Bachelor @ IAIK 2019/2020

Welcome!

Stefan Mangard

The Bachelor thesis is a milestone of your studies

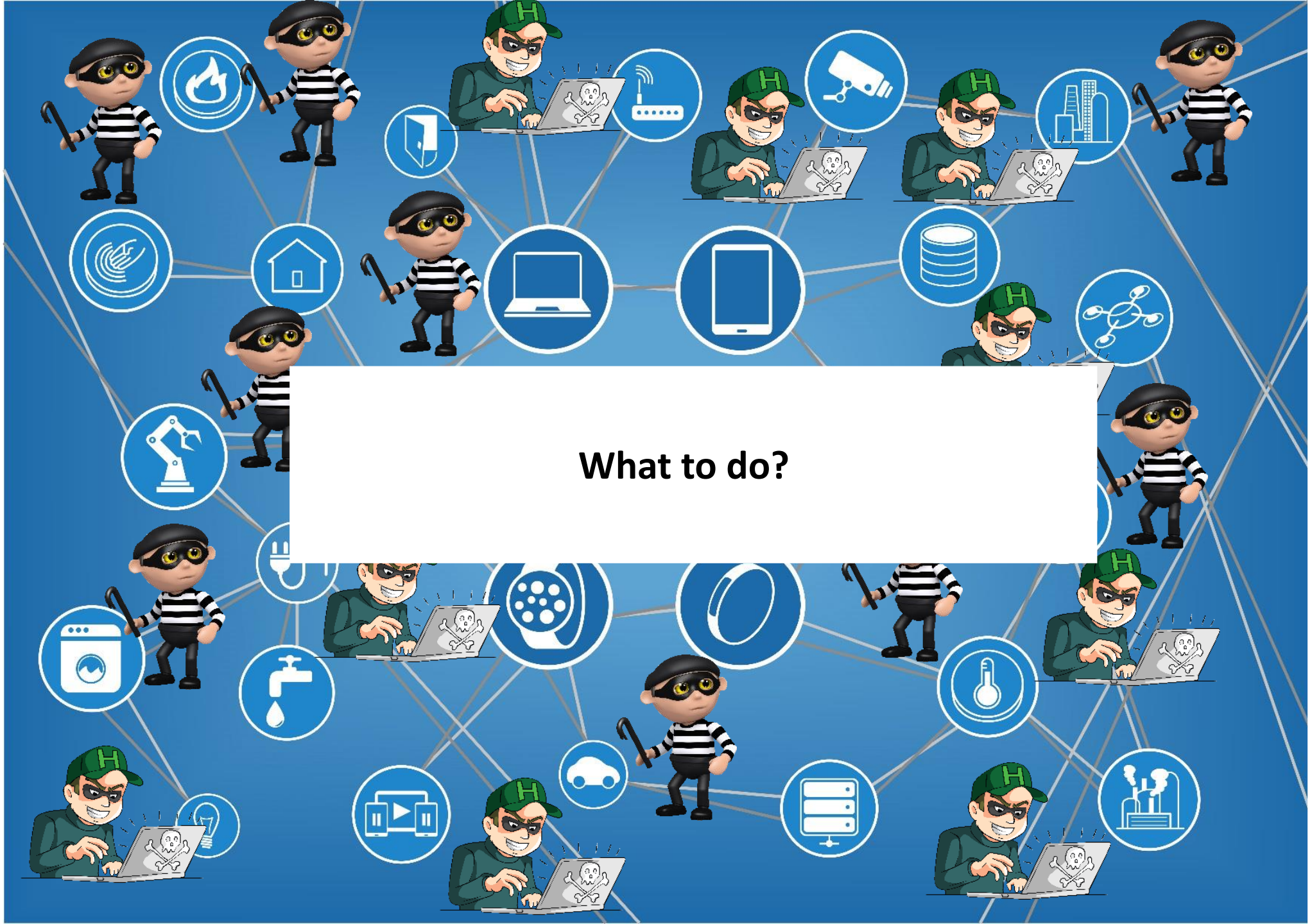
Compulsory/basic topics
vs.
specialized/elective topics

