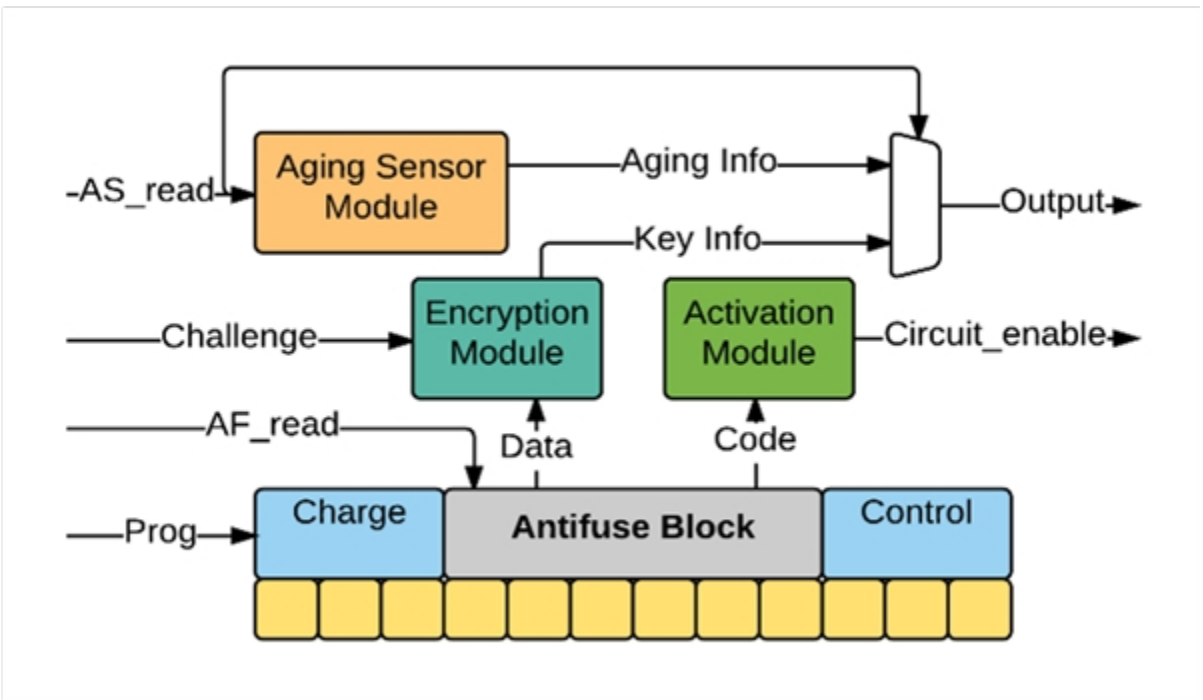
Innovative Sensors for Detection of Counterfeited ICs

Tech ID: 25921 / UC Case 2016-182-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,298,236	05/21/2019	2016-182

IMAGES



BRIEF DESCRIPTION

Brief Description:

UCR researchers have developed an innovative multifunctional on-chip sensor for comprehensive detection of counterfeited ICs. Their original on-chip invention could measure usage age via electromigration, but they have improved upon the accuracy of this readout by implementing antifuse memory block and combining two aging sensors: RO-based and EM-based. To enhance security even further, they applied corresponding post-fabrication methods of registering ICs with unique IDs so that activation can only occur once matched up to the ID embedded in the antifuse memory component.

FULL DESCRIPTION

Background

Counterfeiting and recycling of integrated circuits (ICs) are a major problem with recycling cases more widely reported. Detection of recycled chips is done either through physical and/or electrical methods. While

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OTHER INFORMATION

KEYWORDS

integrated circuits, IC, counterfeited IC, piracy, electromigration, aging sensors, antifuse memory, RO-based, EM-based, chip ID, chip identification, encryption, recycled chips, remarked chips, cloned chips, overproduced chips, chip authentication, on-ch

CATEGORIZED AS

- **Computer**
  - Hardware
  - Security
- **Security and Defense**
  - Cyber security
  - Other
- **Sensors & Instrumentation**
  - Other

RELATED CASES

2016-182-0

physical methods are destructive and time consuming, electrical methods can be very expensive. Antifuse based sensors have been explored but require large area overhead when more accurate usage information is required.

Technology

UCR researchers led by Prof. Tan have developed an innovative, multifunctional on-chip sensor for comprehensive detection of counterfeited ICs. Their original on-chip invention could measure usage via electomigration (EM), but they have improved upon the accuracy of this readout by implementing antifuse memory block and combining two aging sensors. To enhance security even further, they applied corresponding post-fabrication methods of registering ICs with unique IDs so that activation can only occur once matched up to the ID embedded in the antifuse memory component.

ADVANTAGES

- A simpler circuit implementation with a smaller footprint that provides accurate measure of chip usage time.
- Detects the following types of counterfeited chips: remarked, recycled, out-of-spec, cloned, overproduced
- Incorporates antifuse memory block – stores unique chip ID, time stamp of activation, and other chip assets, encrypted against tampering
- Enhances usage time estimation range and accuracy by combining 2 types of sensors – differentiates between short-term and long-term aging effects

APPLICATIONS

- Central on-chip security hardware IP
- On-chip timer
- Post-fabrication authentication/activation module for ICs

RELATED MATERIALS

- EM-based on-chip aging sensor for detection and prevention of counterfeit and recycled ICs

OTHER INFORMATION

Counterfeiting of ICs is a billion-dollar market based and its ramifications can be read at this blogpost by Synopsys -

"Counterfeit Chips 101: Protect Your Next Design"

Therefore this technology offers an all-inclusive, yet cost-efficient, detection solution to lower the detrimental impacts of counterfeiting and piracy.

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