Securing the Internet of Things from the Bottom Up Using Physical Unclonable Functions

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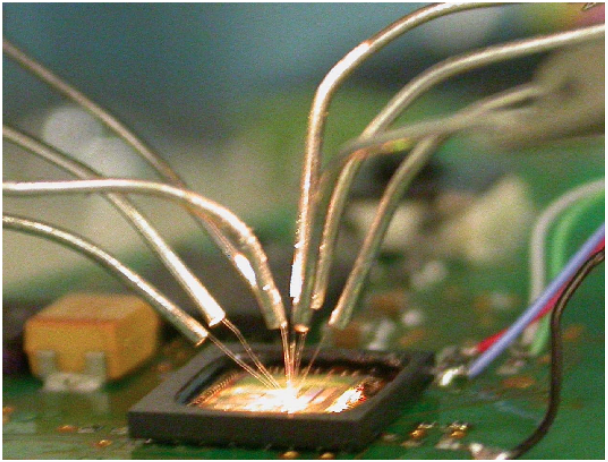
About the Author

Leah Lathrop, B. Eng.:

- Project Engineer and Master's Student at OTH Amberg-Weiden, Germany
- Fields of Research:
  - Physical Unclonable Functions
  - Side-channel Attacks

Outline

Motivation



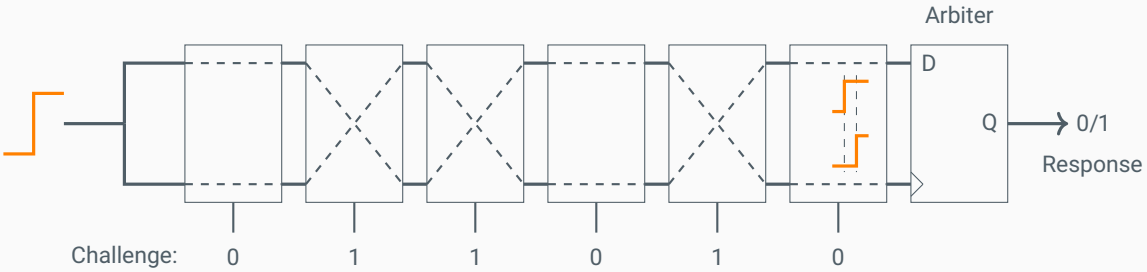
S. Skorobogatov, “How microprobing can attack encrypted memory,” in *2017 Euromicro Conference on Digital System Design (DSD)*. IEEE, August 2017, pp. 244-251.

Physical Unclonable Functions

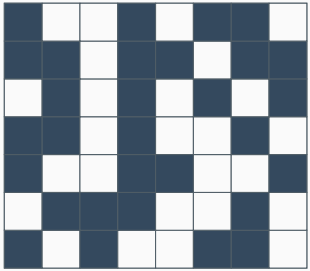
- Like biometrics for physical objects
- Use of an intrinsic random physical feature
- Challenge-Response Behavior

Outline

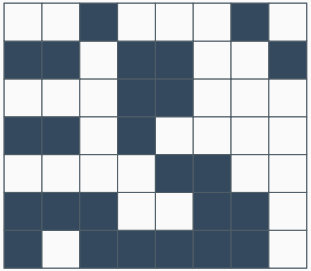
Arbiter PUF



SRAM PUF



SRAM 1

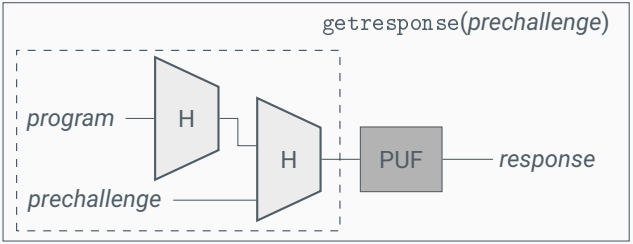


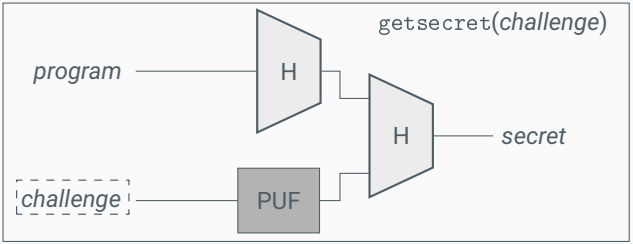
SRAM 2

PUF Characteristics

	Arbiter PUF	SRAM PUF
Number of Challenges	Strong PUF	Physically Obfuscated Key
Probabilistic Behavior	Delay-Based	Memory-Based

PUF Applications

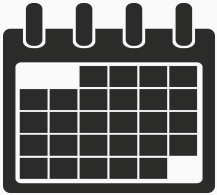




B. Gassend, D. Clarke, M. van Dijk, and S. Devadas, "Controlled physical random functions," in *18th Annual Computer Security Applications Conference*. IEEE, January 2002, pp. 149-160.