Bachelor Thesis

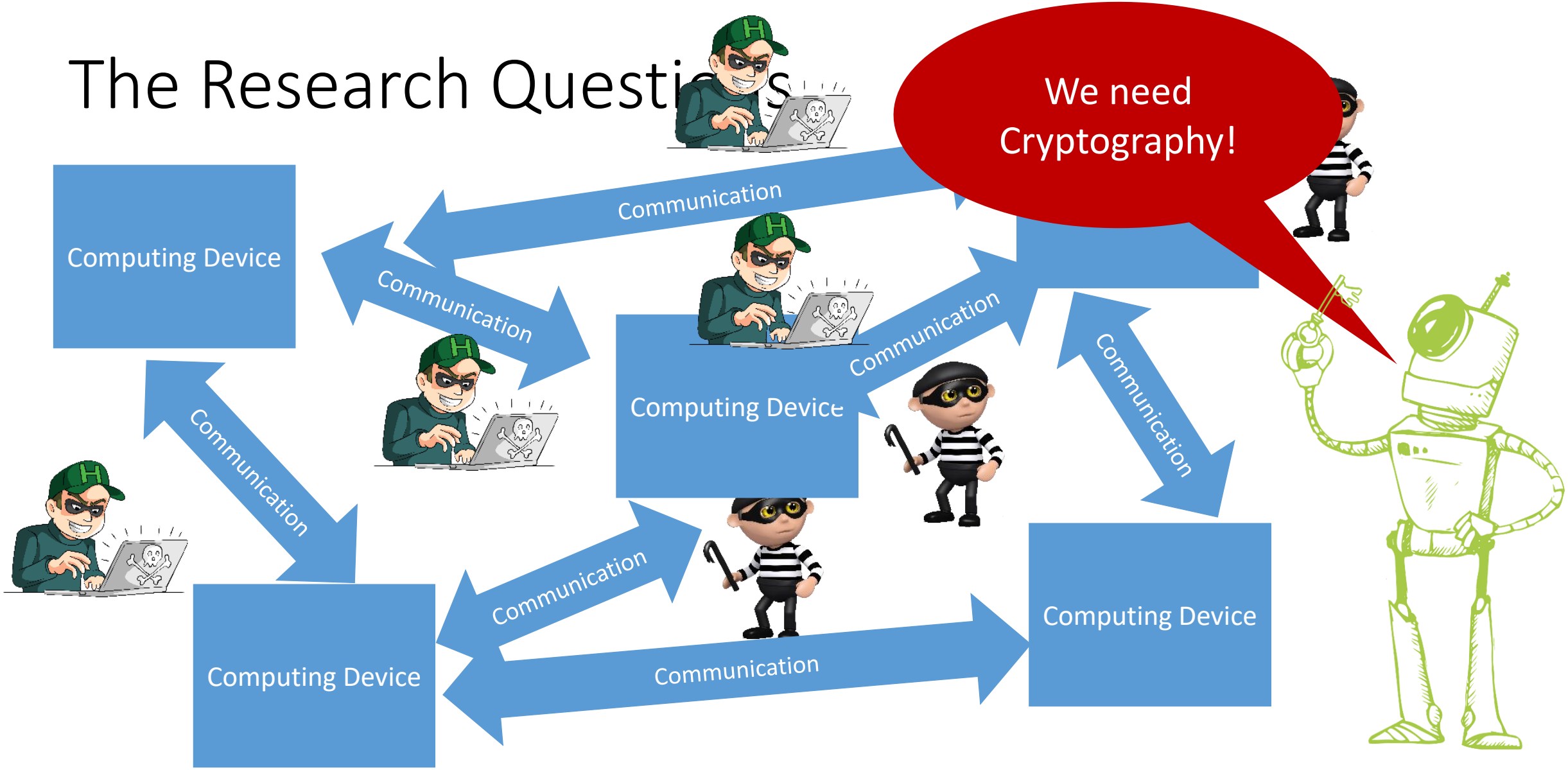
You choose – you have your own individual topic

?

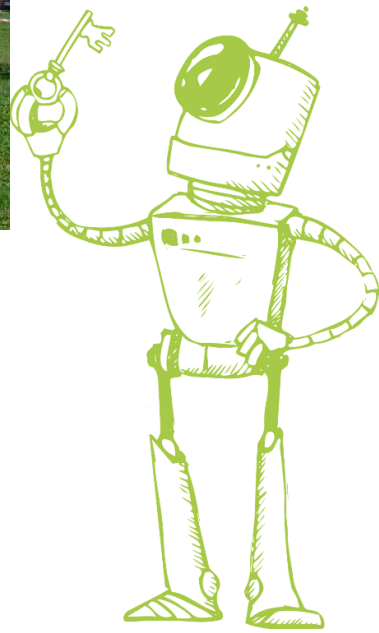
Information Security


What to do?

