Scientists use optics to speed data transfer on chips

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Sam Costello, *IDG News Service, Boston Bureau*

Researchers at Baltimore's Johns Hopkins University have developed a technique that allows them to use light, rather than electricity, to send data between microchips, the university announced at the end of December. The technology will greatly increase the speed at which data travels in computer and networking systems, according to one of the inventors.

The new technique relies on the same technology used in fiber optic communication, but adds a new material for building chips to the equation. While computer chips are currently built using silicon, the new technique, called "silicon on sapphire," uses thin slices of silicon placed on top of a

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layer of synthetic sapphire to achieve its effects, according to Alyssa Apsel, a doctoral student at Johns Hopkins and co-inventor of the technology. Apsel worked on the project with Andreas Andreou, the technology's other co-inventor and a professor at Johns Hopkins.

When data is transmitted to the silicon-on-sapphire chip by a wire (chips currently use wires to transmit data), it is then turned into light and beamed through the sapphire using a microscopic laser built onto the chip, Apsel said. The data is then sent to either another part of the chip or, using an optical fiber, to another chip, she said. When the laser containing the data enters the new chip, it is received by an optical receiver circuit that transforms the light back into electricity, she said.

Though optical transmission and microscopic lasers are both almost 10 years old, the addition of the sapphire layer on the chip, through which the data is sent, is the breakthrough, Apsel said. Apsel expects that commercial implementation of the technology is "not very far away" and could happen within a few years.

The researchers expect that data transmitted using the new technology could move as much as 100 times faster than data sent over wires, according to a statement issued by the university. The silicon-on-sapphire technology will also use less power than current chips, the statement said.

Sending data as light, rather than electricity, is preferable because "light moves faster than electrons in a medium," Apsel said.

The technology could also help cut costs for high-speed transfer technologies, she said. Apsel also sees potential applications for the technology in optical processing, as well as in local area networking.

Sam Costello is a correspondent for the IDG News Service.