

Stories from my PhD

Michael Sammler

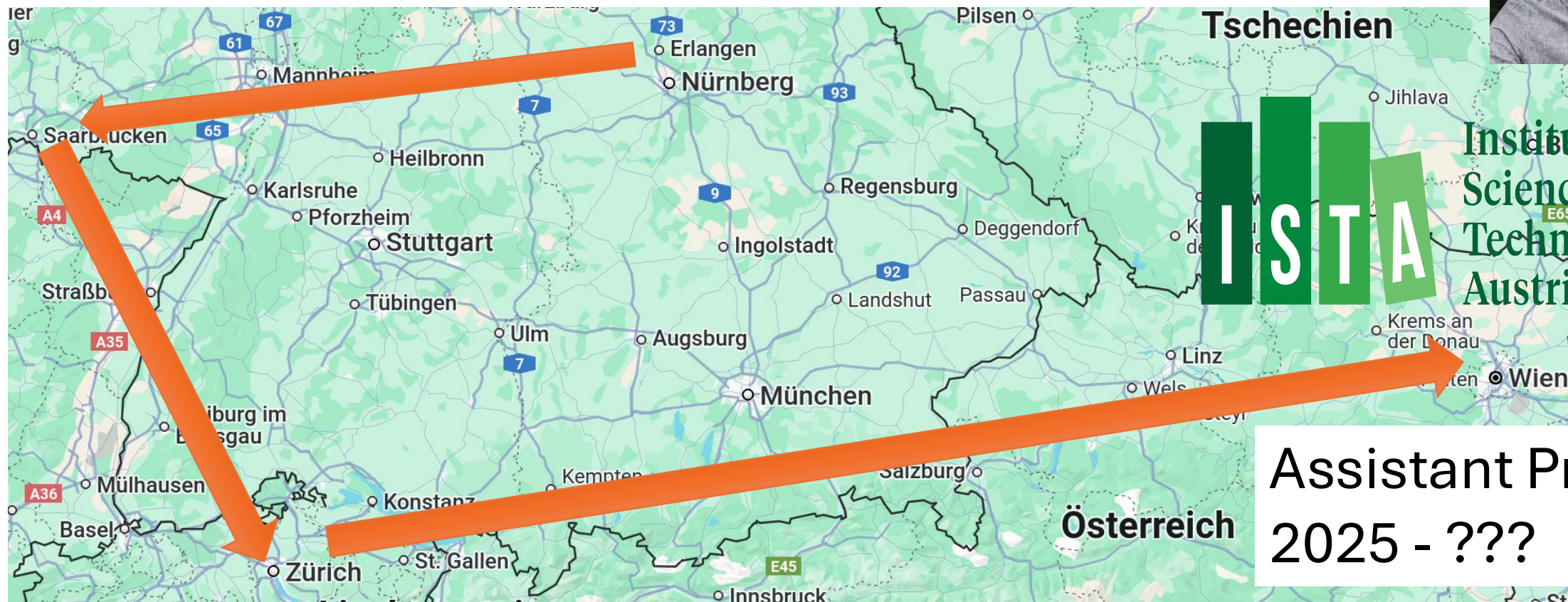
ECSS 2024

PhD (2019 - 2023)

B. Sc. & M. Sc. (2013 - 2019)



MAX PLANCK INSTITUTE
FOR SOFTWARE SYSTEMS



ISTA

Institute of
Science and
Technology
Austria

Assistant Prof.
2025 - ???

ETH zürich

Postdoc (2024)



Institute of
Science and
Technology
Austria

International, cross-disciplinary
institute dedicated to basic
research and graduate education

Located on the outskirts of Vienna

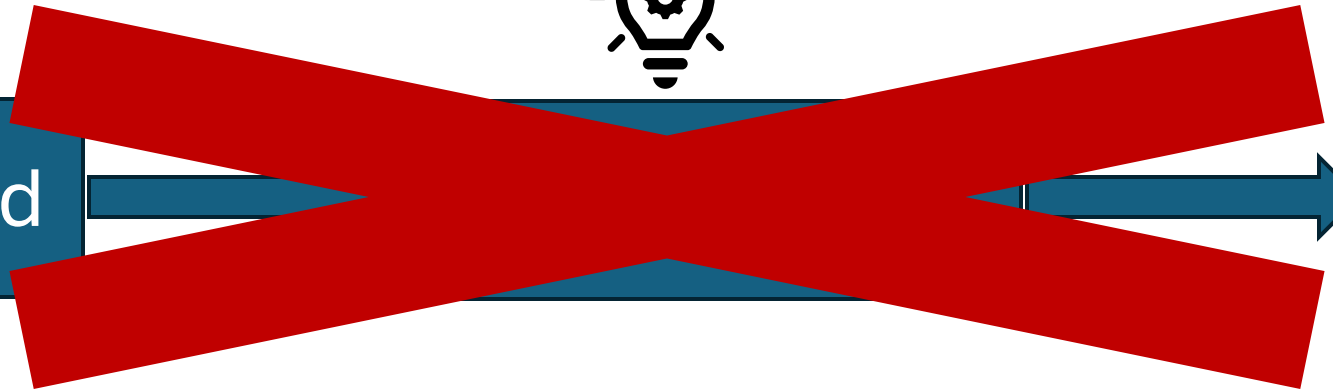
Looking for (tenure-track) faculty,
post-docs, PhD students, interns...