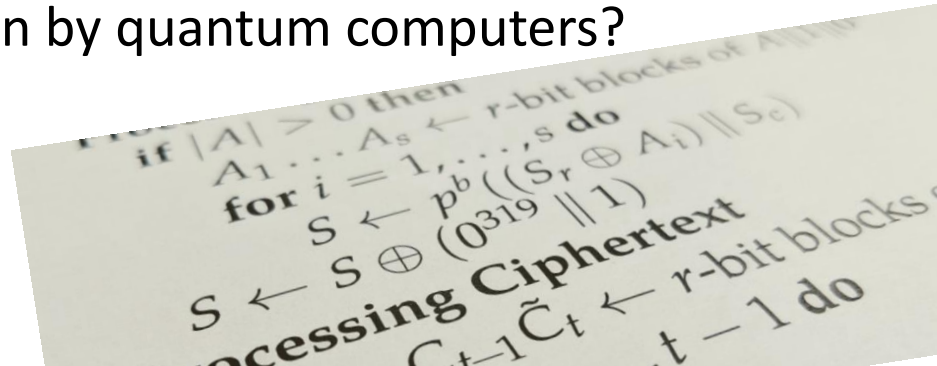
The Research Questions



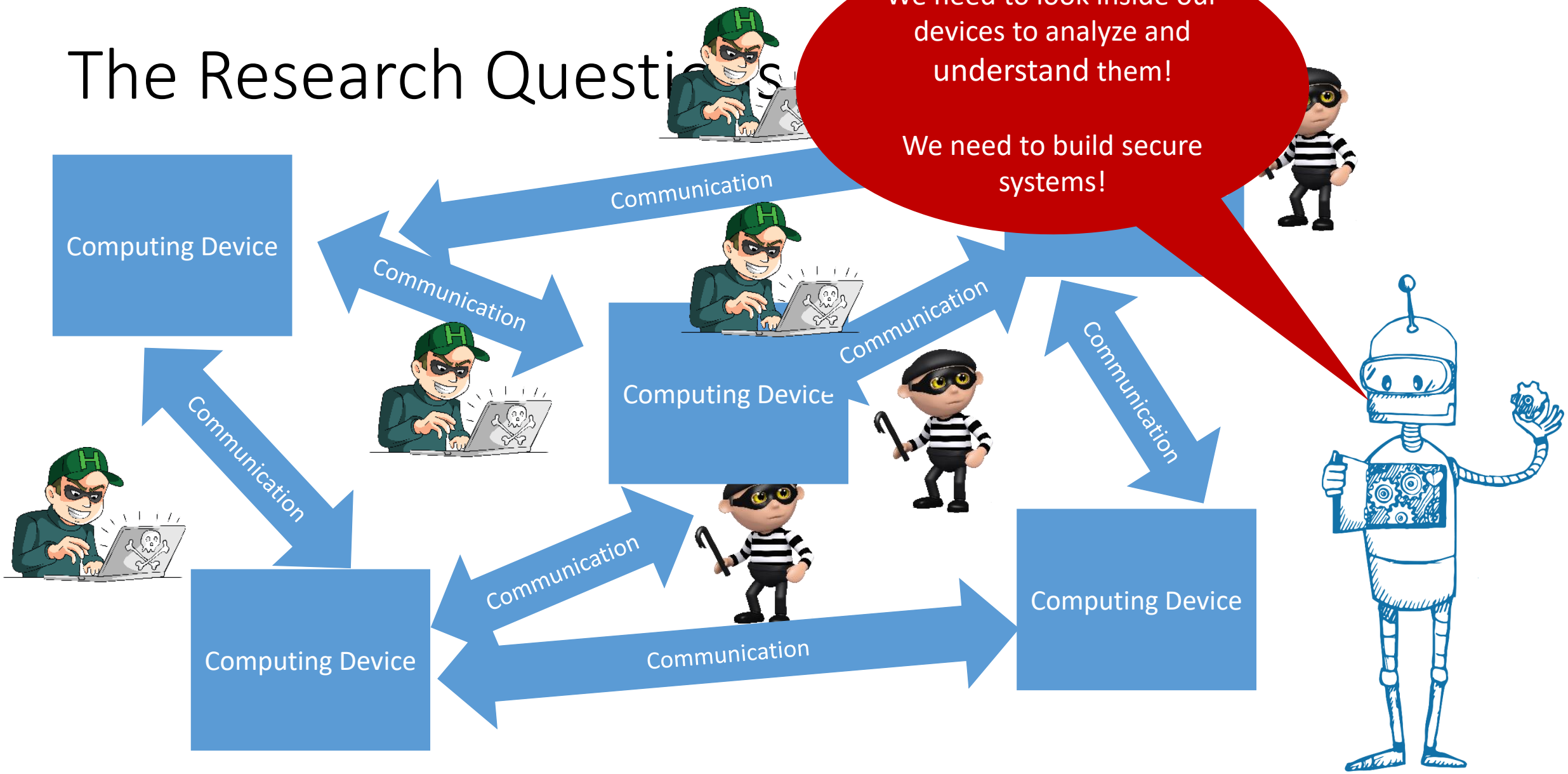
Cryptology & Privacy



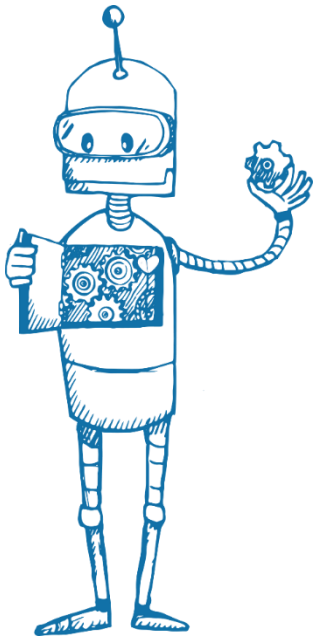
- **Research Questions**
  - How can we design efficient and secure cryptographic algorithms/protocols?
  - How can we compute on encrypted data?
  - How can we attack current cryptographic schemes?
  - How can we build cryptography that cannot be broken by quantum computers?
  - …



The Research Questions



System Security



- **Research Questions:**
  - What are the weaknesses of current systems?
  - How can we design systems (compiler, software, hardware, …) to prevent an attacker from hacking a computer?
  - How can we cope with side channels?
  - …

