DIMINISH: Detection and Isolation of Malicious Inclusions in Secure Hardware

Mohammad Tehranipoor and Jim Plusquellic (www.engr.uconn.edu/~tehrani) (www.csee.umbc.edu/~plusquel)

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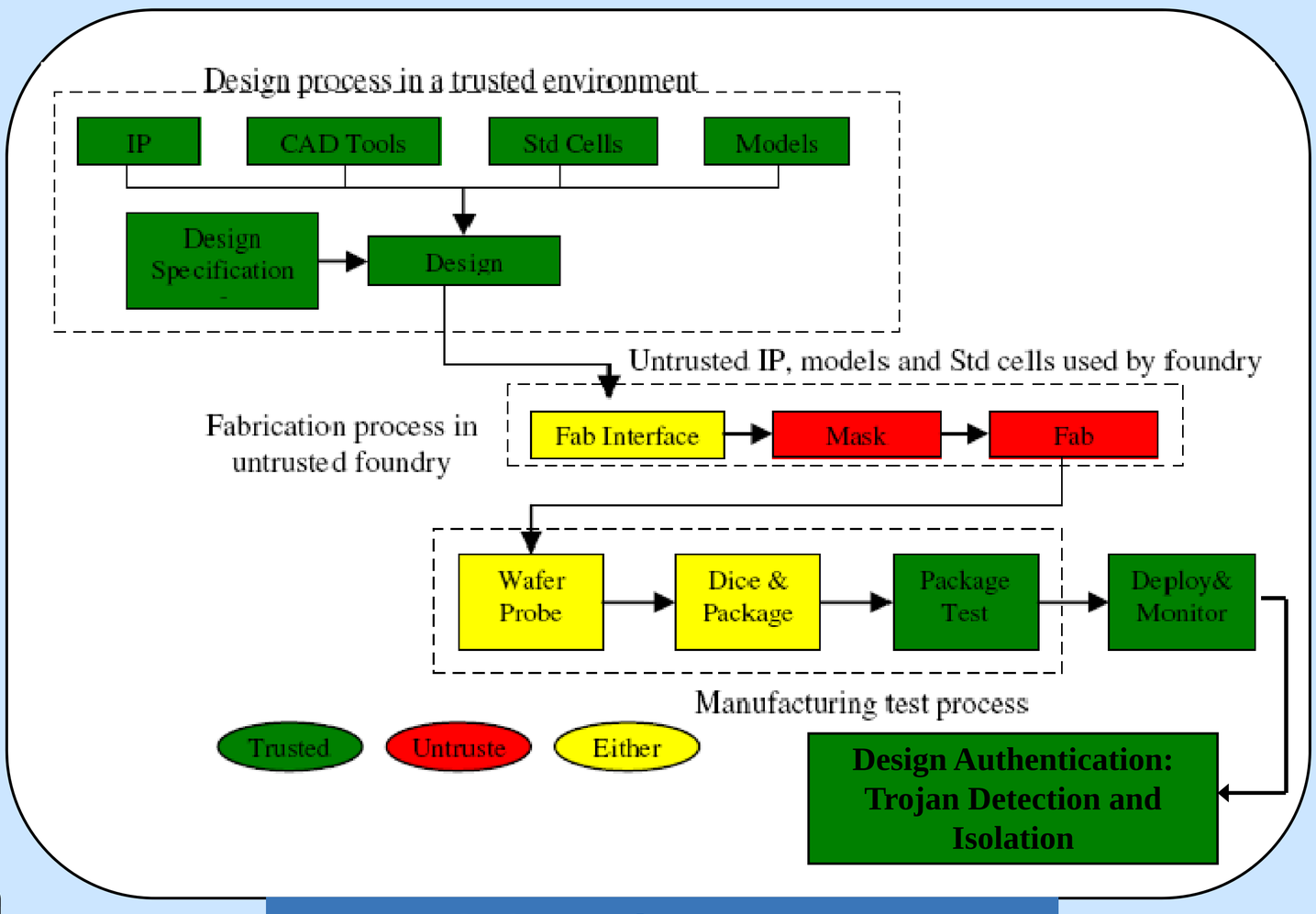
Problem:

Chip design and fabrication is becoming increasingly vulnerable to malicious activities and alterations with globalization. An adversary can introduce a Trojan designed to disable and/or destroy a system at some future time or the Trojan may serve to leak confidential information covertly to the adversary.

