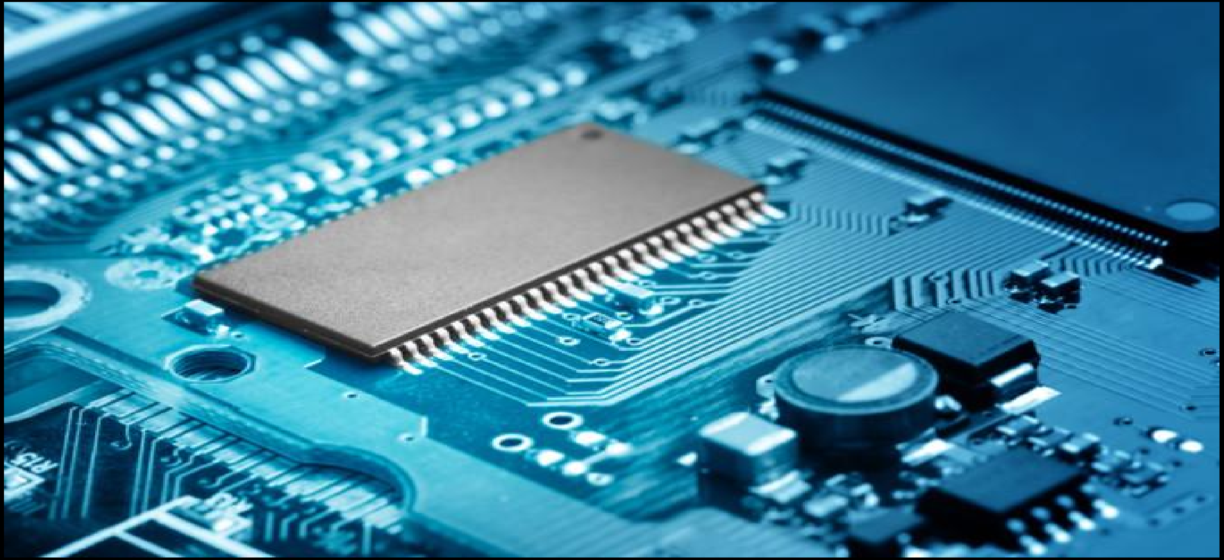
Team Intruder



Who: Team Intruder

Advisor: Dr. Hassan Salmani

- Shrijanand Chintapatla (Computer Science, Freshman)
- Sheriff Adewumi (Electrical Engineer, Freshman)
- Jah’lil Allen (Computer Science, Transfer)
- Amanuel Getahun (Computer Engineer, Senior)
- Taylor White (Computer Engineer, Senior)
- Darren Earle (Computer Engineer, Senior)

Graduate Student

- Raza Shafiq Ajmi

Background

- $150B increase in computer hardware sales since 2006

- 2 major industries
    - Government
    - Consumer (Microsoft, Apple, etc)

Problem Formulation

Why do we need to detect hardware trojan?

- Functionality
  - it can fail at crucial time or generate false signals
- Security
  - loss of internal data

Design Requirement for detection system:

- Ease of use
- Quick responsive time
- Cost effective

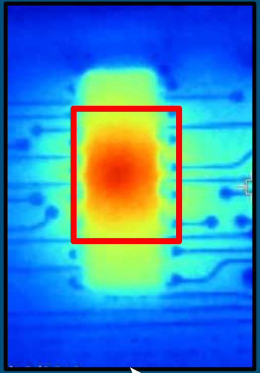
Problem Formulation

A hardware Trojan is a threatening modification to the circuitry of an integrated circuit. This can lead to security breaches in an electronic system or cause a device to behave incorrectly when in operation. It is sometimes difficult to determine if a piece of hardware has a Trojan because a small modification can easily go undetected by the system. Therefore, a method of detecting the slightest modification to a system needs to be developed. Although there are other hardware researchers and companies that are developing methods to detect internal bugs, as of now there isn’t a way to successfully detect all bugs, no matter how small, that would assure safety.