The Research G

We need to show/proof that the implementations indeed do what we specified

Computing

Communication

Communication

Communication

Communication

Communication

Communication

Communication

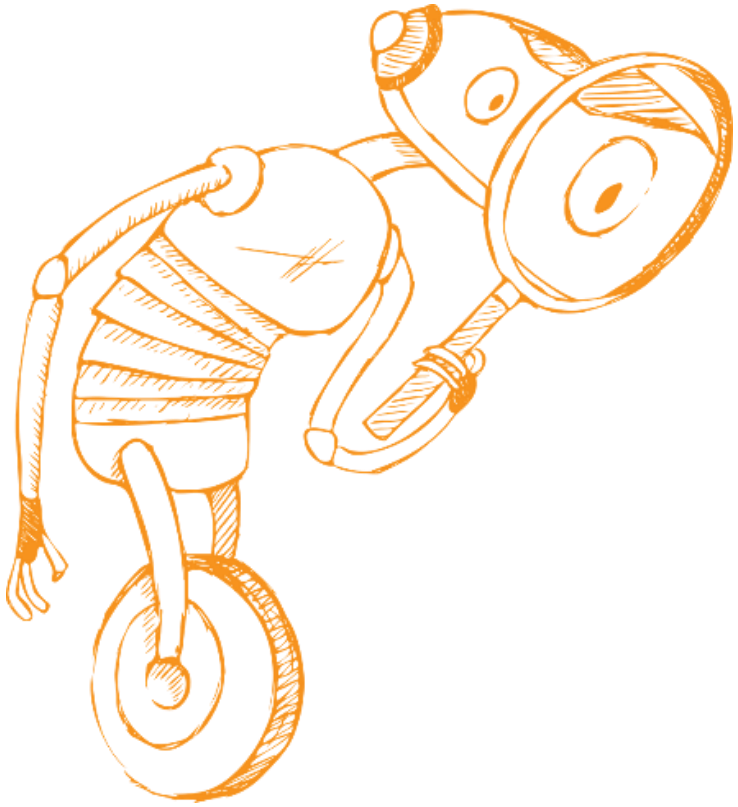
Computing Device

Computing Device

Computing Device

Computing Device

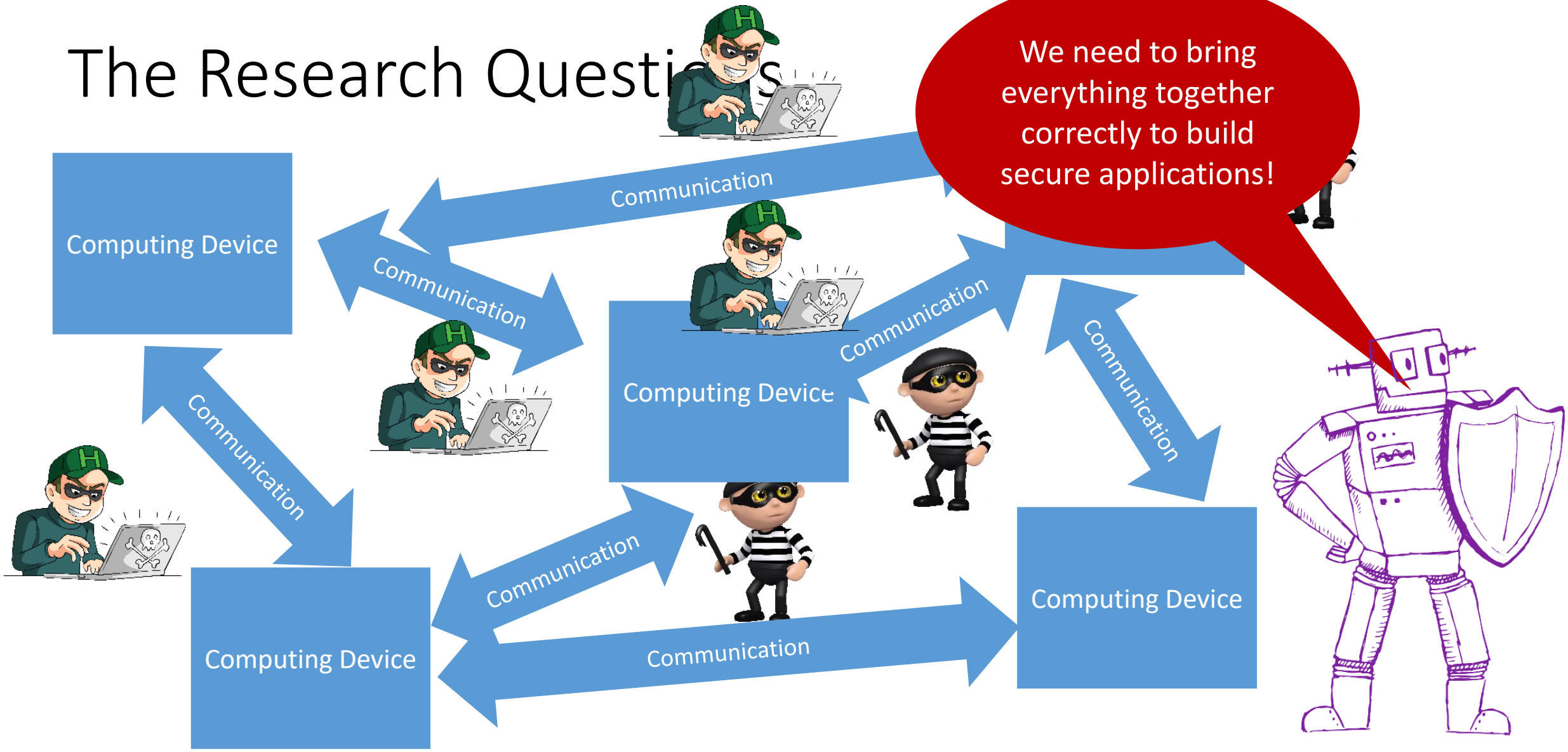
Formal Methods



- **Research Questions**
  - How can we formally proof the security of a system?
  - How can we generate suitable test vectors?
  - How can we synthesize secure systems?
  - How can we verify the security of systems using deep learning?
  - …

