STEFFAN SØLVSTEN

PhD Student of Computer Science at Aarhus University

@ soelvsten@proton.me +45 24772366 Aarhus, Denmark in /steffan-soelvsten

Technophobic computer scientist, climber, dancer, psychology and philosophy interested and board game playing hippie. My PhD research is at the intersection between the areas of *formal methods*, *algorithms*, and *complexity theory*.

PROFESSIONAL EXPERIENCE

Academic Experience

PhD Student

Aarhus University

November 2019 – August 2024 Aarhus, Denmark

Research in the field of Formal Verification in collaboration with Prof. Jaco van de Pol as my supervisor. The aim of this project is to design I/O-efficient variants of the algorithms and data structures used in the field of Verification; this way we hope to scale our current techniques to encompass more real-life pieces of software and hardware.

Products of my research:

</> Adiar: External Memory Decision Diagrams

A fully-fleshed BDD library implemented in C++ allowing one to construct and manipulate Decision Diagrams, even when these vastly outgrow the memory available.

git : github.com/ssoelvsten/adiar/
: ssoelvsten.github.io/adiar/

Industry Experience

Student Programmer

SCALGO

May 2019 – October 2019 Aarhus, Denmark

SCALGO brings cutting-edge massive terrain data-processing technology to market, build on more than two decades of research on I/O-efficient and geometric algorithms.

As a student developer my responsibilities was to improve and maintain the frontend of the *SCALGO Live* platform.

Software Developer

IT Minds

March 2018 – April 2019 Aarhus, Denmark

Consultant providing IT solutions, that improve and automate the client's workflow. Among my clients have been *LEGO*, where I was working full stack and was the main architect on the frontend Angular application.

I was the lead architect on the frontend of an internal project, where I succesfully mentored the new interns, providing feedback on their approaches to solutions and code quality.

EDUCATION

BSc in Computer Science

Aarhus University, Denmark

August 2015 – June 2018

Graduating from Denmark's most theoretical computer science bachelor's degree.

Course Average: 11.42 (*A*).
Bachelor's Project: 12 (*A+*).

MSc in Computer Science

Aarhus University, Denmark

August 2019 – August 2022

Master's degree obtained as part of an integrated PhD. My choice of courses focused on *algorithmics* and *formal verification*.

Course Average: 12.00 (*A+*).

SKILLS

Interpersonal Skills

Teaching · Public speaking

Technologies

C++ · Rust · LaTeX · SML / OCaml · Java / C# · Python · Git · SQL

Spring Boot · Twisted · TypeScript · Angular · React

Theoretical Computer Science

Model Checking · Formal Verification · Logic · Functional Programming · I/O Model · Algorithms · Game Theory · Complexity Theory

Proof Assistants · Concurrency · Distributed systems

Mathematics

Linear Algebra · Algebra · Mathematical Modelling · Mathematical Analysis

TEACHING

Teaching Assistant

Aarhus University

March 2017 – August 2023 Aarhus, Denmark

For a group of students I corrected their weekly assingments and organized their weekly face-to-face lessons that follow the exercises provided by the course coordinator of the following courses.

Computability and Logic | Algorithms and Datastructures | Regularity and Automata | Software Design using C++

Supervisor

Aarhus University

Aarhus, Denmark

I have had the pleasure to supervise the following students.

- **Anders Benjamin Clausen** and **Kent Nielsen**
  Spring 2022 BSc Project
  Investigation of whether a prior space-efficient algorithm for BDD variable reordering could be made I/O-efficient.
- **Anna Blume Jakobsen** and **Mathias Weller Berg Thomasen**
  Summer 2020 Talent-Track Project
  Implementation of the prototype that was to become the *Adiar* project.

I have also hired the following talented student programmer.

- **Anna Blume Jakobsen**
  Spring 2022

INTERNATIONAL ACTIVITIES

Talks at International Events

- **2023** *NFM* [1] (May, 2023)
- **2022** *TACAS* [2] (April, 2022) *MOVEP* (June, 2022)
- **2020** *MFCS* [3] (August, 2020)

Research Visits

- **Twente University**
  October 2021 Netherlands
  Collaboration with Tom van Dijk, mapping out what to be done to integrate *Adiar* with *LTSMin*.
- **Carnegie Mellon University**
  August – December 2023 United States
  Collaboration with Marijn Heule and Randal E. Bryant, where we will try to implement an I/O-efficient DRAT proof checker.

LANGUAGES

English ●●●●○
Fluent – IELTS Academic: 8.0 (2019)

Danish ●●●●●
Native

German ●●●●●
Native

REFERENCES

Prof. Jaco van de Pol
@ Aarhus University
jaco@cs.au.dk

PhD Supervisor

Ass. Prof. Kristoffer Arnsfelt Hansen
@ Aarhus University
arnsfelt@cs.au.dk

Supervisor of small project in game theory

PUBLICATIONS

In order of publication (newest to oldest).

Published

1. Steffan Christ Sølvsten and Jaco van de Pol.
   "Adiar 1.1: Zero-suppressed Decision Diagrams in External Memory".
   In: *NASA Formal Methods*. Lecture Notes in Computer Science (LNCS). Vol. 13903. 2023.

2. Steffan Christ Sølvsten, Jaco van de Pol, Anna Blume Jakobsen, and Mathias Weller Berg Thomasen.
   "Adiar: Binary Decision Diagrams in External Memory".
   In: *Tools and Algorithms for the Construction and Analysis of Systems*. Lecture Notes in Computer Science (LNCS), Vol. 13244. 2022. DOI: doi:10.1007/978-3-030-99527-0_16.

3. Kristoffer Arnsfelt Hansen and Steffan Christ Sølvsten.
   "∃R-Completeness of Stationary Nash Equilibria in Perfect Information Stochastic Games".
   In: *Mathematical Foundations of Computer Science*. Leibniz International Proceedings in Informatics (LIPIcs), Vol. 170. 2020. DOI: doi:10.4230/LIPIcs.MFCS.2020.45.

   Pre-recorded Talk: *youtu.be/CXC2UMi6hg0*.

In Submission

- Steffan Christ Sølvsten and Jaco van de Pol.
  "Predicting Memory Demands of BDD Operations using Maximum Graph Cuts".
  Sent To: *Automated Technology for Verification and Analysis*. Lecture Notes in Computer Science (LNCS). 2023.