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 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** *ATVA* [1] (October, 2023) *NFM* [2] (May, 2023)
- **2022** *TACAS* [3] (April, 2022) *MOVEP* (June, 2022)
- **2020** *MFCS* [4] (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

GRANTS

- **STIBOFONDEN** (IT-Rejsestipendie)
  February 2022 40.000 DKK

PUBLICATIONS

In order of publication (newest to oldest).

Published

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

2. 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.
   doi:10.1007/978-3-031-33170-1_28

3. 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:10.1007/978-3-030-99527-0_16.

4. 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:10.4230/LIPIcs.MFCS.2020.45.

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