Approach:

1. Taxonomy of Trojans
2. Power/Current Analysis
3. IDDQ Pattern Generation
4. Delay Analysis
5. Novel Delay Pattern Generation
   - Hard-to-detect Inclusions
   - Small Delay Inclusions
6. Silicon Data Collection
   - Trojan Detection & Localization



ASIC Design Process

Approach and Impact

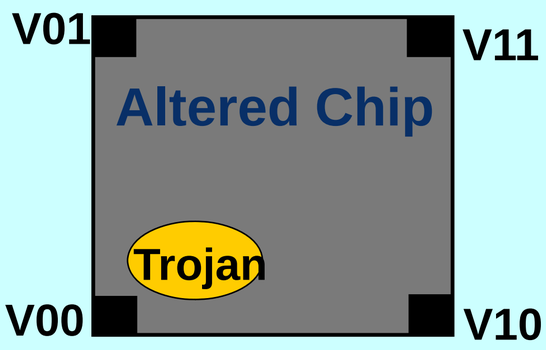
New approach:

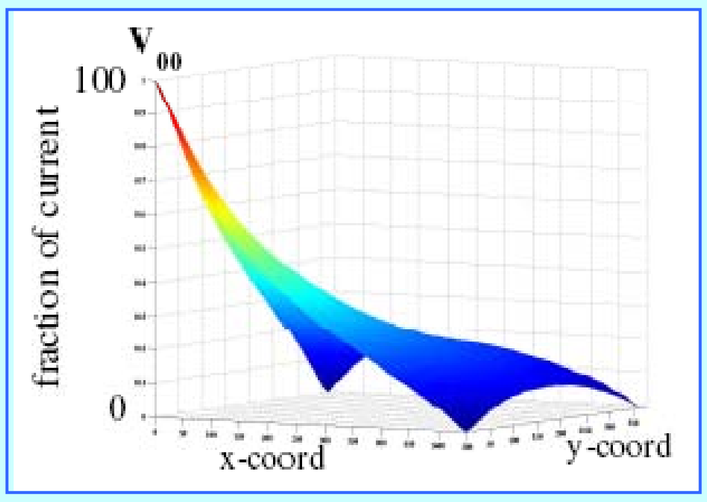
- Detecting and localizing Trojans
- Multiple power supply analysis
- Novel delay trace analysis

Research Impact:

