Aging Sensitive Recycling Sensors for Chip Authentication

Researhers at the University of South Florida have developed a novel sensor to detect recycled microchips to improve the security and efficiency of electronic systems.

An integrated circuit (IC), or “microchip,” is a set of electronic circuits on one small piece of silicon. It is common in electronics manufacturing to utilize recycled ICs; however, there are concerns with this practice as aged ICs have a shorter lifetime, among other issues. Although devices using recycled ICs might operate correctly, the operating speed and energy-efficiency is degraded due to prior use. Recycled ICs not only impact the performance of a device, but they can also be tampered with to leak confidential data to those with malicious intent. Detecting recycled ICs can improve the security and trustworthiness of a computer system, but it is challenging to isolate the recycled ICs from new ones.

Inventors at USF have developed a novel sensor that is capable of distinguishing recycled ICs from new ones. Conventional techniques exploit the microchip’s lowered performance in order to isolate it, but this is ineffective for detecting chips that have been minimally used. The new sensor, called the Schmitt Trigger-Based Recycling Sensor, is capable of detecting ICs that have been used for a very short amount of time. The device can detect recycled ICs that are only 8 hours old, whereas current technology requires more than 1 month of usage for detection. This “smart” sensor is capable of self-calibration, thus it avoids process variation brought on by sensing errors. This sensor will enhance the security and performance of circuit-based electronic devices.

ADVANTAGES:
- Can detect recycled ICs that have had only hours of use
- Improve the performance and security of circuit based systems
- Self-calibrating and avoids errors

Sensor to Detect Minimally Used Recycled Integrated Circuits

Schematic of the Schmitt Trigger-Based Recycling Sensor

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