Last updated in January 2025. Get the latest version at https://www.onsetsu.github.io/cv.html.

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Area of Expertise

Since 2011, I have built elaborate web applications, including interactive software visualizations, physics simulations, and full-fledged integrated development environments. Through this work, I acquire an in-depth understanding of various web technologies and a diverse arsenal of tools, techniques, and workflows to solve problems. Further, I am a strong advocate for continuously improving and adapting the tools I work with, applying this philosophy to input devices, editors, programming systems and languages. As a researcher, I designed, implemented, and evaluated programming tools and language extensions, focusing on live and exploratory programming, reactive programming, and dynamic program adaptation.

Working Experience

2015–present **Research Assistant, Software Architecture Group, Hasso Plattner Institute, Potsdam**

- » Research on programming languages and tools, with a focus on reactive programming, live and self-sustaining programming environments, and dynamic analyses
- » Seminar lead and lecturer in undergraduate and graduate courses on software architecture (object-oriented design, idioms, design patterns), software engineering (agile processes, debugging, reverse engineering), programming languages and environments, programming paradigms, reactive programming, program analysis tools, machine learning and generative AI, design processes and design thinking, and game design (multiple seminars at various abstraction levels) with excellent student evaluations

2017 **Software Developer, Freelance**

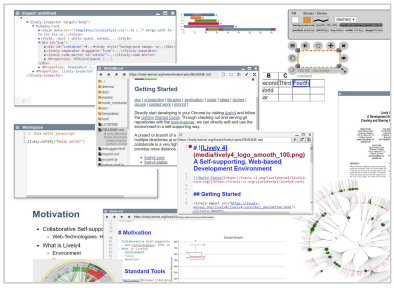
- » Conceptualized, implemented, and maintained a JavaScript syntax extension for a complex web application
- » Extended compilation workflows for the extension
- » Developed mechanisms to handle reactive and asynchronous content in a declarative manner

2012 **Research Assistant, Computer Graphics Systems, Hasso Plattner Institute, Potsdam**

- » Processing and visualization of massive software repository data
- » Collaboration with the SAP Innovation Center, Potsdam

Selected Projects [More Projects]

Lively4



79 people, 9 years

Lively4 is a web-based development environment and application platform. It is self-sustaining and live in that applications and tools to create them exist in one environment. Both can be adapted while being used. Lively4's community embraces a wiki-like spirit, meaning everybody is encouraged to change aspects of Lively4 to suit their needs and share their adaptations with others.

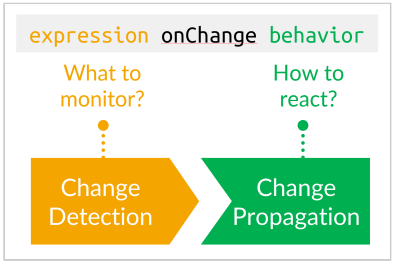
» Designed core features of Lively4 and contributed to the initial version, supervising a team of 10 people

» Oversaw numerous teams of master students working on various applications in or core aspects of Lively4

» Co-maintained the project for over 9 years

▶ Demo Code Paper

Active Expressions



18 people, 8 years

Active Expressions allow developers to react to changes in any object-oriented expression in state-of-the-art languages. In contrast to most reactive programming concepts, Active Expressions leverage the host language's existing expressiveness and build upon it: Developers use ordinary variables, properties, and expressions to specify dependencies.

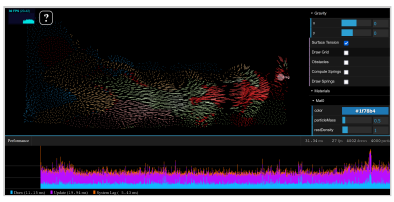
» Designed core aspects of Active Expressions and implemented multiple versions in JavaScript

» Oversaw 4 teams of master students to work on other implementations in Python, Squeak/Smalltalk, and JavaScript

» Supervised 12 Students to work on supporting technologies, including debugging tools, editor watch integrations, and graphical connectors

▶ Demo Code Paper

Floom



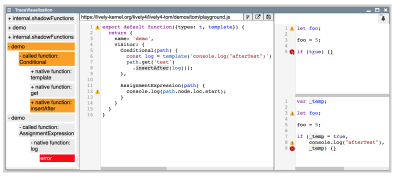
1 person, 2 years

Floom is an interactive fluid simulation, implementing the hybrid Material Point Method using both particles and a grid. Floom supports different computational models and multiple materials. On the fly, you can dynamically apply forces, add or remove particles, change material parameters, and even switch between models.

