Mark H. Snyder — Curriculum Vitæ

145A Nichols Hall
2335 Irving Hill Rd
Lawrence, KS 66045

(785) 766-7140
marks@ittc.ku.edu
http://www.ittc.ku.edu/~marks

Education

Ph.D., Computer Science, expected Summer 2011
The University of Kansas
Lawrence, KS

Thesis: Type-Driven Specification Refinement
Advisor: Prof. Perry Alexander
Committee: Professors Andrew Gill, Prasad Kulkarni, Nancy Kinnersley, and Jeremy Martin (external member)
GPA: 4.0/4.0

M.S., Computer Science with Honors, Fall 2007
The University of Kansas
Lawrence, KS

Title: A Modular, Algebra-Sequenced Paramorphic Constraint-Based Type Checker for Rosetta
Advisor: Prof. Perry Alexander
Committee: Professors Nancy Kinnersley and Man Kong

B.S., Computer Science with Honors, Spring 2004
The University of North Carolina at Chapel Hill
Chapel Hill, NC

Minor in Mathematics.

Honors

Paul F. Huebner Teaching Excellence Award. Awarded in 2006 and 2009. *Huebner Awards honor teaching assistants who best exemplify the role of a teacher. They are intended to not only reward good teaching, but also to encourage students to consider teaching as a career.*

Teaching at the University of Kansas

Graduate Teaching Experience I've had many positive experiences teaching a variety of courses while at the University of Kansas. I have designed new courses, I have strong experience in generating assignments and examinations, and I've created supplementary materials that are in use beyond my time as a teaching assistant. I have received consistent strong evaluations above the departmental average for teaching assistants and professors, which are available upon request.

- EECS 210: Discrete Structures. Spring 2008 to Spring 2009. This course covers the mathematical foundations required as prerequisites for many of the advanced courses in the undergraduate curriculum, covering boolean logic, proof writing, mathematical induction, recurrence relations, set and relation properties, and graph properties.

Working under different professors and in different textbooks, I designed recitation notes and problem sets, and graded all assignments.

- EECS 138, Java: Introduction to Computing. Fall 2004 - Fall 2006. This class is an introduction to programming basics, such as control flow, data structures, inheritance, and recursion. I was wholly responsible for the course, from designing a new syllabus, assignments, examinations and supplementary lab materials to lecturing and grading.
- EECS 138, Web Programming: Introduction to Computing. Fall 2005 - Fall 2006. This section of EECS 138 covers the same introductory materials while using various web technologies — HTML, CSS, JavaScript, and PHP. I co-designed this course with another teaching assistant for its initial offering in Fall 2005. I again generated the syllabus, assignments, examinations, and lab materials, as well as performed all lecturing and grading.
- EECS 128: Intro to Computer-Based Information Systems, Fall 2004, Spring 2007-Spring 2008. This class is for non-majors, covering basics of computer organization, a light introduction to programming in Visual Basic, and practical skills in Microsoft Office. I lectured, graded, and generated assignments, labs, and examination materials. In Fall 2007 and Spring 2008, I served as coordinator of the 6-8 sections by organizing efforts between teaching assistants and writing the examinations. In Summer 2008 I had the opportunity to update the course supplementary text and to improve the examples and presentation.

Guest Lecture Experience

- EECS 700: Functional Programming (Spring 2010, for Dr. Andrew Gill). Topics included functional programming, list comprehensions, and monads.
- EECS 368: Programming Language Paradigms (Fall 2010, for Dr. Andrew Gill). I covered a week of classes. Topics included introducing the Scheme language and basics of functional programming.
- EECS 368: Programming Language Paradigms (Fall 2009, for Dr. Andrew Gill). Topics included the Java language, inheritance and interfaces, overloading, data structures, and generics (polymorphism).

Research - Interest Areas

Language interpretation, type-driven language specification, language semantics, type systems, domain specific languages, compilation and systems level design.