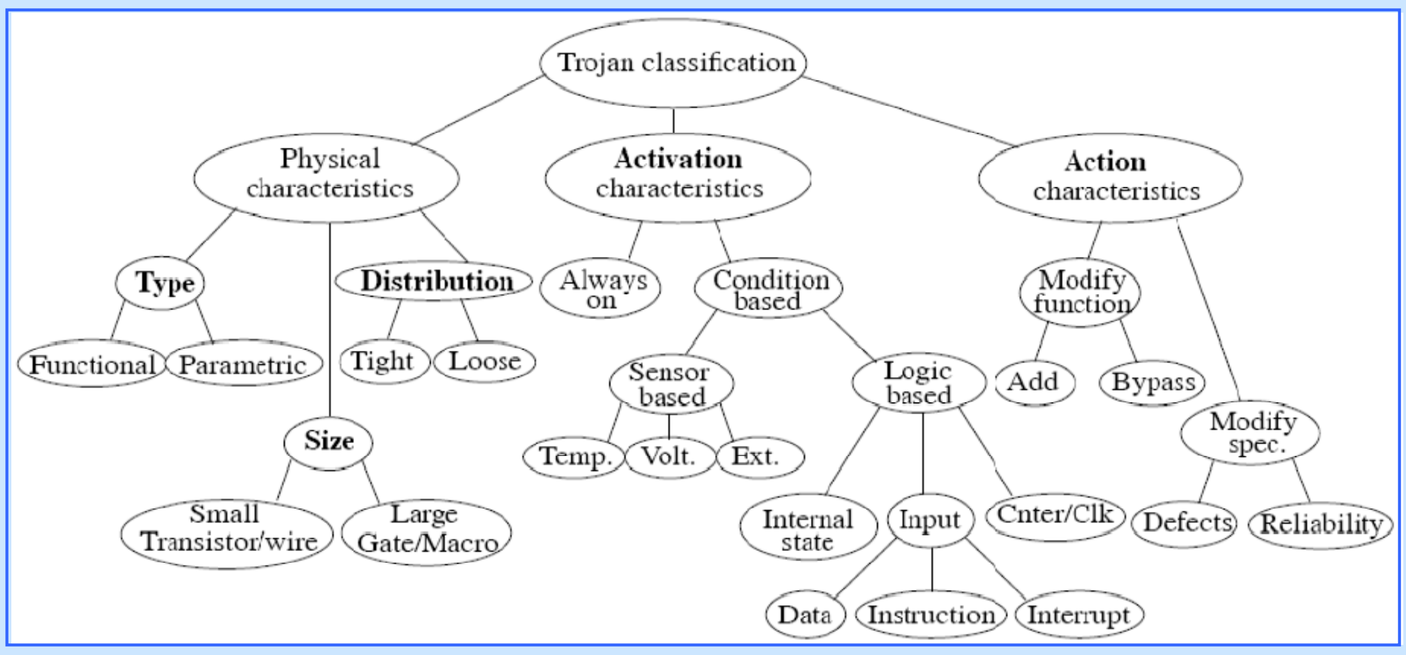
- Improve trustworthiness of chips
- Improve manufacturing testing
- Improve software-based diagnosis

Power/Current Analysis



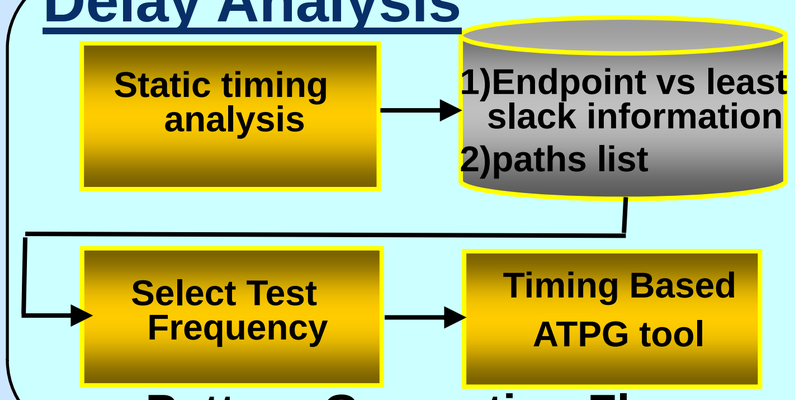


Calibrated and normalized current from V00

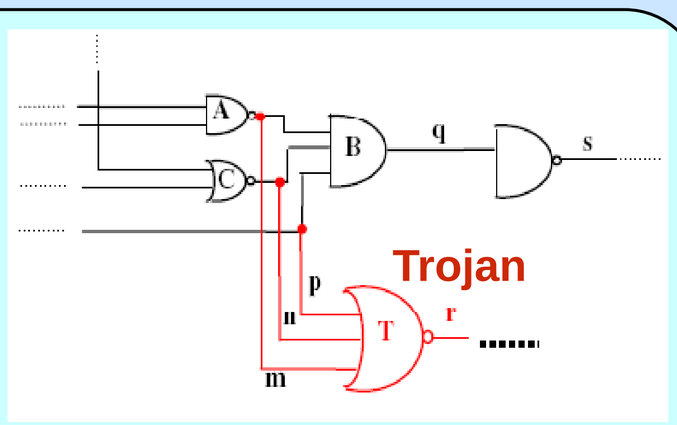


Taxonomy of Trojans

Delay Analysis



Pattern Generation Flow



Circuit with Trojan

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