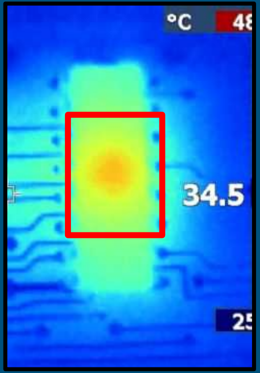
Solution Approaches

- **Heat Dissipation Analysis**
  - Compare heat maps of 2 FPGA boards, one with a Trojan and one without using an IR camera.

Board with Trojan



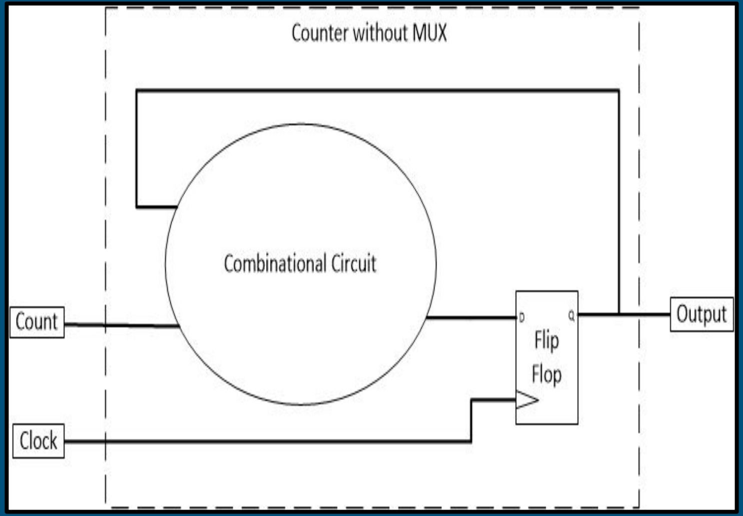
Board without

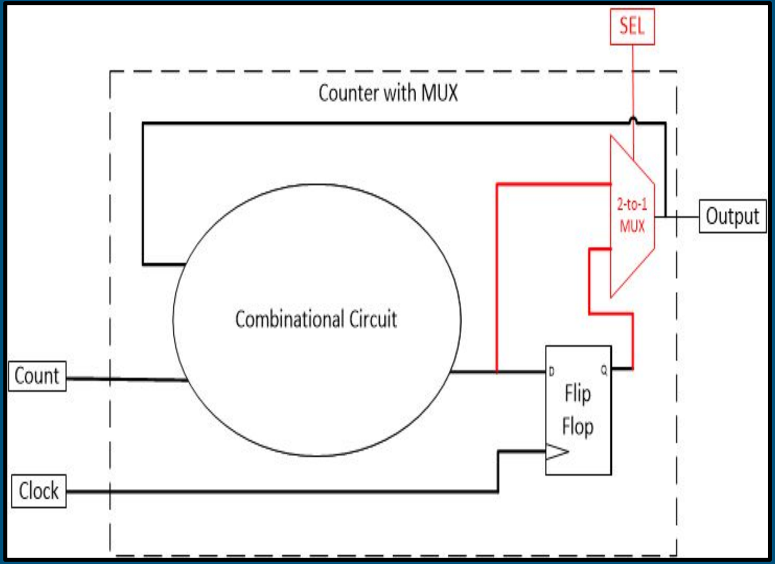


Produces more heat

Solution Approaches

- Timing Analysis





Solution Approaches

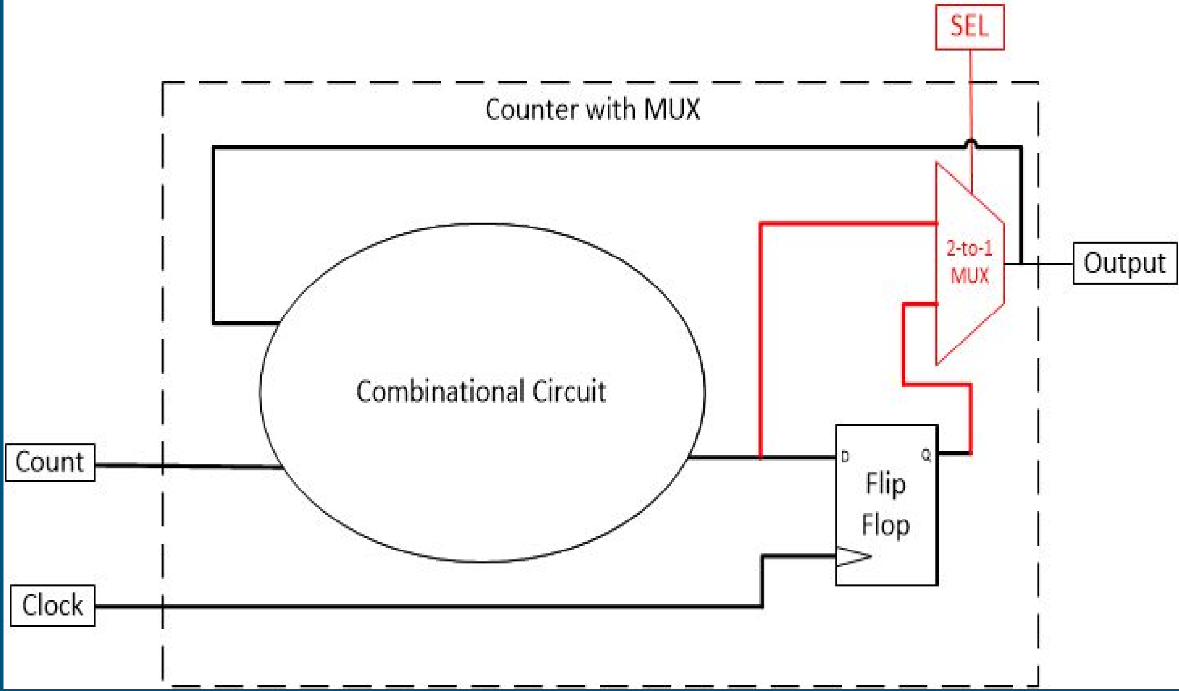
Decision Matrix

Criteria	Weight	Heat Dissipation Analysis	**Timing Analysis**
Time	5	5(1) = 5	5(2) = 10
Accuracy	5	5(1) = 5	5(2) = 10
Cost	4	4(1) = 4	4(2) = 8
Ease of use	4	4(1) = 4	4(2) = 8
Total:		18	36

*Weight: 1(Least important) - 5(Most important).
Rating: 1(Worst) - 2(Best)

Implementation Plan

- Develop sample sequential circuit
- Develop and Implement MUX
- Bypass clock using MUX
    - Why is this important?
- Measure Paths of combinational circuit
- Compare Path times with expected times

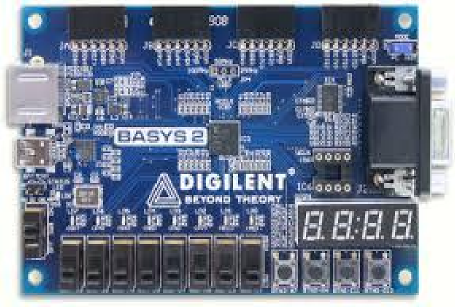


Current Status of Art

- There are many researches going on, some even using a similar method to ours, but there is no final product that's out on the market.

Costs and Resources

- Xilinx ISE (FREE)
- Python 3.4 (FREE)
- 2 FPGA Board (Basys2) (Alternative) $65
- IR Camera (Alternative) $400



Timeline

Months	**Tasks**
September	- designed a sample circuit for detection
October	- Run timing analysis on sample circuit
November-Dec	- Creating python program (analyze circuit)
Spring Semester	- Finalize python program (analyze circuit) - Insert a trojan on sample circuit, and detect it

Progress Report

- Read scientific journals in electrical and computer engineering fields
- Composed brief research reports on the articles
- Developed great insight in the field

Link to the Weekly Reports:

https://docs.google.com/document/d/1DVJb3xMAkoXeR6bLsLGyBzvildIC9Xi5a7h5tAte0js/edit?usp=sharing

Conclusion/Recap

Team Intruder plans to achieve our projected goal to detect trojan by the end of the spring 2016.

- Method/Design ✔
- Implementation ½

Efficiency

- Once implementation is complete , we plan to run many trials with different trojan circuits.

Q & A