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School of Computing
University of Utah

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Dear Faculty Search Committee,

I am applying for a tenure-track professorship at the SoC. I got my Ph.D. in CS at the University of Illinois at Urbana-Champaign in 2007 and postdoc at MIT in 2008. Afterwards I held faculty positions at Illinois, OSU, and CU Boulder, and I've been tenured since 2016. I am the Founder and Director of the NSF IUCRC Center on Pervasive Personalized Intelligence (PPICenter.org) that advances the science and education on ML for IoT systems.

As I am on an industry sabbatical at JetBrains working from SLC, I visited the SoC several times this year (50th anniversary, the Organick lecture, NSF CCRI PI meeting, etc.) and witnessed the amazing things happening at the U. As I visited with faculty from the SoC, the dean's office, the president's office, and industry in Utah, I fell in love with the vision for the FinTech Center, the leadership style, the values, the culture, and the lifestyle in Utah. I am impressed that the SoC has a long tradition of pioneering research in Graphics and other CS areas, a strong commitment to teaching, and a pioneer spirit towards launching grad and undergrad programs in Software Development. I want to continue this tradition.

I am attracted by Utah and SoC because of the opportunity of serving along and partnering with Utah faculty on several exciting initiatives. First, I am excited about President Randall's vision for FinTech that will bring together expertise from the SoC and the School of Business to provide unprecedented value for Utahns, create high-quality jobs, and make Utah known as the epicenter for FinTech. I plan to collaborate and be thinking partners with the faculty already working on this initiative and share my extensive experience of conducting discovery sessions with more than 100 C-level executives.

Second, I am excited that SoC values building community infrastructures for research & development. Supporting others to go further is a core value of mine, that's why I started the PPI Center and launched an NSF Community Infrastructure for refactoring. I see tremendous synergies with other like-valued people in the SoC, for example Kobus Van der Merwe (POWDER's testbed for IoT/5G), Alex Lex (with their reVISit), Jeff Philips (with Utah Center for Data Science), Ganesh Gopalakrishnan (with the Center for Parallel Computing), and others. Together, we can make the SoC an R&D partner for the vibrant high-tech industry in the Silicon Slopes, so that we bring additional value, beyond the workforce development.

Third, I am impressed about the pioneering spirit in education at the SoC and the desire to align with the Utah Legislator to create software development degrees and certificates. I would like to be a thinking partner and contribute to (i) the growth of the Software Development degree that launched in Fall'22, (ii) the Master of Software Development (with Matt Flatt).

Fourth, I am impressed with the growth and faculty hires in the SoC, as half of the faculty are at assistant level. Growth brings opportunities and pains. I would be delighted to launch or support existing mentoring programs for junior faculty. I will build upon my track record in launching faculty group mentorship programs. At CU I've launched and grew a strong mentoring program. I've been serving as a Faculty Mentorship Chair at six leading conferences in my field (FSE'18, ASE'19, ICSE'19, ICSME'19, ICSE'20, OOPSLA'21). On Zoom, I have been mentoring more than three dozen CS faculty at universities all over the world. Mentoring others is my way of giving back to the community so that we can ensure a strong future. SoC would provide ample faculty mentorship opportunities. I am dedicated to growing faculty that help the U raise tomorrow's leaders.

Next, I describe how my research, funding, and teaching experience enables me to be a partner and contribute to the great initiatives in the SoC. My research interests are in Software Engineering, with a focus on *interactive program transformations* that improve programmer productivity and software quality. I successfully pioneered interactive program transformations by opening the field of refactoring in cutting-edge domains including Generative AI & LLMs, mobile, concurrency and parallelism, component-based, testing, and end-user programming. With my emphasis on interactive, performance-driven program transformations, my research allows me to serve as a bridge between the Utah's PL group, the HCI group, and the Scientific Computing group, while my broad interests I developed at the IUCRC PPI Center affords synergies with other groups (e.g., POWDER and Security). Given that I am

now doing a sabbatical with JetBrains, the industry leader for IDEs such as PyCharm and IntelliJ IDEA, I have access to datasets containing programming activities and advanced research tools that I plan to share with other faculty colleagues in the SoC. For example, I am now bootstrapping a collaboration that would provide Eliane Wiese access to a vast dataset of more than 1M student coding sessions from the JetBrains Academy platform.

