Ki Yung Ahn Research Fellow in the School of Computer Science & Engineering at Nanyang Technological University, Singapore

Contact Information

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Research Interests

Security protocol verification using process calcului,
Executable relational specifications of polymorphic type systems using logic programming,
Language design to support both convenient programming and logically consistent reasoning via the Curry–Howard correspondence,
Extending the Hindley–Milner (HM) type inference for languages with Mendler-style recursion schemes and GADTs with true term indices, and
Interfacing with solvers (e.g, SAT, SMT) in automated testing/verification frameworks.

Education

Portland State University, Portland, OR, USA
Ph.D. (Advisor: Tim Sheard), Computer Science, Dec 2014

The Nax language: *unifying functional programming and logical reasoning in a language based on Mendler-style recursion schemes and term-indexed types*

KAIST, Daejeon, Republic of Korea
B.S., Computer Science (major) and Mathematics (sub-major), Mar 2002

Research Experience and Academic Visits

Research Fellow (current position) Jul 2016 - current
School of Computer Science & Engineering, Nanyang Technological University, Singapore
PI: Alwen Tiu (Assistant Professor)

Gratuitous Visit (Talk info: http://talks.cam.ac.uk/talk/index/60589) Sep 2015
Programming Principles and Tools group, Microsoft Research, Cambridge, UK
Host: Claudio Russo (Senior Research Software Development Engineer)

Academic Visit (Talk info: http://slides.com/kyagrd/tiperdundee) Aug 2015
Programming Languages, Semantics and Logic group, University of Dundee, UK
Host: Ekaterina Komendantskaya (Reader)

Visiting Student [1] (Talk info: http://talks.cam.ac.uk/talk/index/33917) Sep - Dec 2011
Computer Laboratory, University of Cambridge, Cambridge, UK
Hosts: Andrew M. Pitts (Professor), Marcelo Fiore (Professor)

NASA Ames MCT Internship [2, 3] Jun - Sep 2009
Mission Control Technologies at NASA Ames Research Center, CA, USA
Supervisor: Ewen Denney (Senior Computer Scientist)

Research Assistant (Graduate Student) [4, 5, 6, 7] Sep 2007 - Sep 2013

Awards

Bronze medal in the ACM Student Research Competition (SRC) at ICFP 2012

Teaching Experience

Full-time Lecturer Spring 2016
Electronics and Information Engineering, Korea University, Sejong City, Korea

- EIEN233(02) Data Structures (lecture in Korean)
- EIEN363(03) Computer Architecture (lecture in Korean)
- EIEN215(02) Engineering Mathematics I (lecture in English)

Teaching Assistant Spring and Summer 2007
CS 106: Computing Fundamentals II (Intro. to programming for non-CS majors)
Computer Science, Portland State University, Portland, OR, USA
Supervisor: Cynthia A. Brown (Emerita Professor)

Industry Experience

Formal Verification Software Engineer (Intern) Sep 2013 - Mar 2014
Refactored parts of the Forte system libraries written in FL (a reflective functional language for HW design and theorem proving) and also implemented specification search by using term rewriting
Formal Verification Center of Expertise (DTS/FVCoE), Intel, Hillsboro, OR, USA
Supervisors: John W. O'Leary, Roope Kaivola (Principal Engineers)

Quantitative Summer Institute (QSI) Associate (Intern) Jun - Aug 2008
Global Modelling and Analytics Group, Credit Suisse, New York, NY, USA
Supervisor: Howard Mansell (Quantitative Strategist)

Internet Storage Service Server Developer Mar 2002 - May 2005
PopFolder: revenue over 10 million USD, over a million users in 2002
Gretech, Seoul, Republic of Korea
Supervisor: Keunho Bae (Director) Skills: C/C++, TCP/IP, UNIX, Berkley DB, PostgreSQL

Translations

Korean translation (ISBN 9788972808183) of
Programming in Haskell (ISBN 9780521692694) by Graham Hutton

Reviewer (Referee)

Typed Lambda Calculus and Applications 2015
Trends in Functional Programming 2013
Higher-Order and Symbolic Computation (special issue for PEPM 2012)
NASA Formal Methods Symposium 2011