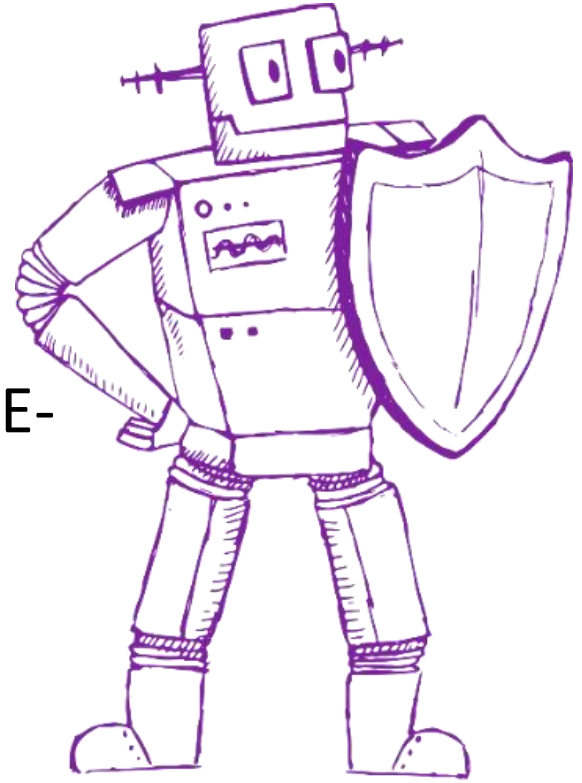
DEPENDABLE THINGS
Dependable Internet of Things in Adverse Environments

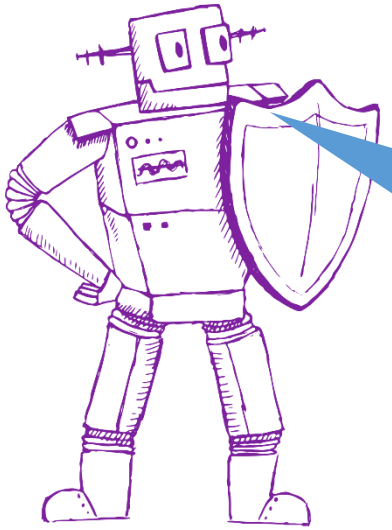
The Research Questions



Secure Applications

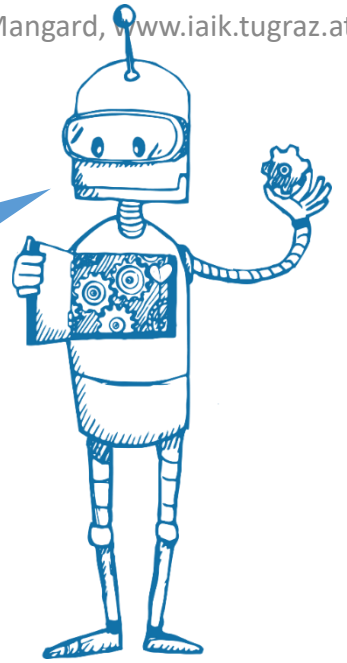
- How can we design secure cloud solutions?
- How can we do fine grained identity management?
- How can we design complex and secure applications (e.g. in E-government)?
- …



