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Nanowires touch a nerve

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Scientists at Harvard University have used slender silicon nanowires to detect, stimulate and inhibit nerve signals along the axons and dendrites of live mammalian neurons.

In their research, reported in Science, Harvard chemist Charles M. Lieber and colleagues made the first artificial synapses between nanoelectronic devices and individual mammalian neurons. They also linked a solid-state device - a nanowire transistor - to the neuronal projections that interconnect and carry information in the brain.

The nanowire transistors developed by Lieber and colleagues gently touch a neuronal projection to form a hybrid synapse. They are relatively non-invasive and thousands of times smaller than the electronics now used to measure brain activity.

Because the nanowires are so slight, having contact with a neuron of no more than 20 nanometres, Lieber and colleagues were able to measure and manipulate electrical conductance at as many as 50 locations along a single axon.

The researchers are now working toward monitoring signalling among larger networks of nerve cells. Lieber said the devices could also eventually be configured to measure or detect neurotransmitters, the chemicals that leap synapses to carry electrical impulses from one neuron to another.

Lieber said the research could be useful for drug discovery and other applications, and it opens the possibility for hybrid circuits that couple the strengths of digital nanoelectronic and biological computing components.