» Designed and implemented the simulation, editing tools, and debug support

▶ Demo Code

Plugin Explorer and Debugger



5 people, 2 years

The Plugin Explorer is a live editor specifically designed for writing and adapting source code transformations, here babel.js plugins. Developers can visually explore and correlate input and output examples and apply instant changes. Further, a back-in-time debugger allows developers to inspect the entire transpilation process of an example input.

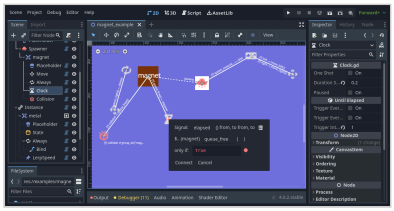
» Designed core features and workflows for the Plugin Explorer

» Co-implemented and maintained the project

» Supervised corresponding master students' projects

▶ Demo Code

Pronto



13 people, 2 years

Pronto is a rapid prototyping tool for designing game mechanics based on the Godot game engine. It fosters quick assembly of game logic by overlaying the game scene with visual behaviors, which can be connected using drag-and-drop interactions.

» Co-designed core features of Pronto

» Supervised 5 teams of master students to iteratively improve Pronto

▶ Demo Code Paper

Education

2015–present

Ph.D. Student

Hasso Plattner Institute, Digital Engineering Faculty, University of Potsdam

Topic: In my thesis, I present Active Expressions, a language extension that adds reactive capabilities to state-of-the-art programming languages. Active Expressions provide a shared foundation for reactivity in object-oriented languages, allowing system developers to create novel reactive programming concepts without having to deal with the technical necessities of change detection.

Doctoral Thesis: "Active Expressions: Basic Building Blocks for Reactive Programming"

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

Master 2015

M. Sc. IT-Systems Engineering

Hasso Plattner Institute, University of Potsdam

Grade: 1.1 (distinction)

Coursework: Software Design, Module Systems, Dependable Systems, Parallel Programming, Embedded Operating Systems, Robotics, Control Engineering, Data Mining and Cleansing, Probabilistic Reasoning, Software Visualization, IT Law, Communication, Leadership

Thesis Topic: "Scoped Constraints and Reactive Behavior – Towards a practical Constraints Programming Tool"

Grade of Thesis: 1.0
Final Year Project: Piggyback Profiling: Metadata for Query Results

Bachelor 2012

B. Sc. IT-Systems Engineering
Hasso Plattner Institute, University of Potsdam
Grade: 1.3 (very good)
Final Year Project: "Graphvisualization-Framework for the Exploration of Software Analysis Data"

Abitur 2009

Higher Education Entrance Certificate "Abitur"
Johann-Wolfgang-von-Goethe-Gymnasium Pritzwalk
Grade: 1.0 (distinction)

Skills

Programming Languages
JavaScript (Expert), Smalltalk (Advanced), Python (Intermediate), GDScript (Intermediate), Java (Intermediate), SQL (Intermediate), C++ (Intermediate), Ruby (Basic)

Frameworks and Technologies
Babel.js (Expert), CodeMirror (Expert), HTML5 (Expert), CSS3 (Expert), Web Components (Advanced), three.js (Advanced), d3.js (Advanced), jspdf (Advanced), Godot (Intermediate), openai API (Intermediate), Tree-sitter (Basic), Unity (Basic)

Tools
Git (Intermediate), Travis CI (Intermediate), GitHub Actions (Basic)

Software Engineering Methodology
Agile Processes, Extreme Programming, Scrum, Kanban, Testing, Test-driven Development, Debugging, Reverse Engineering, Refactoring, Requirements Engineering

Research Methodology
Scientific Process, Literature Surveys, Emperical Evaluation, User Studies, Statistical Analysis, Scientific Writing, Presenting Complex Ideas

Design Methodology
Rapid Prototyping, Iteration, Design Thinking Process (Contextual Inquiry, Ideation, Prototyping, User Testing, Evaluation), Interviewing, Questionaires, Qualitative and Quantitative Analyses, Game Design

Mindset
Continuous self-improvement by making crafting and adapting my own tools a part of the process
Eat your own dogfood mentality to help create meaningful things
Drive to acquire new skills and a deep understanding of various domains