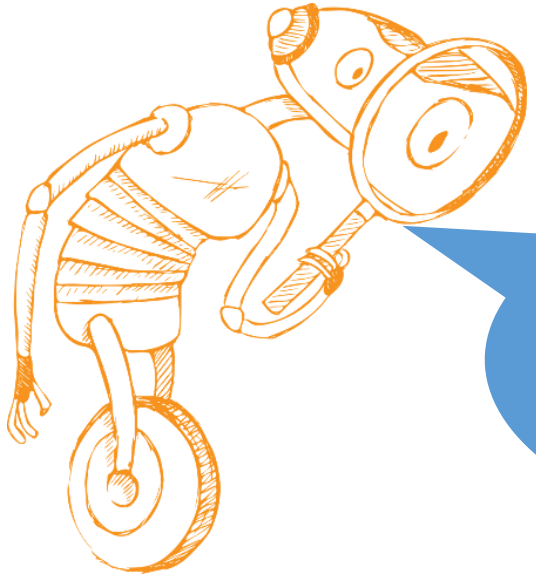


Secure Applications

System Security

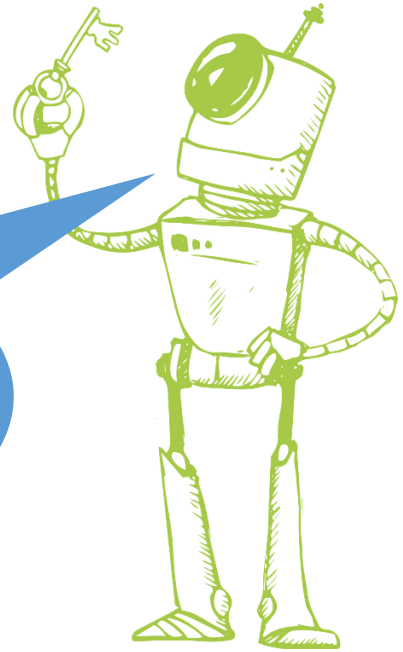


Topic Tables



Formal Methods

Cryptography & Privacy



Bachelor Thesis

Today

- Find a topic → talk to people, look at topics on IAIK website

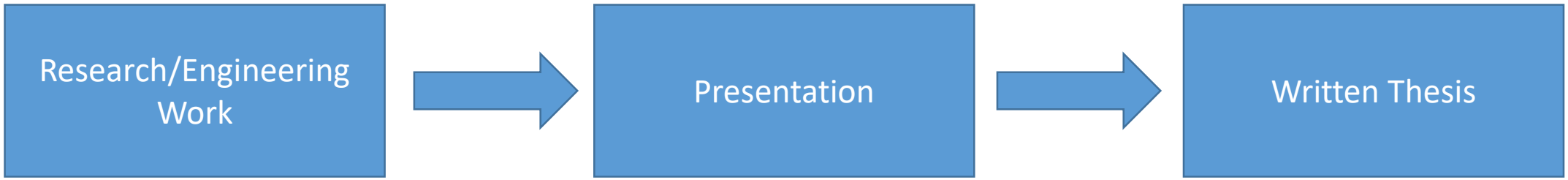
- Get it done → classic mode or Bachelor@IAIK mode

Summer Term 2020

Bachelor Thesis – Getting it Done

- Classic Mode
  - Individual timeline – you can start any time

- Bachelor@IAIK
  - Work @ IAIK
  - Get part of the team
  - Get free coffee
  - Discuss, meet, research with us and other students working on their thesis
  - Fixed timeline


Research/Engineering Work
Presentation
Written Thesis

Timeline for Bachelor@IAIK

- Nov 29: Presentation of topics
- Dec – Jan: Meet with supervisors @ IAIK and decide on mode for Bachelor thesis

- Feb 24 – March 6: 1st working block
  - Feb 28: Writing lab (optional)
  - March 6: Lightning Talks 12:00-13:30
- April 13 – April 24: 2nd working block

- April 25-26: Presentation Lab (optional)
  - June 5: Final presentations

2019 Student Research Excellence Awards

Student Research Excellence Awards

- Many excellent student projects have been completed during the last year

- Any student that contributes to a publication at an international conference in IT security receives this award.

Bachelor Thesis

A Systematic Evaluation of Transient Execution Attacks and Defenses

Claudio Canella, Jo Van Bulck, Michael Schwarz, Moritz Lipp, **Benjamin von Berg**, Philipp Ortner, Frank Piessens, Dmitry Evtyushkin, Daniel Gruss

USENIX Security Symposium 2019

Santa Clara, CA, USA

Summer Internship

Big Numbers - Big Troubles: Systematically Analyzing Nonce Leakage in (EC)DSA Implementations

Samuel Weiser, David Schrammel, Raphael Spreitzer, **Lukas Bodner**

USENIX Security Symposium 2020

Boston, MA, USA

Bachelor Thesis

Page Cache Attacks

Daniel Gruss, **Erik Kraft**, Trishita Tiwari, Michael Schwarz, Ari Trachtenberg, Jason Hennessey, Alex Ionescu, Anders Fogh

CCS 2019

London, UK

Bachelor Thesis

JavaScript Template Attacks: Automatically Inferring Host Information for Targeted Exploits

