

Scientists Create Electron Surf Machine

Scientists at the UK's National Physical Laboratory and the Cavendish Laboratory of Cambridge University have found a new way to control the movement of individual electrons -- they are making them ride the crests of energy waves like surfers.

By precisely controlling billions of individual electrons every second, they hope to develop new computing systems and increase the security of digital communication.

Much like the conveyor belt in a production plant, NPL's electron surf machine delivers electrons one by one in a reliable steady stream at a rate of more than a billion a second. Whilst small streams of electrons can already be produced, until now no one has found a way to deliver them in a controlled fashion at such a high rate.

NPL's method involves creating oscillating waves of electro-static force which flow like the surf rolling into a beach. A single electron is placed on the crest of each wave and the electro-static waves are then focused in a particular direction or at a particular object.

The applications for the control of so many individual electrons include better new computers and ensuring absolute security for digital communication.

All computer systems rely on a flow of electrical current through microprocessors. In existing computers, thousands of electrons flow in a disorderly manner in and out of each processor. This random motion causes significant heating (just feel the bottom of your laptop) and limits the computer's efficiency. By controlling individual electrons, exactly the right amount of current can be targeted at the processor at exactly the right time, allowing the computer to undertake more tasks, run more efficiently and cope with more requests at once.

Digital communication relies on the break up of a signal into small pieces, which are transported through wired or wireless communication networks and then pieced together at the recipient's end. Anyone wishing to eavesdrop needs to remove part of the message in transit to see or hear the information. The new electron surf machine could be used to encode the message into individual tiny light pulses (photons), making it much simpler to identify any which have been 'removed' by eavesdroppers, deterring snooping and alerting the sender or recipient that tampering has taken place.

Source: National Physical Laboratory

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