Scientists make quantum leap in developing faster computers

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(PhysOrg.com) -- Scientists have created a molecular device which could act as a building block for future generations of superfast computers.

The researchers have created components that could one day be used to develop quantum computers - devices based on molecular scale technology instead of silicon chips and which would be much faster than conventional computers.

The study, by scientists at the Universities of Manchester and Edinburgh and published in the journal *Nature*, was funded by the European Commission.

Scientists have achieved the breakthrough by combining tiny magnets with molecular machines that can shuttle between two locations without the use of external force. These manoeuvrable magnets could one day be used as the basic component in quantum computers.

Conventional computers work by storing information in the form of bits, which can represent information in binary code - either as zero or one.

Quantum computers will use quantum binary digits, or qubits, which are far more sophisticated - they are capable of representing not only zero and one, but a range of values simultaneously. Their complexity will enable quantum computers to perform intricate calculations much more quickly than conventional computers.

Professor David Leigh, of the University of Edinburgh's School of Chemistry, said: "This development brings super-fast, non-silicon based computing a step closer.

"The magnetic molecules involved have potential to be used as qubits, and combining them with molecular machines enables them to move, which could be useful for building quantum computers. The major challenges we face now are to bring many of these qubits together to build a device that could perform calculations, and to discover how to communicate between them."

Professor Richard Winpenny, of the University of Manchester's School of Chemistry, said: "To perform computation we have to have states where the qubits speak to each other and others where they don't - rather like having light switches on and off.

"Here we have shown we can bring the qubits together, control how far apart they are, and potentially switch the device between two or more states. The remaining challenge is to learn how to do the switching, and that's what we're trying to do now."

Provided by University of Manchester

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