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New in Cerebrum: Reality Meets Science Fiction

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During the opening ceremonies at this past summer's World Cup, a young man paraly down walked onto the field and kicked the first ball of the event. The demonstration—i an estimated one-billion TV viewers—was based on a battery-powered "Iron Man" exo into the suit to detect muscle movements and a control system guided by brain waves. 29 year-old Juliano Pinto, wore an electroencephalogram (EEG) cap dotted with electr magnified the faint electrical signals emanating through his skull.

The person behind the demonstration was Duke University neurologist Miguel Nicolelis, M.D., Ph.D., the author of this month's *Cerebrum* feature, "Brain-to-Brain Interfaces: When Reality Meets Science Fiction." Nicolelis is a pioneer in "brain-computer interfaces" (BCI)—defined as a direct connection between a human (or animal) brain with an external device. These connections range from non-invasive technologies, which recognize brain signals from outside the brain, to invasive technologies that involve surgery and implanting electrodes. While many of these technologies aim to restore function to disabled people, others aim to improve upon or augment existing functions.

Research on BCIs began in the 1970s at the University of California Los Angeles under Science Foundation. Fast-forward to 2003, when Nicolelis first envisioned a bionic sui primates on brain machine interfaces (BMI). A few years later, he demonstrated that, monkey could generate movements in a robot. He subsequently gathered an internatio and engineers to develop a mind-controlled bionic suit that could enable people with p it the Walk Again Project. By 2009, Nicolelis was confident that he would soon have a device.

Nicolelis's *Cerebrum* story traces some of the early technological breakthroughs and a

up to the demonstration in Brazil, and his and others' efforts to advance the research t with spinal cord injuries can functionally reconnect brain areas where communication by brain damage.

Writes Nicolelis: "Right now this latter proposition may sound farfetched. However, se become a hallmark of our laboratory during the past decade. During this period, we ha similarly abstract basic-science ideas into potential new therapies for untreatable epile and disabling paralysis. All of these therapies are currently undergoing clinical testing

–Bill Glovin