Finding my research project

Expectation



Think Hard



PROFIT



Manual proofs in the Rocq proof assistant



George Pirlea
(Intern)



Michael Sammler
(Me)

Takeaway
By getting my hands dirty and doing technical work I stumbled upon ideas for new projects

It looks like one should be able to automate these proofs

Can I build a verification tool based on these ideas?

Takeaway

By getting my hands dirty I could build confidence in my ideas

I want to build a new C verification tool based on these Ideas!



I tried out these ideas and I think they will work



RefinedC

Bonus Takeaway

Being young and naïve sometimes is good

There are already dozens of C verification tools out there, why would yours be different?



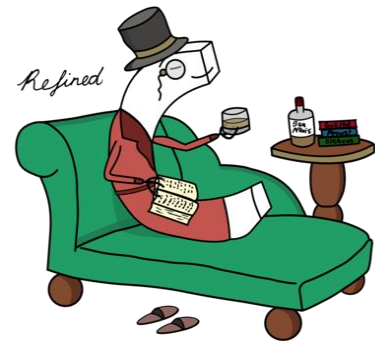
Derek Dreyer
(Advisor)

Building a C verification tool is a lot of work



Deepak Garg
(Advisor)

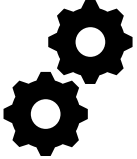
Writing my first big paper



Expectation



Find project



Do the work



Write a paper



PROFIT

Reality:

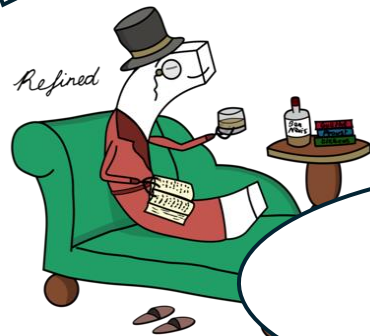
This is really hard!





Rodolphe Lepigre
(Postdoc)

Let's write a
paper!



It works! (At least kind-
of on some interesting
examples)



Top PL conference

Top PL conference

How does
RefinedC
work?



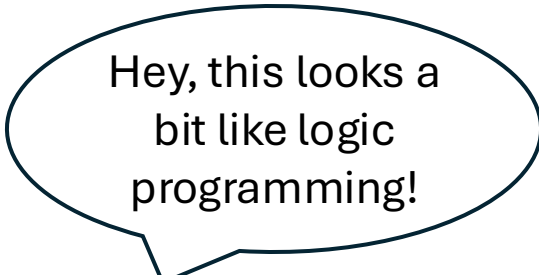
Well, like this:



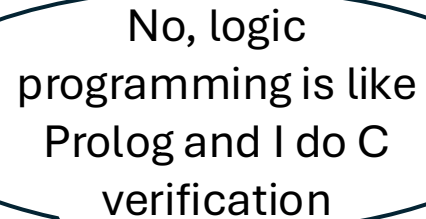
```
Lemma struct_mono A
  subsume (l <_i{\beta} st
  iterate: zip (fi
  inhale (l at{s
  ∃ x, exhale [len
  iterate: zip (fi
  exhale (l at{s
  return T x.
Proof.
```

Takeaway
Doing the
technical work is
only half of the
story, *without*
being able to
communicate the
ideas, the work is
worthless!

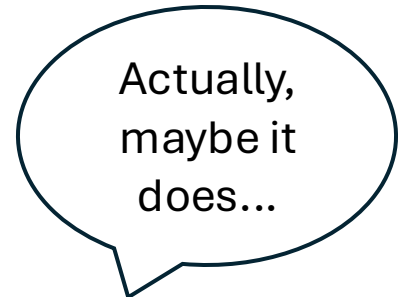
Top PL conference



Hey, this looks a bit like logic programming!



No, logic programming is like Prolog and I do C verification



Actually, maybe it does...

Takeaway
The interesting insights happen when one tries to explain what one has actually done!

Submitting my first big paper



Expectation



Write a paper



Get accepted



PROFIT

Reality: ...



