

Detection of IC usage using AF based sensor

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ABSTRACT

The reuse of various electronic components has become the major impact in today's world. One among the major counterfeiting is IC usage. Various On-Chip methods like RO based sensor are used to detect the usage of IC. But these methods will detect only for a particular period. In this paper, we proposed a new On-Chip IC detection method known as Anti-fuse based sensor. This AF based sensor will count the values when the power supply is ON. The power up timing is used to detect the usage of IC. Even for a very short period it will analysis the usage time.

KEY WORDS: counter, one time programmable memory, power-up timing, look-up table, AF based sensor.

1. INTRODUCTION

The integrated circuits (ICs) counterfeiting method is probably impacting the security of various electronic systems. A recycled or a duplicate component is not genuine Because of its identical functionality and packaging distinguishing usage of IC is a tedious task. From one of the survey it is reported that the usage of counterfeiting ICs is more than the new IC. If this method of IC usage gets increased day by day, then quality of the electronic component will also get reduced In addition, it is also suggest that the number is going to increase over time. Demand for the counterfeiting electronics products will be more comparable to the new one because of its reduced cost. This will degrade the performance of the IC. In today's world integrated ICs play a major role for the manufacture of each and every electronic equipment. Counterfeiting ICs must be used to protect the electronic equipment. So to detect the usage of IC, one of the best method is On-Chip IC detection.

2. METHODS & MATERIALS

Existing method

Physical unclonable function: Each and every ICs security operation is secret, which cannot duplicated. Various properties of PUF are capacity, tamper-evidence etc. These properties make them very appealing for deployment in cryptographic application. Any special manufacturing process and testing steps are not required (Lu, 2011). It will not detect the whether the IC i.e. reused one or new one but instead it will authenticate the integrated ICs. (Lu, 2011).

Fingerprint: Even in designs with large process and temperature variations, finger print method is very effective. This method has no area overhead, Less power consumption, Resilient to attacks and Better simulation results. But the temperature variations could make it difficult to detect recovered ICs.

Silicon odometer: Separates the aging effects of HCl, BTI, TDDB. This method has High frequency resolution. But it consumes high power.

The above three existing methods will authenticate the integrated ICs but it will not detect whether the IC is recycled one or new one.

Proposed Method: The recycled ICs are used ICs and it will experience aging .This is the major difference between recycled ICs and unused ICs. The fresh ICS are removed from their actual boards and resold in the market. Negative-bias temperature instability and hot-carrier injection are various aging effects that occurs due to counterfeiting of ICs. These would have had an impact on the performance of the counterfeiting ICs because of the change in threshold voltage. In this paper, we proposed AF-based sensor with power up timing for the detection of recycled ICs.

AF-based sensor:

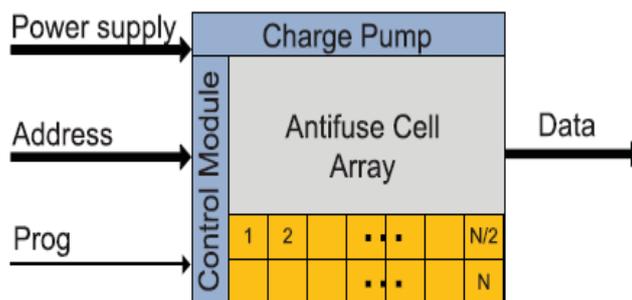


Fig.1.AF Based Sensor System

The traits of AF block in the AF-based sensor are as follows:

- It consumes less power
- The area of an AF is much smaller

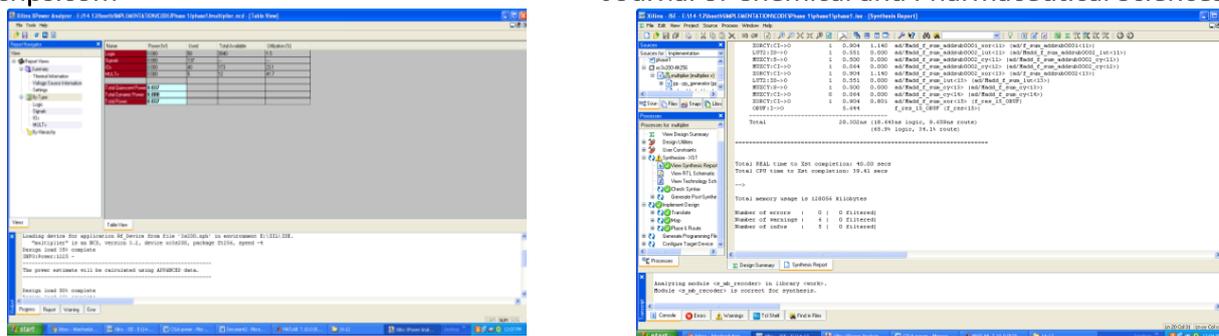


Figure.4. Power and delay calculation of antifuse based sensor

Fig .4 shows the power and delay calculation of antifuse based sensor. The calculated power is 0.05 and the delay is 10.65ns. Thus by using this method power consumption is reduced. Here the software used is Xilinx to calculate the power. This gives the accurate value for power and delay.

4. CONCLUSION

Thus the proposed design using anti fuse based sensors detects the usage of ICs. The counters and an embedded antifuse (AF) memory block, record the usage time of ICs and this stored values will be dynamically stored in the AF memory block by controlling the programming signal. By using this design counterfeiting of IC usage can be easily detected and also the power and delay can be reduced. This method provides high power consumption and provides high reliability.

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