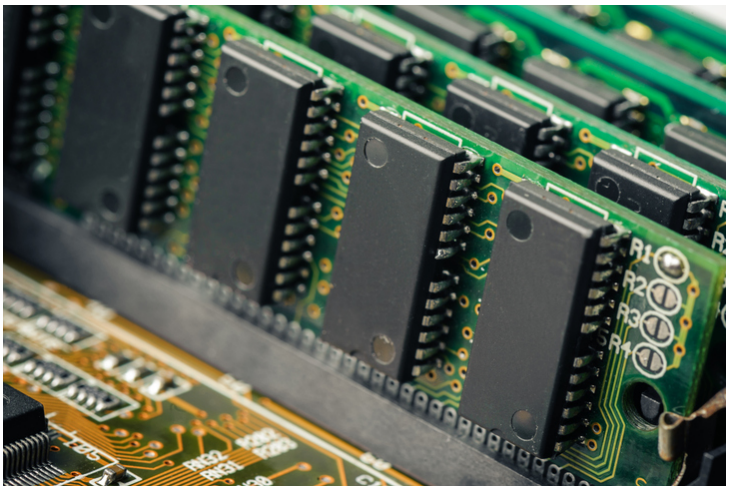
INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Adaptive Method of Reading and Writing to a Memory Array

Technologu Number: 5408



OVERVIEW

Adaptive read-write-erase methods for memristor-based resistive memory arrays

- Simplifies design, increases reliability, and enhances efficiency over existing memory tech
- Used in SSDs, SD-cards, and resistive memory (RRAM) designs

BACKGROUND

The advancement of memory technology has been pivotal in the evolution of computing systems, with non-volatile memories playing a crucial role due to their ability to retain information without power. Historically, flash memory has dominated this space, but its scaling limitations and power inefficiencies prompt the need for better alternatives. To address these issues, research has focused on alternative memory devices like resistive RAM (RRAM) / memristors. Despite their promising attributes, such as non-volatility and high scalability, existing methods to read, write, and erase data in these devices can be complex and prone to errors due to process and device variability. Therefore, there's a pressing need for an improved technique that enhances efficiency, scalability, and reliability in next-generation memory technology.

Technology ID
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Category
Hardware
Engineering & Physical Sciences
Semiconductor, MEMS, and Electronics

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INNOVATION

The University of Michigan's research group has proposed a novel adaptive read, write, and erase technique for resistive memory arrays using memristors. This technique leverages the transient conductance behavior of memristors, which experience significant conductance changes before stabilizing under applied bias. By integrating all memory processes into a unified circuit, the method simplifies design while being resistant to process and device variations. Moreover, it achieves power metrics comparable to existing flash memory technology but with enhanced scalability potential. Real-world applications of this invention include improved resistive memory (RRAM) designs, solid-state drives (SSDs), and SD-cards, offering a robust and efficient alternative to current non-volatile memory solutions.

ADDITIONAL INFORMATION

US9111613 "Adaptive reading of a resistive memory"