

Patrick Rein

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 🎓 Google Scholar

Abstract

As a programming tools researcher, I have designed, implemented, and evaluated various programming tools, focusing on live programming environments and structured editing tools. Thereby, I became an expert in dynamic program analysis and parsing algorithms. My research has always been grounded in implementing actual systems, so everything I write about I have built first. Next to research, I have always enjoyed extensive teaching and supervising students at all experience levels.

Experience

Software Architecture Group, Hasso Plattner Institute, University of Potsdam, Research Assistant

Potsdam, Germany
Oct 2015 – present
9 years 1 month

- Research on programming tools and models, with a focus on live programming environments, structured editors, and underlying dynamic analysis and parsing mechanisms
- Authored and co-authored 38 peer-reviewed publications
- Seminar lead, head tutor, and lecturer in undergraduate and graduate courses on software architecture (idioms, design patterns, architectural styles), software engineering (agile processes, XP, Kanban, CI/CD), programming languages, environments, and program analysis tools (multiple seminars at various abstraction levels) with excellent student evaluations
- Responsible for and participated in several successful grant applications for the German Research Foundation and the Design Thinking Research Program
- Co-supervised ten master theses
- Maintenance of GH and GH Actions infrastructure for teaching ([hpi-swa-teaching](#) 📄)

Freelance, Software Developer

Potsdam, Germany
Sept 2015 – Sept 2019
4 years 1 month

- Developed and maintained a conference registration and participant management system based on Django
- Migrated the system from a previous Drupal-based stack
- Developed and maintained a content-management system and mobile app for the conference program based on the Ionic framework

SAP Research, Working Student

Potsdam, Germany
June 2011 – Nov 2011
5 months

- Demonstrated the feasibility of using Python as a stored procedure language in SAP HANA in a working prototype.
- Designed and implemented the columnar object library for Python to speed up analytical applications by making use of tracing just-in-time compiler features.

University of Cape Town, Independent Researcher

Cape Town, South Africa
Jan 2012 – Aug 2012
7 months

- Designed, implemented, and evaluated the Drop Drop mobile app designed to help members of underprivileged communities with water management.

Selected Projects

Babylonian Programming Systems

- Babylonian Programming environments are example-based live programming environments that allow programmers to access information from

[Smalltalk version](#) 📄
[VSC and LSP version](#) 📄
[«Programming» paper](#) 📄

dynamic program analysis anywhere in their programs immediately.

[Onward! paper](#) 

- Designed core features of Babylonian Programming environments
- Implemented the Squeak/Smalltalk version
- Lead the project team of 6 masters students developing the implementation for Visual Studio Code and the Language-server Protocol based on GraalVM
- Published with the Art, Science, and Engineering of Programming Journal and the Onward! Symposium

RTPTorrent

[MSR paper](#) 
[dataset](#) 

- Open-source dataset for evaluating regression test prioritization and history-based test prioritization techniques
- Co-supervised corresponding master thesis that developed a new regression test prioritization technique
- Published with the Conference on Mining Software Repositories (MSR)

Home Desktop System

[Smalltalk version](#) 
[PX paper](#) 

- The Home desktop system is a desktop system that uses live objects as the primary information representation
- Designed and implemented the meta-model, persistence mechanisms, and tool set
- Published with the Programming Experience Workshop (PX)

Columnar Objects

[Onward! paper](#) 

- Columnar objects are a library-based approach to speed up analytical applications written in Python by storing objects in a columnar memory layout in a way that can be leveraged by JIT compilers
- Co-designed the columnar object layout and conducted benchmarks
- Published with the Onward! Symposium

Competitive Debugging

[Onward! paper](#) 

- Competitive Debugging is an event format that combines competitive programming with debugging to promote debugging as a skill to be honed
- Devised the event format and conducted several events
- Published with the Onward! Symposium

Technologies

Programming Languages: Smalltalk (Expert), Python (Advanced), R (Intermediate), Java (Intermediate), JavaScript (Intermediate), SQL (Intermediate), Ruby (Intermediate), PHP (Basic), Rust (Basic), Scheme (Basic)

Frameworks and Technologies: Django (Advanced), Tree-sitter (Intermediate), tidyverse (Intermediate), Ionic Framework (Intermediate), Angular (Basic), Ruby on Rails (Basic), HTML5, CSS3

Tools: Git (Advanced), GitHub Actions / Travis CI (Intermediate), Unix (Intermediate), Docker (Intermediate), Kubernetes (Basic)

Education

PhD Hasso Plattner Institute, University of Potsdam, IT-Systems Engineering

Oct 2015 – present

- In my thesis, I presented the Babylonian Programming Environment, a live programming environment that leverages executable examples to allow programmers to access various kinds of dynamic information immediately throughout their programs.
- **Doctoral Thesis:** Augmenting the Static with the Dynamic: Example-based Live Programming with the Babylonian Programming Environment

- **Advisor:** Robert Hirschfeld, Hasso Plattner Institute, University of Potsdam

M.Sc. Hasso Plattner Institute, University of Potsdam, IT-Systems Engineering

Oct 2012 – Sept 2015

- Grade: 1.0 (A+)
- **Coursework:** software design, execution environments, dependable systems, parallel programming, embedded operating systems, semantic web, data integration, IT entrepreneurship, leadership
- **Thesis Topic:** Gramada: Immediacy in Programming Language Development
- **Final Year Project:** Software Transactional Memory for RSqueak-VM based on the RPython toolchain

B.Sc. Hasso Plattner Institute, University of Potsdam, IT-Systems Engineering

Oct 2009 – July 2012

- Grade: 1.3 (A)
- **Final Year Project:** Programming Models for Data-intensive Applications

Awards

- **Editor's Choice Award** of the The Art, Science, and Engineering of Programming Journal 2024 awarded for the article "Broadening the View of Live Programmers: Integrating a Cross-Cutting Perspective on Run-Time Behavior into a Live Programming Environment"
- **Distinguished Artifact Reviewer Award** of the ECOOP conference 2022
- **Outstanding Service Award** of the Aspect-oriented Software Association (AOSA) 2021
- **First Price of the ACM Student Research Competition (Graduate Category)** at «Programming» 2019

Academic Community Service

Program Committee Member

- Onward! (2024), ECOOP (2020), PX (2024 - 2020), PAINT (2022), LIVE (2020, 2019), COP (2021), ECOOP Artifacts (2022)

Organizing Committee Member

- «Programming» Journal Artifact Evaluation Co-chair (2024 - 2022), «Programming» Virtualization Co-chair (2021), «Programming» Conversation Starters Co-chair (2021), ECOOP Posters Co-chair (2020), ECOOP Virtualization Co-chair (2020)

Other

- Secretary and Treasurer of the Aspect-oriented Software Association (AOSA) (present - 2018)
- Squeak/Smalltalk Community Election Organizer (2024 - 2021)