# Engineers add sense of touch to prosthetic hand

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Engineers at Johns Hopkins University have created an electronic skin, which when added to a prosthetic hand allows the user to feel objects as if through their own hand, including feeling pain when touching a sharp object.

The research team, funded through a training grant from the National Institute of Biomedical Imaging and Bioengineering, created an "electronic skin" which they placed over the thumb and index finger of a prosthetic hand. The skin contains biosensors in a configuration that mimics the touch and pain receptors in human skin. The skin is electronically connected to the nerves in the arm that are involved in relaying the sensations of touch and pain to the brain.

Luke Osborn first author of the publication and a graduate student at the Johns Hopkins University Biomedical Instrumentation and Neuroengineering Laboratory, directed by professor Nitish Thakor, explained the design of the technology. "The electronic sensing skin we call an e-dermis was designed to fit over prosthetic devices that are already in use by individuals. It will allow the wearer to tell the shape of what he or she is picking up. Sharp objects will actually cause the feeling of pain, which is an attempt to give the person a range of realistic sensations. It could also help avoid picking up something sharp that could damage the prosthetic."

This version of the e-dermis was designed to be able to distinguish a round shape from a pointed, pain-inducing shape. The team is working on expanding the abilities of the e-dermis to include temperature perception. Beyond making prosthetic fingers more human, the team envisions other uses for the technology such as enhancing the sense of touch in augmented reality systems. The e-dermis could also be incorporated into the gloves of astronauts where enhanced sensation could help them perform intricate tasks more quickly and with more precision.

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