Brain chip reads man's thoughts

The "chip" reads brain signals

A paralysed man in the US has become the first person to benefit from a brain chip that reads his mind.

Matthew Nagle, 25, was left paralysed from the neck down and confined to a wheelchair after a knife attack in 2001.

The pioneering surgery at New England Sinai Hospital, Massachusetts, last summer means he can now control everyday objects by thought alone.

The brain chip reads his mind and sends the thoughts to a computer to decipher.

Mind over matter

He can think his TV on and off, change channels and alter the volume thanks to the technology and software linked to devices in his home.

Scientists have been working for some time to devise a way to enable paralysed people to control devices with the brain.

Studies have shown that monkeys can control a computer with electrodes implanted into their brain.

It's quite remarkable

Dr Richard Apps, neurophysiologist from Bristol University

Recently four people, two of them partly paralysed wheelchair users, were able to move a computer cursor while wearing a cap with 64 electrodes that pick up brain waves.

Mr Nagle's device, called BrainGate, consists of nearly 100 hair-thin electrodes implanted a millimetre deep into part of the motor cortex of his brain that controls movement.

Wires feed the information from the electrodes into a computer which analyses the brain signals.

The signals are interpreted and translated into cursor movements, offering the user an alternative way to control devices such as a computer with thought.

Motor control

Professor John Donoghue, an expert on neuroscience at Brown University, Rhode Island, is the scientist behind the device produced by Cyberkinetics.

He said: "The computer screen is basically a TV remote control panel, and in order to indicate a selection he merely has to pass the cursor over an icon, and that's equivalent to a click when he goes over that icon."

Mr Nagle has also been able to use thought to move a prosthetic hand and robotic arm to grab sweets from one person's hand and place them into another.

Professor Donoghue hopes that ultimately implants such as this will allow people with paralysis to regain the use of their limbs.

The long term aim is to design a package the size of a mobile phone that will run...
on batteries, and to electrically stimulate the patient's own muscles. This will be difficult.

The simple movements we took for granted involved complex electrical signals which would be hard to replicate, Dr Richard Apps, a neurophysiologist from Bristol University, UK, told the BBC News website.

He said there were millions of neurones in the brain involved with movement. The brain chip taps into only a very small number of these. But he said the work was extremely exciting.

"It's quite remarkable. They have taken research to the next stage to have a clear benefit for a patient that otherwise would not be able to move.

"It seems that they have cracked the crucial step and arguably the most challenging step to get hand movements.

"Just to be able to grasp an object is a major step forward."

He said it might be possible to hone this further to achieve finer movements of the hand.

Matthew Nagel's story is featured in a Frontiers programme on BBC Radio Four on Wednesday 13 April, 2005, at 2100 BST