Orpheas van Rooij – Curriculum Vitae

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About Me

I will soon be starting a PhD position at the University of Edinburgh under the supervision of Sam Lindley. My main research interests are in effects handlers, type systems, program verification, functional programming, proof assistants and programming language research in general.

Education

2021-2024 MSc in Software Science - Radboud University

Grade: Cum laude
Thesis: A Substructural Type and Effect System
Main Courses: Type Theory & Coq, Category Theory, Coalgebra, Compiler Construction, Semantics and Domain Theory, Program Verification with Types & Logic.

2018-2021 BSc in Computer Science - University of Cyprus

Grade: 9.03/10 (Excellent)
Thesis: An Instrumentation Approach To Web Fuzzing

Research Projects

- **A Substructural Type and Effect System**

  Masters Thesis
  Formalising a substructural (affine) type and effect system in Coq that tracks whether continuations are one- or multi-shot for an OCaml-like language with effect handlers and mutable state. Type Safety is proven using the logical type soundness approach using the separation logic framework of Iris. We rely on recent extensions of separation logic that allow reasoning about programs with effect handlers and manage to prove soundness of non-standard typing rules that broaden the scope of programs that can be typed.

- **A type-theoretic approach to Absent Argument Analysis**

  Internship Project
  Providing a type-theoretic description of a form of absent argument analysis in a first-order Simply Typed Lambda Calculus, and proving that the associated optimization that removes arguments preserves the semantics under certain conditions. The motivation for this project is SaC, a strict array functional programming language, whereby the optimization would keep only the part of the array that is used in computations.

- **webFuzz: Grey-box Fuzzing for Web Applications**

  In Proceedings of the 26th European Symposium on Research in Computer Security (ESORICS)
  This paper designs, implements and evaluates webFuzz, a gray-box fuzzing prototype for discovering vulnerabilities in web applications. webFuzz is successful in leveraging instrumentation for detecting cross-site scripting (XSS) vulnerabilities and has discovered one zero-day vulnerability in WordPress.

Work Experience

Jan 2023 - Jun 2024 Radboud University
Teaching Assistant

Assignment correcting and assisting in tutorial sessions for the BSc course Software Verification, the BSc course Complexity, and the MSc course Advanced Programming.

Mar 2021 - Aug 2021 Networks Research Laboratory, Dept. of Computer Science, UCY
Software Developer

Designing and implementing a web dashboard for the collection, analysis and visualization of Telecom provider's data by the Office of the Commissioner of Electronic Communications (OCECPR). Technologies used are Laravel, Inertia.js and Vue.js.

Jun 2019 - Jul 2021 Novatex Solutions Ltd.
Software Developer

Involved in the European research project NovaTrap (https://kampos.eu/), a prototype system to provide live pest monitoring in vine fields. Tasks: Working with IoT devices, Web dashboard development, relational and non-relational databases and a Message parsing back-end system using RabbitMq and Haskell.

Professional Activities

- **POPL 2024**

  Awarded 1st prize at the ACM Student Research Competition, London, UK, January 2024

- **NL Functional Programming Day**

  Attendee, TU Delft, January 2024

- **NL Functional Programming Day**

  Attendee, TU Eindhoven, January 2023

- **ESORICS 2021**

  Research Paper Presenter, Virtual Event, October 2021

- **Advanced Functional Programming in Haskell**

  Attendee, Utrecht Summer School, Summer 2021

Languages and Frameworks

- **Coq, Haskell, Clean, Rust, OCaml, C, Python**
- **Iris, iTasks, TorXakis**