Team develops DNA switch to interface living organisms with computers

October 25 2006

Researchers at the University of Portsmouth, UK, have developed an electronic switch based on DNA - a world-first bio-nanotechnology breakthrough that provides the foundation for the interface between living organisms and the computer world.

The new technology is called a 'nanoactuator' or a molecular dynamo. The device is invisible to the naked eye - about one thousandth of a strand of human hair.

The DNA switch has been developed by British Molecular Biotechnology expert Dr Keith Firman at the University of Portsmouth working in collaboration with other European researchers.

Dr Firman and his international team have been awarded a €2 million European Commission grant to further develop this ground-breaking new technology.

But the DNA switch has immediate practical application in toxin detection, and could be used in a biodefence role as a biological sensor to detect airborne pathogens.

The future applications are also considerable, including molecular scale mechanical devices for interfacing to computer-controlled artificial limbs.

'The possibilities are very exciting. The nanoactuator we have developed

can be used as a communicator between the biological and silicon worlds,' Dr Firman said.

'I could see it providing an interface between muscle and external devices, but it has to be pointed out that such an application is still 20 or 30 years away.'

The molecular switch comprises of a strand of DNA anchored in a miniscule channel of a microchip, a magnetic bead, and a biological motor powered by the naturally occurring energy source found in living cells, adenosine triphosphate (ATP).

These elements working together create a dynamo effect which in turn generates electricity. The result is a device that emits electrical signals - signals that can be sent to a computer. The switch, therefore, links the biological world with the silicon world of electronic signals.

The nanoactuator has been patented by the University of Portsmouth, and a patent application for the basic concepts of biosensing is pending.

Source: University of Portsmouth