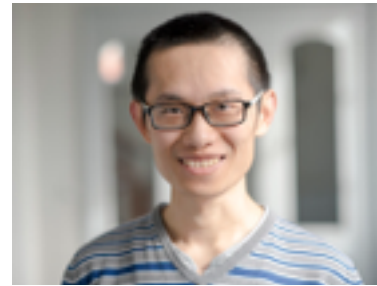# Yufei Cai

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Summary

With 4 years of experience in programming language research, I can help make sense of complicated situations, answer business questions through the power of mathematics, or deliver softwares that do these things.

Employment

University of Tübingen - Germany (2014–Present)
Researcher, Ph.D Candidate

- Implemented a tutorial assignment tool for a lecture with 500 students. Given the time tables of students and tutors and the availability of rooms, it computes an optimal group assignment using integer programming.

- Contributed the single-site Metropolis-Hastings algorithm to Monad-Bayes, a Haskell library for probabilistic programming.

- Co-developed the Discourse-Course plugin in Ruby. It adds lecture administration functionalities to the forum software Discourse.

University of Marburg - Germany (2012–2014)
Researcher, Ph.D Candidate

- Developed the open-source tool CREG, a Scala macro library for datatype-generic programming.

- Co-developed the mechanised correctness proof of incremental lambda calculus in Agda (see publication at PLDI 2014).

Intern, RoRCraft - Hong Kong (2008)

RoRCraft is a web start-up company specialising in Ruby-on-Rails applications interfacing with Amazon Elactic Compute Cloud (EC2).

- Delivered a simulation software to evaluate scheduling strategies for virtual machines on EC2 cloud. Implemented the cloud scheduler, which starts and terminates EC2 virtual machines according to load.

Education

University of Tübingen, Germany
PhD in Computer Science, 2012 - 2016 (anticipated)

The Chinese University of Hong Kong
M. Phil. in Computer Science, 2010 - 2012

The Chinese University of Hong Kong
B. Sc. in Computer Science, 2006 - 2010

Awards & Scholarships

Dean's List, 2008

College Head's List, 2009

Studentship for Research M. Phil. Program, 2010–2012

Publications

- Yufei Cai, Paolo G. Giarrusso, and Klaus Ostermann.
  System F-omega with equirecursive types for datatype-generic programming.
  In *Proceedings of the Symposium on Principles of Programming Languages* (POPL), 2016.

- Yufei Cai, Paolo G. Giarrusso, Tillmann Rendel, and Klaus Ostermann.
  A theory of changes for higher-order languages–incrementalizing lambda calculus by static differentiation.
  In *Proceedings of the 35th Conference on Programming Language Design and Implementation* (PLDI), 2014.

- Leizhen Cai and Yufei Cai.
  Incompressibility of H-free edge modification problems.
  In *Proceedings of the 8th International Symposium on Parameterized and Exact Computation* (IPEC), 2013.

Languages

English: native

German: C1

Chinese: native

Cantonese: fluent

Buzzwords

Scala: Macros, Optimus (lpsolve/Gurobi), SBT, Scalameter

Haskell: Criterion, Stack

Clojure: Criterium

Databases: SQL

Unix: Linux, Mac OS X

Web: HTML, CSS, Javascript, JQuery, Discourse, Ruby on Rails

Graphics: OpenGL (Shader)

Mathematics: lambda calculus, denotational semantics, probability, measure theory, optimization, algorithms, complexity theory

Contributed Open-Source Projects

- CREG, a Scala macro library for datatype-generic programming
  https://github.com/yfcai/CREG

- Tutorial assignment via integer programming
  https://github.com/ps-mr/tutorial-assignment

- Monad-Bayes, a Haskell library for probabilistic programming
  https://github.com/adscib/monad-bayes/tree/transformers

- Discourse-Course, a plugin for lecture administration
  https://github.com/b-studios/discourse-course

- Incremental Lambda Calculus: a formal correctness proof
  https://github.com/inc-lc/ilc-agda