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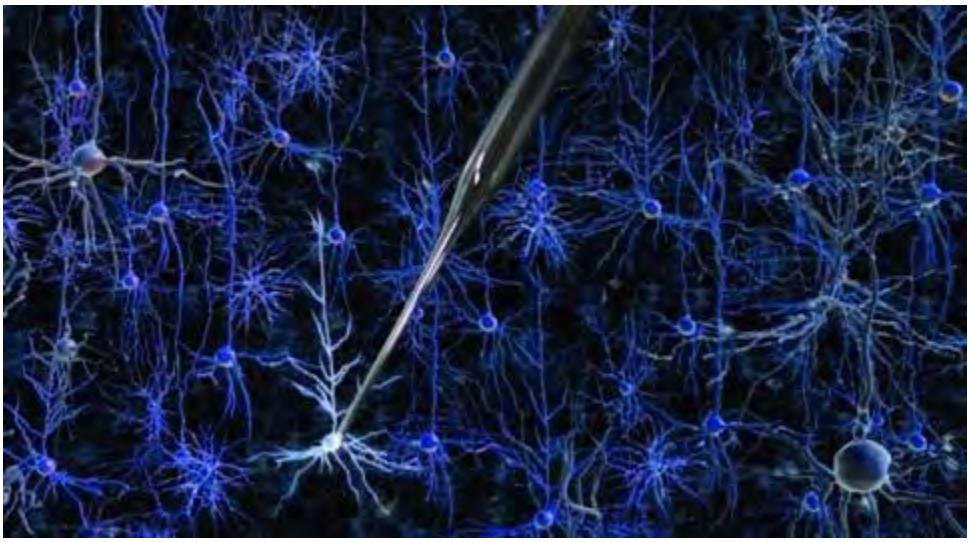
Researchers automate process of recording data from neurons

8 May 2012



Researchers in the US have developed a way to automate the process of finding and recording information from neurons in the brain.

A team from the Massachusetts Institute of Technology (MIT) and the Georgia Institute of Technology used a robotic arm guided by a cell-detecting computer algorithm to identify and record data from neurons in a living mouse brain.

This automated process was found to be more accurate than that carried out by a human experimenter — as well as eliminating the need for months of training — and could enable scientists to classify and analyse the thousands of different types of cells in the brain.

The method could be particularly useful in studying brain disorders such as schizophrenia, Parkinson's disease, autism and epilepsy by determining how diseased cells differ from healthy ones, said MIT's Ed Boyden, one of the research leaders.

'In all these cases, a molecular description of a cell that is integrated with [its] electrical and circuit properties… has remained elusive,' explained Boyden, associate professor of biological engineering and brain and cognitive sciences at MIT.

'If we could really describe how diseases change molecules in specific cells within the living brain, it might enable better drug targets to be found.'

The researchers set out to automate a 30-year-old technique known as whole-cell patch clamping, where a tiny glass pipette is used to open a small hole in the cell membrane of a neuron and record the electrical activity inside.

To do this, they built a robotic arm that lowers the pipette into the brain of an anesthetised mouse with micrometre accuracy.

The pipette monitors electrical impedance — how difficult it is for electricity to flow — in order to locate the edge of a cell with much higher accuracy than a human could.

Once the pipette finds a cell, it applies suction to form a seal with the cell's membrane. An electrode can then break through the membrane to record the internal electrical activity.

The robotic system moves two micrometres at a time, measuring impedance 10 times per second. It can detect cells with 90 per cent accuracy and establish a connection with the detected cells in around 40 per cent of cases.

Boyden and his Georgia Tech colleague Craig Forest have created a start-up company called Neuromatic Devices to commercialise the research.

They are now working on scaling up the number of electrodes so they can record from multiple neurons at a time, potentially allowing them to determine how different parts of the brain are connected.

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