Michael Schwarz, **Florian Lackner**, Daniel Gruss

NDSS 2019

San Diego, CA, USA

Master Project

Bounded Synthesis of Register Transducers

Ayrat Khalimov, **Benedikt Maderbacher**, Roderick Bloem

ATVA 2018

Los Angeles, CA, USA

Bachelor Thesis

SGXJail: Defeating Enclave Malware via Confinement

Samuel Weiser, **Luca Mayr**, Michael Schwarz, Daniel Gruss

RAID 2019

Beijing, China

Bachelor Thesis / Master Project

Analyzing the Linear Keystream Biases in AEGIS

Maria Eichelseder, **Marcel Nageler**, Robert Primas

FSE 2020

Athens, Greece

Master Thesis

Mind the Gap: Finding what Updates have (really) changed in Android Applications

Johannes Feichtner, **Lukas Neugebauer**, Dominik Ziegler

SECRYPT 2019

Prague, Czech Republic

Master Thesis

Cloud Data Sharing and Device-Loss Recovery with Hardware-Bound Keys

Felix Hörandner, **Franco Nieddu**

ICISS 2019

Hyderabad, India

Bachelor Thesis

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Master Thesis

Linear Equivalence of Block Ciphers with Partial Non-Linear Layers: Application to LowMC

Itai Dinur, Daniel Kales, **Angela Promitzer**, Sebastian Ramacher, Christian Rechberger

Eurocrypt 2019

Darmstadt, Germany

Master Thesis

NetSpectre: Read Arbitrary Memory over Network

Michael Schwarz, **Martin Schwarzl**, Moritz Lipp, Daniel Gruss

ESORICS 2019

Luxembourg, Luxembourg

Master Thesis

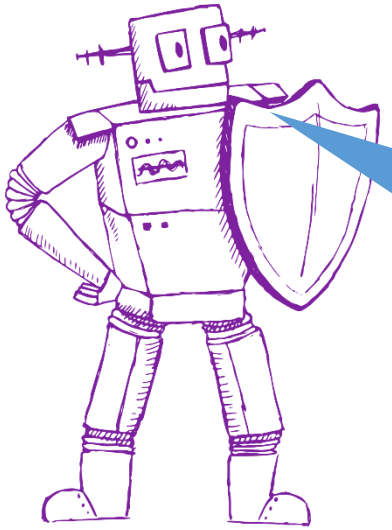
Efficient FPGA Implementations of LowMC and Picnic

Daniel Kales, Sebastian Ramacher, Christian Rechberger, **Roman Walch**, Mario Werner

CT-RSA 2020

San Francisco, CA, USA

What‘s next?



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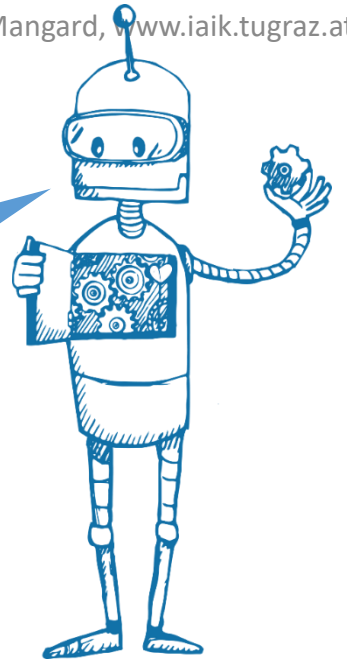

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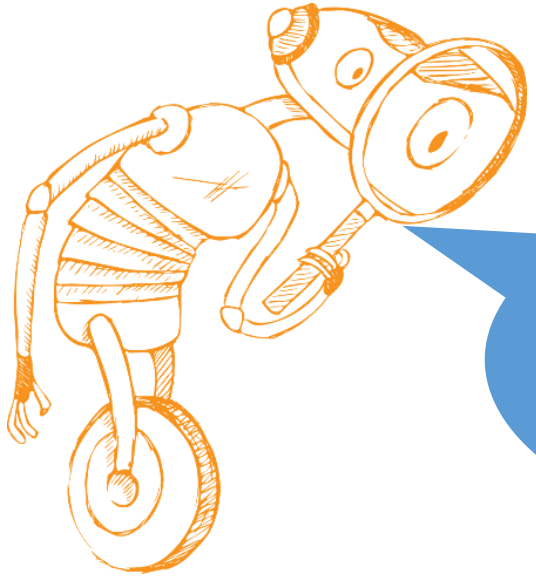

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Cryptography & Privacy