I (co)-authored 60+ journal and conference papers that appeared in top places in SE, and according to Google Scholar have been *cited 7000+* times. My research group targets the most selective venues in SE, thus 88% of our papers are in the flagship & top ACM/IEEE venues. My group's research was recognized with 9 awards at the flagship and top conferences in SE, 4 award runner-ups, 1 most influential paper award (N-10 years), and 3 winners at the ACM Student Research Competition in Software Engineering. We collaborate with academic researchers (MIT, UIUC, NC State, IA State, Portland State, Concordia, Polytechnique Montreal) and industry partners (IBM, Intel, Microsoft, NEC, Trimble, Boeing, Oracle, JetBrains). Our group *released dozens of industrial-strength* software systems, some of these are shipping with the official release of the popular Eclipse, NetBeans, Visual Studio, Android Studio, and IntelliJ development environments, and **are used by millions of Java and C# programmers everyday**. Thus, I am aligned to further pursue President Randall's strong vision for impact in industry. Moreover, I want to use my experience on industry impact to mentor other faculty at the U who can do even greater things.

As a lead or sole PI, my research ideas have generated a significant amount of funding from NSF ($5.9M) and industry (Boeing, IBM, Intel, Google, Microsoft, NEC, Trimble – $1.5M) in the last ten years, and another $10M as Co-PI at Illinois prior to that. By partnering with faculty from SoC and Business, together we can access industry and government funding.

As a service to the software evolution community, I have started two popular workshops: Workshop on Refactoring Tools, and Hot Topics On Software Upgrades, that already had eight and five instances, respectively. In 2014 I was the lead organizer of a Dagstuhl Seminar on the Future of Refactoring, which gathered the top 50 international experts on refactoring. I have chaired or co-chaired 16 workshops and 1 conference, and I have served as a member of 40+ program or review committees for all top conferences in SE. From these experiences, I learned that my greatest joy comes from enabling and building communities that go further than individuals. I am excited to see that this is a core value and the culture at the U.

I already have a strong track record for involving minorities and other under-represented groups. Since I have been supervising my own group of students, I worked with **four racial-minority students, six females, and one student with a physical disability.** I also readily involve undergrads in my research. To date I have involved **20 undergrads as researchers**, and I have published with 16 of them. I inspired more than half of them to continue their education through graduate school. I am excited to see the recently launched Utah Center for Inclusive Computing and I am looking forward to joining forces.

I will continue to expand the area of program transformations with other practical, scalable, and safe transformations. I am interested to bring refactoring advances to ML engineers and data scientists in several STEM fields. Given our common interests, I plan to collaborate and interact closely with several faculty at Utah, first with the faculty from the Programming Systems area that have closer interests (e.g., Mary Hall – transformations for parallel computing, John Regehr – synthesizing bug fixing transformations from examples, Matthew Flatt – static analysis for DSL and Racket programs, Mike Kirby – IDEs and interactive transformations for HPC, Zvonimir Rakamaric – static analysis for concurrency, Pavel Panchekha – program transformations for web-systems, Miriah Meyer – software visualization, Jeff Philips – program transformation for Data Science) and then with others as I get to know them. My IUCRC experience will provide opportunities for collaboration with the Systems Group (e.g., Kobus and the POWDER testbed), the Data Science Group, the Security group (e.g., Mu Zhang and Jun Xu on secure IoT devices), and HCI (e.g., Jason and Eliane Wiese on privacy for personalized IoT services).

I enjoy teaching and mentoring undergrad & grad students. My experience allows me to teach both introductory courses in SoC (e.g., CS-1030, 1400, 1410, 1420, 2100) and upper division and grad courses on Software Engineering and Programming Languages (e.g., CS-3500, 3505, 3550, 4000, 4011, 4500, 4230, 4530, 4550, 5470, 5510, 6010, 6011, 6015, 6018, 6019, 6800), Multicore Parallel Programming, Design and Architectural Patterns, Software Evolution, Program Analysis and Transformation, Software Development for IoT Systems, etc. I am excited to bring grad-level SE classes to Utah students, so they have equal opportunities with students in the MSD program.

After I finish my industry sabbatical in SLC with JetBrains, the leading provider for IDEs, I want to **bring the best software development tools & educational resources from JetBrains as resources for the SoC.** I will leverage my industry relationships and my access to industry datasets so that many faculty and students at the U can benefit.

While I am productive at CU and enjoy working with colleagues, the opportunities to serve along visionary leaders that are dedicated to impact their state, combined with family reasons, make Utah an attractive destination for me and my whole family. I thank you and the committee for volunteering your time to assess my application and look forward to meeting with you soon. Given the sensitive nature of my application, I would appreciate if it could be treated with as much confidentiality as possible.

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