Research Experience

I joined the Systems Level Design Group at the University of Kansas in my second semester of graduate school. In my research I've explored languages, interpreters, type systems, and the Rosetta specification language in particular. One focus of our laboratory is to find ways of accelerating the language design process, with goals of increasing modularity and composability. I have studied and published in a few directions:

- The Rosetta specification language provides a framework for combining specifications written in different domains. Each of these 'views,' called *facets*, can be combined

while explicitly relating the involved domains to dictate the nature of their interactions. We have an upcoming publication at Engineering of Computer-Based Systems 2011 that discusses composition in Rosetta via the facet composition operators for hierarchical instantiaion, sums and products, as well as some discussion on the semantics of these composition operators.

- Type Indexed Monads offer the easing of a key restriction in functional monadic programming in Haskell by providing for code re-use at the type class level in defining monads. Monads pragmatically provide controlled side effects to recapture paradigms such as imperative code flow without violating the purity of languages such as Haskell. The default approach to monad implementations led to a quadratic increase in support code when combining multiple monads, which is solved in this new approach. This work was published in the post proceedings of Trends in Functional Programming 2010.
- The InterpreterLib framework allows for highly modular interpreter implementations, allowing composition of different features through sums of functors. Further modularity is achieved by defining algebras and delaying recursion until the last step via a catamorphism. Modular monadic semantics are readily available through InterpreterLib. Even more composability is available by sequencing algebras, much like the passes of a compiler. This work was published in Software Composition 2009.

Publications

Conference Papers

- "Model Composition in Rosetta." Frisby, N., Peck, M., Snyder, M., Alexander, P. In: Engineering of Computer-Based Systems (2011). Las Vegas, NV.
- "Monad Factory: Type-Indexed Monads." Snyder, M., Alexander, P. In: TFP 2010: Post-proceedings of Trends in Functional Programming. Norman, OK. (2010) 106-120.
- "Writing Composable Software with InterpreterLib." Snyder, M, Frisby, N, Kimmell, G, and Alexander, P. Software Composition 2009. ETH, Zurich, Switzerland.

Theses

- "A Modular, Algebra-Sequenced Paramorphic Constraint-Based Type Checker for Rosetta." Master's Thesis, Snyder, M. The University of Kansas.

Technical Reports

- "The 2009 ICFP Programming Contest Problem Specification." Kimmell, G., K. Matlage, T. Bull, N. Frisby, A. Gill, M. Jantz, E. Komp, M. Peck, W. Peck, M. Snyder, et al., ITTC Tech Report: Information Telecommunication and Technology Center, University of Kansas, Lawrence, KS, 2009.
- "Fast Trigonometric Functions using Intel's SSE2 Instructions", Nyland, N., and Snyder, M. Technical Report TR03-041, Department of Computer Science, UNC-Chapel Hill.

Poster Sessions

- "Type-Driven Specification Refinement." Snyder, M. ITTC Advisory Board Poster Session, Spring 2010.

- "Rosetta Analysis and Verification." Austin, E., Frisby, N., Snyder, M. ITTC Advisory Board Poster Session, Spring 2010.
- "Rosetta Static Analysis and Transformation." Snyder, M. and Frisby, N. ITTC Advisory Board Poster Session, Spring 2009.
- "Indexed Monads." Snyder, M. 4th Annual Graduate Research Poster Competition 2008.

Extracurricular

KU DanceSport Competitive Ballroom Dance Team (2004-present)

- Competition Coordinator for 3 years. I organized travel and registration, and I handled some treasury duties for the 15-35 members on numerous trips.
- Instructor - I led weekly ballroom classes for this nationally competitive group for three years. Class sizes varied from 10-70.

References

Dr. Perry Alexander
alex@ittc.ku.edu.
208 Nichols Hall
2335 Irving Hill Rd
Lawrence, KS 66045

Dr. Prasad Kulkarni
kulkarni@ittc.ku.edu.
137 Nichols Hall
2335 Irving Hill Rd
Lawrence, KS 66045

Dr. Andrew Gill
andygill@ittc.ku.edu.
252 Nichols Hall
2335 Irving Hill Rd
Lawrence, KS 66045

Dr. Nancy Kinnersley
kinners@eecs.ku.edu.
2040 Eaton Hall
EECS Department
1520 W. 15th St
Lawrence, KS 66045