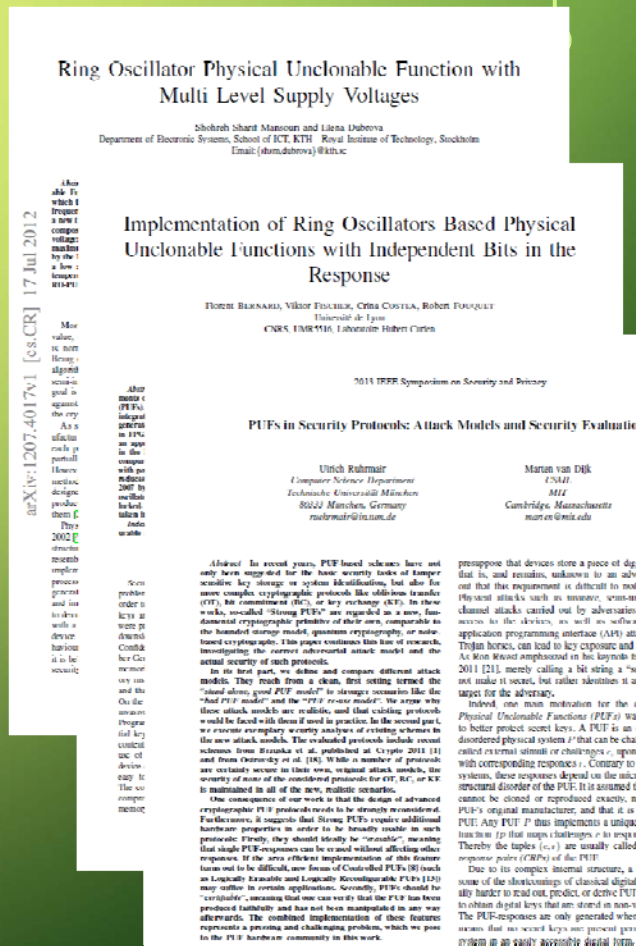
HARDWARE SECURITY

WHAT IT IS, HOW IT WORKS, AND WHAT YOU CAN DO ABOUT IT

OUR TITLE: RESEARCH ASSISTANT

- What we did:
- Read lots of research papers
- Design VHDL code to specifications
- Wrote up experiments including the hardware we built



Ring Oscillator Physical Unclonable Function with Multi Level Supply Voltages

Implementation of Ring Oscillators Based Physical Unclonable Functions with Independent Bits in the Response

PUFs in Security Protocols: Attack Models and Security Evaluatio

WHAT WE LEARNED

- Lots of Research Papers
- Fewer practical applications
  - Most prominent example: Defeating Xbox Region Locking
- Hardware Security == Fight Club
- Most of the effective strategies rely on physical security of the hardware involved
  - Hits to hardware performance and/or device cost have left security out
  - This is changing with computer performance increases

HARDWARE TROJANS

- The anti-art of breaking stuff by putting in unwanted functions
- Famous examples:
  - Backdoor
  - Time bomb
  - Malicious errors
- Inserted by:
  - Fabrication Facility
  - Unethical Engineers
  - Used for testing and not removed from production hardware

BUS SNOOPING

- The bus is the connection set between your CPU and memory
- Data on this is almost always not encrypted
- EVERYTHING a computer does crosses this connection
- “Snooping” is watching what happens over this connection
  - Can be with an oscilloscope or with specialized software depending on the system
- Requires physical access to hardware

PHYSICAL UNCLONABLE FUNCTION

- Method of authenticating hardware
- Works by challenging the PUF and getting a response
- Xbox used this for region lock
- Defeated by interface between PUF and main system