Environmental Influences

Temperature



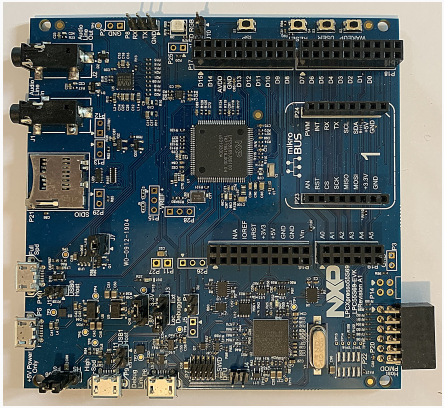
Aging

Supply Voltage

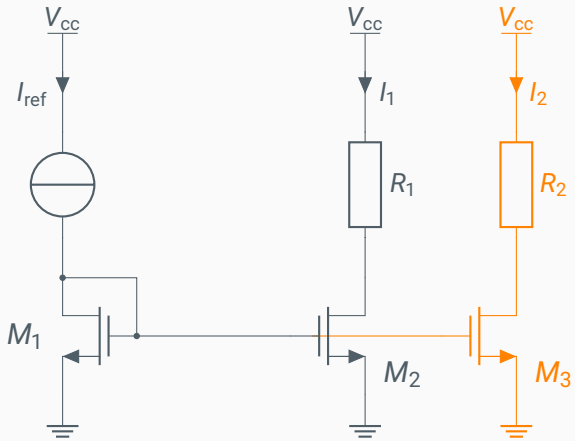
Outline

SRAM PUF

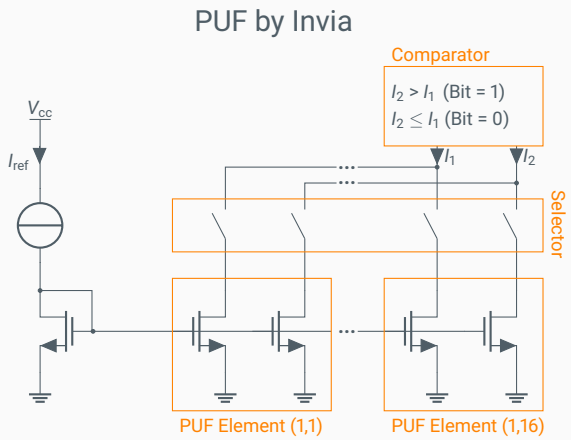
- Intellectual Properties by Intrinsic ID
  - QuiddiKey (Hardware)
  - BroadKey (Software)
- Integrated into products by:
  - NXP
  - Microsemi

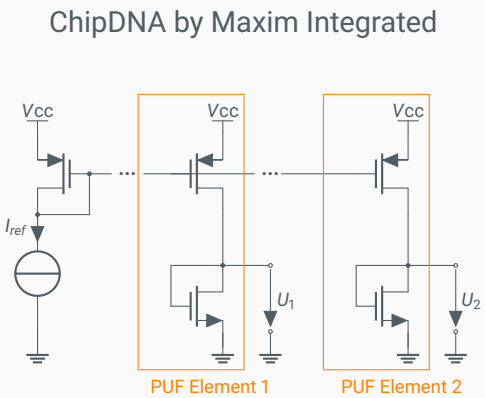


Current Mirror

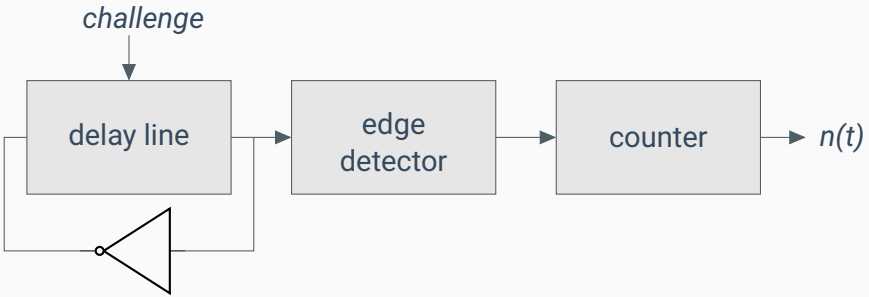


Current Mirror PUF





Ring Oscillator PUF

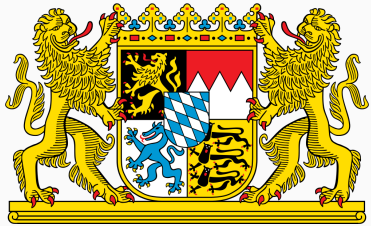


Outline

Conclusion

- Variety of different PUF types
- PUFs included in a many different types of devices
- Some of the PUFs used in basic ways
- All technologies were physically obfuscated keys

Thank You! Questions?



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