Reviewer C





How about
RefinedC as c
automate
foundational ve

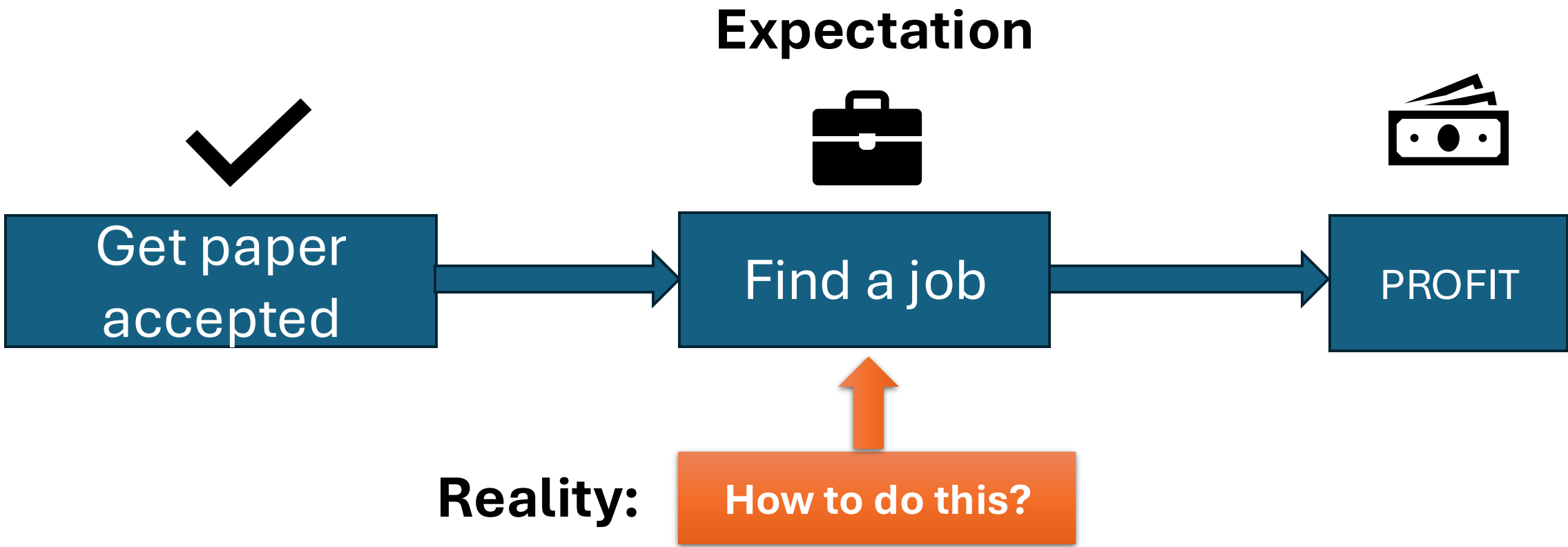
Takeaway
A rejection can be a
blessing in disguise.



PLDI



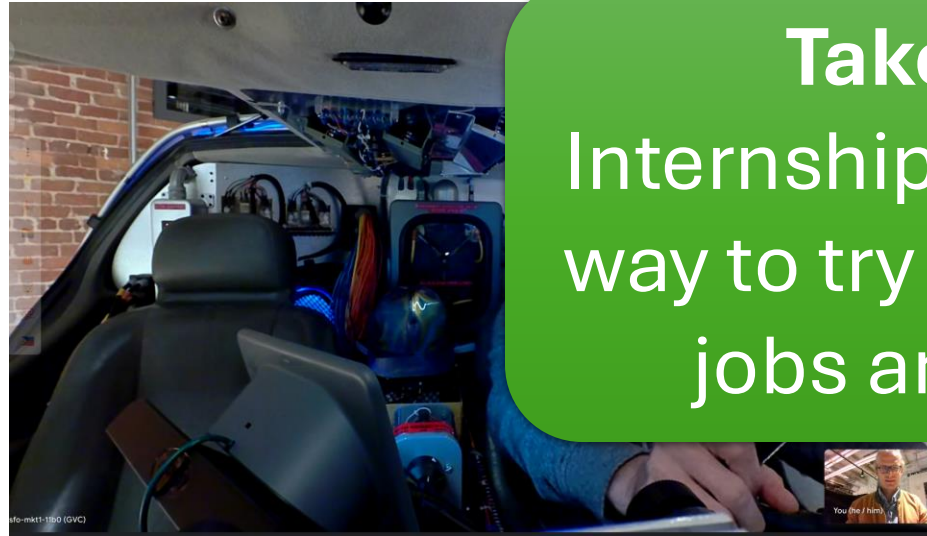
Figuring out what to do after the
PhD





What do I want to do
after the PhD?

I want to
try it out!



Takeaway
Internships are a great
way to try out different
jobs and areas!



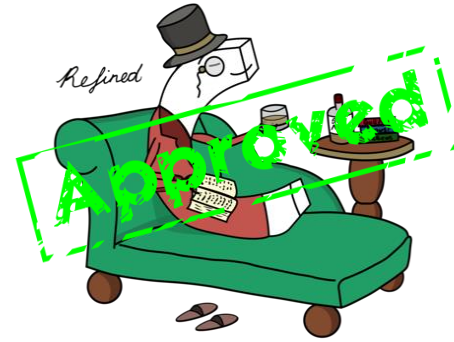
BEDROCK
Systems

Start-up working on formally
verifying a hypervisor



Worked with the Linux
kernel team

How to make it through it all



Takeaway

Figure out what you enjoy
about doing research!

Have fun!

Thank you for your attention!



Takeaway
A rejection can be a blessing in disguise.



Takeaway
Do internships!

Takeaway
Get your hands dirty

Takeaway
Communication is important!

Takeaway
Have fun!