


science wire

- Business and Economics
- Engineering Sciences
- Humanities and Social Sciences
- Medicine and life sciences
- Natural sciences

wire.myScience

Last News

Literature - Dec 10
Cornell Rewind: The fluid landscapes of yesteryear


Civil Engineering - Dec 3
 New paradigms for urbanisation


Architecture - Dec 2
Crews working on heating issue on campus

Architecture - Nov 16
Scaling commercial energy efficiency

Architecture - Nov 5
World's Columbian Exposition of 1893 comes alive on computer screens

Environmental Sciences - Oct 19

 John E. Fernandez named new leader of MIT Environmental Solutions Initiative

Architecture - Oct 6
 University Terrace information session scheduled today for Stanford faculty

Architecture - Oct 5
 "Rock Print" at the forefront of architectural innovation

Architecture - Sep 28
Stanford submits new plans for Menlo Park development

Architecture - Aug 29
Water Safety Notice for Hyde Park

Medicine - Aug 18
Quiet design: Hospital experiments with sound panels to reduce noise

Civil Engineering - Aug 18

Error prevention, rather than correction, best for future of nanoelectronic devices



25 May 2011

Architecture - Microtechnics/Electroengineering

The move toward smarter, lighter and more powerful electronics, computers and smartphones depends on whether transistor circuits, the building blocks of such devices, can process large amounts of information. As these circuits get faster and smaller, the number of errors they generate — arising from heat dissipation, noise and structural disorder — in the physical information they process increases, which can impede development.

Experts have debated which of two error-suppressing processes is more efficient and efficacious as these circuits are reduced to the nanoscale: (1) physical fault-tolerance, in which the device is scaled down in size (and number of electrons) only to the point at which it can still *prevent* the generation of logical errors, or (2) architectural fault-tolerance, in which the device is continuously scaled down and robust algorithms are used to *correct* the errors it generates.

In a new study, Vwani Roychowdhury, professor of electrical engineering at the UCLA Henry Samueli School of Engineering and Applied Science and a member of the California NanoSystems Institute at UCLA, and Thomas Szkopek, professor of electrical and computer engineering at McGill University, and colleagues quantified for the first time these error-suppressing processes for model nanoelectronic systems and estimated the minimum number of electrons necessary for reliable circuit logic. They found that physical fault-tolerance in transistor circuits suppresses the error rate per electron exponentially, while even the most efficient architectural fault-tolerance system only suppresses the error rate subexponentially. They conclude that physical fault-tolerance error *prevention* is better than architectural fault tolerance error *correction*.

The study contributes a fundamental insight into the reliability of nanoscale transistor device technologies and scaling and may impose

Related Stories

Architecture

UQ showcases projects by tomorrow's architects - 03.12

Crews working on heating issue on campus - 02.12

Scaling commercial energy efficiency - 16.11

World's Columbian Exposition of 1893 comes alive on computer screens - 05.11

University Terrace information session scheduled today for Stanford faculty - 06.10



Related Stories

Microtechnics / Electroengineering

Shanbhag awarded funding for research on studying competition under uncertainty - 11.12

Stanford-led skyscraper-style chip design boosts performance 1,000-fold - 09.12

Could metal particles be the clean fuel of the future? - 09.12

Siemens research center coming to Garching - 08.12



jobs.myScience

Last job offers

- 10.12
Fachbereichsleiter/-in und Dozent/-in
Erziehungswissenschaftliche Studien 50-80%

Medicine/Pharmacology - 9.12
Project Leader CT Imaging

Pedagogy/Education Science - 8.12
Wissenschaftliche Mitarbeiterin / wissenschaftlicher Mitarbeiter an Universitäten (Entgeltgruppe 13...

Medicine/Pharmacology - 4.12
Junior Faculty at the Department of Biomedicine

Earth Sciences - 2.12
Projektleiter/in
Bohrstellengeologie

Earth Sciences - 2.12
Projektleiter/in Bohrtechnik

Medicine/Pharmacology - 11.12
Clinical professor with specific responsibilities in infectious diseases (combined position)

Life Sciences - 11.12
Assistant professor in Clinical Genetics

Civil Engineering - 2.12
Universitätsassistent/in mit Doktorat für Professoren Laufbahnstelle

Arts and Design - 6.10
Universitätsprofessorin / Universitätsprofessor für das Fach Klavier und Klavierdidaktik (BV gem. § 98...

Computer Science/Telecom - 11.12

Juniorprofessor für Sicherheit in Informationssystemen

Law/Forensics - 11.12

Nebenberufliche Professur, Strafrecht, insbesondere Wirtschaftsstrafrecht" (20%)

Business/Economics - 12.12
Assistant / Associate Professor

Business/Economics - 11.12
Professor of Marketing

Medicine/Pharmacology - 12.12
Family Medicine - Associate or Full Professor (AA15343)

Microtechnics - 12.12
The William Magee Endowed Chair in Chemical Process Design

»»» Search for job

Stories from Europe's busiest bus route

Architecture - Aug 11

An Imperial researcher discusses the effects of fires on skyscrapers

Environmental Sciences - Aug 5

Building from the ground up: participatory design in Kenya's oldest slum

Architecture - Jul 28

Women architects debate future ways to work

Architecture - Jul 16

'Smart' carbon positive energy house

» » more

a minimum limit on the size of devices. The findings are of immediate relevance to researchers working in transistor-scaling, through to scientists developing new device concepts.

AUTHORS:

Authors of the research include Thomas Szkopek, Vwani P. Roychowdhury, Dimitri A. Antoniadis and John N. Damoulakis

FUNDING:

JOURNAL:

The research was recently published in the peer-reviewed Physical Review Letters and is available online at:

prl.aps.org/abstract/PRL/v106/i17/e176801 .

» Insert a job offer
» Announce Events
» Jobs and news alerts
» **SIGN UP HERE**

Jobs listed on
careerJET

Links

- [University of California Los Angeles](#)
- [Science Wire](#)
- [News from the Lab](#)



» [Comment on this page.](#)

[home](#) | [about](#) | [login](#) | [register](#) | [search](#) | [sitemap](#) | [contact](#) | [privacy](#)

Copyright © Dec 2015 - myScience