Awards / Scholarships

2024 ***Editors' Choice Award 2024* der Fachzeitschrift "The Art, Science, and Engineering of Programming" der AOSA, Inc.** — AOSA, Inc.
for the article *"Broadening the View of Live Programmers: Integrating a Cross-Cutting Perspective on Run-Time Behavior into a Live Programming Environment"*

2019–present **Scholarship of the HPI Software Architecture Group** — Hasso Plattner Institute

2015–2019 **Scholarship of the HPI Research School for "Service-Oriented Systems Engineering"** — Hasso Plattner Institute

Academic Community Service

2020 **Editor** — Dagstuhl
Proceedings of the 2020 Joint Workshop of the German Research Training Groups in Computer Science

Organizer — Dagstuhl
2020 Joint Meeting of the German Research Training Groups

Program Committee Member — COP
ACM International Workshop on Context-Oriented Programming and Advanced Modularity (COP)

2018 **Organizer** — HPI FutureSOC
13. HPI Symposium on Future Trends in Service-oriented Computing

Reviewer (including sub-reviews)
COLA (2024), ECOOP (2022, 2018), VL/HCC (2021), OOPSLA (2020), COP (2020, 2018), REBLS (2019), NGPS (2018), FlexMDE (2018), DLS (2018), IDEA (2018), SAC (2017), Programming (2017), LiquidSoftware (2017)

Teaching [Detailed Version]

Co-supervised Master's Theses

2024 **Extreme Pro-gaming: Augmenting Software Engineering Courses with Educational Board Games**
Luc Prestin

2023 **Learning About Programming System Design From Board Game Rulebooks**
Lina Urban

2022 **Extensible Tooling for Reactive Programming Based on Active Expressions**
Markus Brand

2021 **Call Graphs for Live Programming: Implementing Call Tracing in Babylonian/S based on a Survey of Property Extraction Techniques for Dynamic Analysis**
Christian Maximilian Flach

2017 **Composition of Modular Language Extensions for JavaScript**
Philipp Otto

Master and Bachelor Projects

Master projects are research-focused and span one semester.
Bachelor projects are year-long and conducted in collaboration with an industry partner.

2020/21–2021 **Tool Support for Collaborative Creation of Interactive Storytelling Media (Bachelor Project)**
Student supervision

2019 **Design and implementation of a live programming tool set for heterogeneous simulations in Squeak/Smalltalk (Master Project)**
Student supervision, Topic preparation

2018/19–2019 **Blocks to the Rescue (Bachelor Project)**
Student supervision, Topic preparation

2017/18–2018 **GS/Squeak: Smalltalk as a language implementation platform (Bachelor Project)**
Student supervision

Lectures and Project Seminars

Tasks include course conceptualization, topic preparation, lecturing, and student supervision.

2024	Rapid Prototyping for Educational Games	Lecture/Master
	Software Design	Project Seminar/Master
2023/2024	Future of Programming	Project Seminar/Master
	Rapid Prototyping in Game Development	Lecture/Bachelor
2023	Programming Experience	Project Seminar/Master
	Tools for Game Development	Project Seminar/Master
2022/2023	Programming in Virtual Reality	Project Seminar/Master
2022	Reverse Engineering	Project Seminar/Master
2021/2022	Visual Abstractions for Framework, Tool, and Language design	Project Seminar/Master
	Programming Experience	Project Seminar/Master
2021	Live Programming	Project Seminar/Master
	Software Design	Project Seminar/Master
2020/2021	Programming Language Concepts, Tools, and Environments	Project Seminar/Master
2020	End-user Development	Project Seminar/Master
	Code Repository Mining	Project Seminar/Master
2019/2020	Reactive Programming	Project Seminar/Master
2019	Software Design	Project Seminar/Master
2018/2019	Reverse Engineering	Project Seminar/Master
	Introduction to Programming Technology I	Lecture/Bachelor
2018	Reactive Programming	Project Seminar/Master
	Programming Experience	Project Seminar/Master
	Machine Learning on Code Repositories	Project Seminar/Master
2017/2018	Context-oriented Programming	Project Seminar/Master
	Web-based Development Environments	Project Seminar/Master
	Code Repository Mining	Project Seminar/Master

