch equivalent to, or better than, the human skin with the Asynchronous Coded Electronic Skin (ACES), an artificial nervous system developed by a team of researchers at the National University of Singapore (NUS).

The new electronic skin system has ultra-high responsiveness and robustness to damage, and can be paired with any kind of sensor skin layers to function effectively as an electronic skin.

The innovation has been achieved by Assistant Professor Benjamin Tee and his team from NUS Materials Science and Engineering.

ACES can detect touches more than 1,000 times faster than the human sensory nervous system. For example, it is capable of differentiating physical contact between different sensors in less than 60 nanoseconds — the fastest ever achieved for an electronic skin technology — even with large numbers of sensors.

ACES-enabled skin can also accurately identify the shape, texture and hardness of objects within 10 milliseconds, ten times faster than the blinking of an eye. This is enabled by the high fidelity and capture speed of the ACES system.

Pairing ACES with the transparent, self-healing and water-resistant sensor skin layer also recently developed by Asst Prof Tee's team, creates an electronic skin that can self-repair, like the human skin. This type of electronic skin can be used to develop more realistic prosthetic limbs that will help disabled individuals restore their sense of touch.

Other potential applications include developing more intelligent robots that can perform disaster recovery tasks or take over mundane operations such as packing of items in warehouses. The NUS team is therefore looking to further apply the ACES platform on advanced robots and prosthetic devices in the next phase of their research.