

# Indian schools to benefit from new computer chips

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An educational initiative between Rice University computer scientists and Indian educators will enable schools in rural India to be some of the first to benefit from Rice's revolutionary, low-energy computer chips.

Rice's Krishna Palem, the inventor of the energy-stingy chips, said his team is creating a solar-powered electronic slate, or I-slate, an electronic version of the blackboard slates used by many Indian schoolchildren. The I-slate's developers are working with educational technologists from the International Institute of Information Technology (IIIT) in Hyderabad, India, to develop a visually based [mathematics curriculum](#) that allows children to learn by doing, regardless of their grade level or whether they have a full-time teacher.

Palem unveiled plans for the I-slate today in New York at an event marking the 125th anniversary of the Institute of Electrical and Electronics Engineers, IEEE, the world's leading professional association for the advancement of technology.

Rice's breakthrough low-energy [computer chip technology](#) trades off precision in calculations for significant reductions in energy use. The upshot could be cell phones that have to be recharged every few weeks rather than every few days. A key to using the technology is finding applications -- like streaming video for cell phones or low-powered [video displays](#) in I-slates -- where error can be tolerated. The technology piggybacks onto the "complementary metal-oxide semiconductor" technology, or CMOS (pronounced SEE-moss), that chipmakers already

use and is known as "probabilistic" CMOS, or PCMOS (pronounced PEE-see-moss).

"We expect to begin testing prototypes of the curriculum and the I-slates next spring," said Palem, Rice's Ken and Audrey Kennedy Professor of Computing. "In all likelihood, this — rather than cell phones or other consumer-electronic devices — will be the first real-world application of PCMOS."

The Rice-IIIT team plans to work with the Indian nonprofit Villages in Development and Learning Foundation (VIDAL) to test prototype I-slates in rural classrooms in southern India's Mahboobnagar District. Researchers at IIIT's Center for Information Technology in Education are designing an interactive curriculum that can be used by children of any culture, regardless of their native tongue.

Inspired by microfinance, the I-slate's innovators intend to use social entrepreneurship to create a self-sustaining economic model for the I-slate that both creates jobs in impoverished areas and ensures the I-slate's continued success regardless of ongoing philanthropic support.

The first prototype PCMOS chips were found to use 30 times less electricity while running seven times faster than today's best technology. Palem's PCMOS team includes researchers at Rice and at the Institute for Sustainable Nanoelectronics at Nanyang Technological University in Singapore, where the first PCMOS prototypes were manufactured last year.

Although PCMOS runs on standard silicon, it breaks with computing's past by abandoning the set of mathematical rules -- called Boolean logic -- that have thus far been used in all digital computers. PCMOS instead uses probabilistic logic, a new form of logic developed by Palem and his doctoral student, Lakshmi Chakrapani.

Palem's prior PCMOS research has received funding from the Defense Advanced Research Projects Agency and Intel Corp.

Source: Rice University ([news](#) : [web](#))

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