	Programming Languages: Design and Implementation	Project Seminar/Bachelor
2017	Programming Language Concepts, Tools, and Environments	Project Seminar/Master
2016/2017	Live Programming Systems	Project Seminar/Master
	Software Design	Project Seminar/Master
	Software Modularity	Project Seminar/Bachelor
2016	Web-based Development Environments	Project Seminar/Master
2015/2016	Software Design	Project Seminar/Master
	Einführung in die Programmiertechnik I	Lecture/Bachelor

Annual Lectures

2016–22, 2024	Software Engineering I	Lecture/Bachelor
2015/16–2025	Software Architecture	Lecture/Bachelor
2010/11–2014	Modeling I and Modeling II	Lecture/Bachelor

Publications [Detailed Version]

Journal Articles

Extensible Tooling for Reactive Programming Based on Active Expressions	*JOT* 2024
Broadening the View of Live Programmers: Integrating a Cross-Cutting Perspective on Run-Time Behavior into a Live Programming Environment	*Programming* 2024
Babylonian-style Programming: Design and Implementation of an Integration of Live Examples Into General-purpose Source Code	*Programming* 2019
Exploratory and Live, Programming and Coding: A Literature Study Comparing Perspectives on Liveness	*Programming* 2019
Group-Based Behavior Adaptation Mechanisms in Object-Oriented Systems	*IEEE Software* 2017
Active Expressions: Basic Building Blocks for Reactive Programming	*Programming* 2017

Conference Papers (reviewed)

MµSE: Supporting Exploration of Software-Hardware Interactions Through Examples	*CHI* 2024
Structured Editing for All: Deriving Usable Structured Editors from Grammars	*CHI* 2023
Shortening Feedback Loops in a Live Game Development Environment	*VL/HCC* 2021
Compatibility Layers for Interface Mediation at Run-Time	*LASSY* 2016
Tracking Visitor Engagement in the Blogosphere for Leveraging Rankings	*SocialCom* 2013

Workshop Papers (reviewed)

Pronto: Prototyping a Prototyping Tool for Game Mechanic Prototyping	*PPIG* 2023
Explicit Tool Support for Implicit Layer Activation	*COP* 2022
Zone-based Layer Activation: Context-specific Behavior Adaptations across Logically-connected Asynchronous Operations	*COP* 2020
Visual Design for a Tree-Oriented Projectional Editor	*PX* 2020
An Exploratory Literature Study on Live-Tooling in the Game Industry	*LIVE* 2019

Implementing Babylonian/S by Putting Examples Into Contexts: Tracing Instrumentation for Example-based Live Programming as a Use Case for Context-oriented Programming — *COP* 2019

Piggyback Profiling: Enhancing Query Results with Metadata — *LWDA* 2018

Towards Concept-aware Programming Environments for Guiding Software Modularity — *PX* 2017

Designing a Live Development Experience for Web-Components — *PX* 2017

Living in Your Programming Environment: Towards an Environment for Exploratory Adaptations of Productivity Tools — *PX* 2017

The Declarative Nature of Implicit Layer Activation — *COP* 2017

How Live are Live Programming Systems?: Benchmarking the Response Times of Live Programming Environments — *PX* 2016

Multi-level Debugging for Interpreter Developers — *LaMOD* 2016

Reactive Object Queries: Consistent Views in Object-oriented Languages — *CROW* 2016

Automatically Selecting and Optimizing Constraint Solver Procedures for Object-Constraint Languages — *CROW* 2016

Connecting Object Constraints with Context-oriented Programming: Scoping Constraints with Layers and Activating Layers with Constraints — *COP* 2015

Theses

Scoping Constraints and Reactive Behavior: Towards a Practical Object Constraint Programming Tool — *Master's thesis* 2015

Analysis and Comparison of WebGL Frameworks for Web-Based Rendering of Massive Graph Data Structures — *Bachelor thesis* 2012

Editorship

Proceedings of the 2020 Joint Workshop of the German Research Training Groups in Computer Science — *Dagstuhl* 2020

Technical Reports

SandBlocks: Integration visueller und textueller Elemente in Live-Programmiersysteme — *HPI Technical Reports (vol. 132)* 2020

A Comparison of Implementation Techniques for Implicit Layer Activation — *In HPI Technical Reports (vol. 129)* 2019

Active Expressions as a Basic Building Block for Reactive Programming Concepts — *In HPI Technical Reports (vol. 111)* 2017