

Interpreting brainwaves to give amputees a hand

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Biomedical engineers at Wits are researching how brainwaves can be used to control a robotic prosthetic hand.

Such a brain computer interface (BCI) will enable amputees and people with motor impairments to regain some hand mobility.

BCIs can use electroencephalograms (EEGs - brainwaves - to interpret human intentions from electrical signals in the brain and use these to control an external device such as a [prosthetic](#) hand, computer, or speech synthesizer.

The prosthetic robotic hand relies on EEGs extracted via electrodes on the skull, or electromyography (EMG) obtained from electrodes recording muscle signals, for information. A BCI will interpret these signals and translate them to instruct the movements of the artificial hand.

"I envisage a BCI capable of controlling a robotic prosthetic hand that will enable people with motor disabilities to write, hold a glass or shake hands," says Abdul-Khaaliq Mohamed, Lecturer and PhD candidate in the School of Electrical and Information Engineering at Wits.

Mohamed coordinates a research group of six students studying different aspects of potentially controlling a robotic hand. Most BCI experiments to date have centered on basic hand movements such as finger taps, button presses or simple finger grasps.

Mohamed's research group focuses uniquely on a combination of hand movements including wrist extension, wrist flexion, finger flexion, finger extension and the tripod pinch.

"In South Africa, stroke victims may benefit significantly from this technology," says Mohamed. "Stroke afflicts an estimated 132 000 South Africans per year."

Currently, a prosthetic hand costs around US\$100 000 (about R1,35 million), an investment out of reach for most South Africans.

Thumbs-up for this research that will use 3-D-printing to create a prosthetic [hand](#) for US\$78 (R1 053), thereby increasing access to healthcare for many.

Provided by Wits University

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