

Larry Diehl

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Future Research and Teaching Interests

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TRUSTWORTHY SOFTWARE TECHNOLOGIES - TALLINN UNIVERSITY OF TECHNOLOGY

Future Research Interests

My future research interests involve continuing my efforts to make dependently typed languages more realistic for real-world use, via extensions to type theories, new programming techniques within existing theories, and practical design of languages based on underlying theories. Thus far I have done research on predicative Church-style theories (e.g. Agda and Coq), as well as less popular Curry-style impredicative theories (e.g. Cedille). This has given me a better understanding of the advantages and trade-offs between such theories. In the future, I am interested in exploring similar trade-offs between extensional (e.g. Nuprl) and higher-dimensional (e.g. HoTT) theories, and looking for “sweet spots” in language design that maximize usefulness while minimizing complexity.

Having worked on datatype-generic programming using initial-algebra encodings of datatypes has given me some experience with algebraic programming. However, I am interested in more deeply learning category theory, so that I can be better at structuring programs and theories, and identifying existing structures to avoid reinventing one-off instances of categorical concepts. Doing research in Tallinn would be an exciting opportunity to get guidance from experts in these areas like Tarmo Uustalu. Finally, I am also interested in looking into applying my previous research to problem domains from industry (like those that I worked on before my Ph.D.) to see how much the practical gap has closed and what areas still need to be improved.

Teaching Interests

Areas of Computer Science such as algorithms, networks, machine learning, and databases have clear applications to industry, thus students tend to have a natural motivation to learn such topics. In contrast, the areas of programming languages and functional programming have had much less adoption in industry. With my background in working for Silicon Valley software companies, I feel that I have a rare perspective of knowing the joy and pain involved in programming with conventional (industrial) languages and functional (academic) languages. I am excited by the idea of not only teaching students in the areas of PL and FP, but also inspiring them with concrete examples of how techniques from these areas elegantly address issues from industry in ways that are mostly unknown.

Sincerely,

Larry Diehl