STEFFAN SØLVSTEN

PhD Student of Computer Science at Aarhus University

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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 under Prof. Jaco van de Pol. 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 · Consulting · 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 – Present 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.

Courses: Computability and Logic | Algorithms and Datastructures | Regularity and Automata

Supervisor

Aarhus University

Aarhus, Denmark

I have had the opportunity to supervise students in projects related to my research project.

- **Anders Benjamin Clausen and Kent Nielsen**
  As part of their Bachelor's project in 2022 they investigated the possibility to make a prior known algorithm for BDD variable reordering I/O-efficient.
- **Anna Blume Jakobsen and Mathias Weller Berg Thomasen**
  In the summer after their first year on Bachelor's degree they implemented a prototype of what was to become the *Adiar* project.

INTERNATIONAL ACTIVITIES

International Events

- **MOVEP 2022**
  June, 2022 Aalborg University, Denmark
  I attended the *Summer School on Modelling and Verification of Parallel Processes* where I presented my research project during the Student Session.
- **TACAS 2022**
  April, 2022 LMU/TUM, Germany
  I presented [1] at the 29th International Conference on *Tools and Algorithms for the Construction and Analysis of Systems*.
- **MFCS 2020**
  August, 2020 Prague, Czech Republic (Zoom)
  I presented [2] at the 45th International Symposium on *Mathematical Foundations of Computer Science*. Due to COVID-19, this presentation was pre-recorded and is available *here*.

Research Visits

- **Twente University**
  October 2021 (one week) Netherlands

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, 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, p. 295–313. DOI: doi:10.1007/978-3-030-99527-0_16.

2. Kristoffer Arnsfelt Hansen and Steffan Christ Sølvsten.
   "∃R-Completeness of Stationary Nash Equilibria in Perfect Information Stochastic Games".
   In: *45th International Symposium on Mathematical Foundations of Computer Science*. Leibniz International Proceedings in Informatics (LIPIcs), Vol. 170. 2020

In Submission

- Steffan Christ Sølvsten and Jaco van de Pol.
  "Predicting Memory Demands of BDD Operations using Maximum Graph Cuts".
  In: *Tools and Algorithms for the Construction and Analysis of Systems*. Lecture Notes in Computer Science (LNCS). 2023.

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