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 – March 2025 Aarhus, Denmark

In collaboration with my supervisor Prof. Jaco van de Pol, I investigated how to design *I/O-efficient* algorithms and data structures to make Binary Decision Diagrams, used in the field of *Formal Methods*, scale beyond the limits of the machine's available memory..

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

IT Minds provides consultancy to 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 also 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

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 / C++ · LaTeX · SML / OCaml · Java · Git · Spring Boot · TypeScript · 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 in which they solve the exercises provided by the course coordinator.

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.

- **Anna Blume Jakobsen** and **Mathias Weller Berg Thomasen**
  Summer 2020 Talent-Track Project
- **Anders Benjamin Clausen** and **Kent Nielsen**
  Spring 2022 BSc Project
- **Erik Funder Carstensen**
  Fall 2023 MSc Course Project

I have also managed the following student programmer.

- **Anna Blume Jakobsen**
  Spring 2022

INTERNATIONAL ACTIVITIES

Talks at International Events

- **2024** *SPIN* [1] (October, 2023)
- **2023** *ATVA* [2] (October, 2023) *NFM* [3] (May, 2023)
- **2022** *TACAS* [4] (April, 2022) *MOVEP* (June, 2022)
- **2020** *MFCS* [5] (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 to explore applications of I/O-efficient BDDs and designing I/O-efficient LRAT proof checking.

LANGUAGES

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

Danish ●●●●●
Native

German ●●●●●
Native

REFERENCES

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

PhD Supervisor

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

Supervisor of a project in game theory [5]

ACADEMIC DUTIES

Peer Review

I have reviewed **5** papers for the following conferences (sorted by research area):

Algorithms and Data Structures

SEA 2023

Formal Methods

CONCUR 2021 , FMICS 2024 , TACAS 2020 , SPIN 2024

GRANTS

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

PUBLICATIONS

In order of publication (newest to oldest).

Published

1. Steffan Christ Sølvsten, Casper Moldrup Rysgaard, and Jaco van de Pol.
   "Random Access on Narrow Decision Diagrams in External Memory".
   In: *International Symposium on Model Checking Software (SPIN)*. Lecture Notes in Computer Science (LNCS). 2024.

2. 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.
   doi:10.1007/978-3-031-45332-8_4

3. 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

4. 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.

5. 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*.