Talks

A Prolog Specification of Extensible Records using Row Polymorphism (invited talk)
Workshop on Coalgebra, Horn Clause Logic Programming and Types (CoALP-Ty '16), Edinburgh, UK, 28-29 November 2016

Publications

[1] Ki Yung Ahn, Tim Sheard, Marcelo Fiore, and Andrew M. Pitts. System F_i: a higher-order polymorphic λ-calculus with erasable term indices. In *Proceedings of the 11th international conference on Typed Lambda Calculi and Applications.* TLCA '13, volume 7941 of *LNCS*. Springer, 2013. doi:10.1007/978-3-642-38946-7_4.

[2] Ki Yung Ahn and Ewen Denney. A framework for testing first-order logic axioms in program verification. *Software Quality Journal*, 21(1):159–200, March 2013. ISSN 0963-9314. doi:10.1007/s11219-011-9168-1.

[3] Ki Yung Ahn and Ewen Denney. Testing first-order logic axioms in program verification. In *Proceedings of the 4th international conference on Tests and Proofs*, TAP'10, pages 22–37. Springer-Verlag, 2010. ISBN 3-642-13976-0, 978-3-642-13976-5.

[4] Ki Yung Ahn and Tim Sheard. A hierarchy of mendler style recursion combinators: taming inductive datatypes with negative occurrences. In *Proceedings of the 16th ACM SIGPLAN international conference on Functional programming*, ICFP '11, pages 234–246, New York, NY, USA, 2011. ACM. ISBN 978-1-4503-0865-6. doi:10.1145/2034773.2034807.

[5] Ki Yung Ahn and Tim Sheard. Shared subtypes: subtyping recursive parametrized algebraic data types. In *Proceedings of the first ACM SIGPLAN symposium on Haskell*, Haskell '08, pages 75–86, New York, NY, USA, 2008. ACM. ISBN 978-1-60558-064-7. doi:10.1145/1411286.1411297.

[6] Garrin Kimmell, Aaron Stump, Harley D. Eades, III, Peng Fu, Tim Sheard, Stephanie Weirich, Chris Casinghino, Vilhelm Sjöberg, Nathan Collins, and Ki Yung Ahn. Equational reasoning about programs with general recursion and call-by-value semantics. In *Proceedings of the sixth workshop on Programming languages meets program verification*, PLPV '12, pages 15–26, New York, NY, USA, 2012. ACM. ISBN 978-1-4503-1125-0. doi:10.1145/2103776.2103780.

[7] Vilhelm Sjöberg, Chris Casinghino, Ki Yung Ahn, Nathan Collins, Harley D. Eades III, Peng Fu, Garrin Kimmell, Tim Sheard, Aaron Stump, and Stephanie Weirich. Irrelevance, heterogeneous equality, and call-by-value dependent type systems. In *MSFP*, pages 112–162, 2012. doi:10.4204/EPTCS.76.9.

[8] Ki Yung Ahn. *The Nax Language: Unifying Functional Programming and Logical Reasoning in a Language based on Mendler-style Recursion Schemes and Term-indexed Types*. PhD thesis, Portland State University, 2014. Dissertations and Theses. Paper 2088. http://pdxscholar.library.pdx.edu/open_access_etds/2088.

[9] Ki Yung Ahn and Andrea Vezzosi. Executable relational specifications of polymorphic type systems using Prolog. In *Proceedings of the 13th International Symposium on Functional and Logic Programming*, volume 9613 of *LNCS*, pages 109–125. Springer, March 2016. Draft available at https://www.sharelatex.com/project/557756cfdfb75ebd54bf5807.

Upcoming Papers

[u1] Mendler-style recursion schemes for mixed-variant datatypes
Ki Yung Ahn, Tim Sheard, and Marcelo Fiore.
(slides in TYPES 2013 talk, draft)

[u2] An executable relational specification of extensible records using logic programming
Ki Yung Ahn and others. (An early draft plan available online)

[u3] A Logical Characterisation of Open Bisimulation using an Intuitionistic Modal Logic.
Ki Yung Ahn, Ross Horne, and Alwan Tiu. (available on Arxiv)