STEFFAN CHRIST SØLVSTEN

Postdoctoral Researcher of Computer Science at Aarhus University

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A technophobic computer scientist with a flair for *formal methods* and *algorithm engineering*, and a climber, dancer, psychology and philosophy interested and board game playing hippie.

PROFESSIONAL EXPERIENCE

Academic Experience

Postdoctoral Researcher

Aarhus University

April 2025 – October 2026 Aarhus, Denmark

Together with my mentor, Associate Professor Aslan Askarov, I'm working on extending and improving the information-flow secure and distributed programming language, *Troupe*.

git github.com/TroupeLang/Troupe

PhD Student

Aarhus University

November 2019 – February 2025 Aarhus, Denmark

I have, in collaboration with my supervisor, Professor Jaco van de Pol, designed *I/O-efficient* algorithms and data structures to make Binary Decision Diagrams (BDDs) scale beyond the limits of the machine's available memory.

As part of this work, these algorithms have been implemented, evaluated, and improved upon to create a new BDD library in C++, *Adiar*. Compared to conventional implementations of BDDs, our work is thoroughly tested, is almost as fast or even faster, and it has a more generic and user-friendly API.

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 – March 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

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 Analysis

LANGUAGES

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

Danish ●●●●●
Native

German ●●●●●
Native

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 BSc Volunteers
- **Anders Benjamin Clausen** and **Kent Nielsen**
  Spring 2022 BSc Thesis Project
- **Erik Funder Carstensen**
  Fall 2023 MSc Course Project

I have also managed the following student programmer.

- **Anna Blume Jakobsen**
  Spring 2022

REFERENCES

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

PhD Supervisor [1, 2–5]

Aslan Askarov
@ Aarhus University
aslan@cs.au.dk

Postdoc Mentor

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

Mentor for a project in game theory [6]

INTERNATIONAL ACTIVITIES

Research Visits

- **Eindhoven University**
  January 2025 Netherlands
  Visit to explore possible future directions of research together with Clemens Dubslaff, e.g. further development of *Adiar* for the model checkers *mCRL2* and *Storm*, and possible new applications of BDDs.
- **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.
- **Twente University**
  October 2021 Netherlands
  Collaboration with Tom van Dijk, mapping out what to be done to integrate *Adiar* with their model checker *LTSMin*.

Talks at International Events

SPIN	[2]	(April, 2024)
ATVA	[3]	(October, 2023)
NFM	[4]	(May, 2023)
MOVEP		(June, 2022)
TACAS	[5]	(April, 2022)
MFCS	[6]	(August, 2020)

ACADEMIC DUTIES

Peer Review

I have reviewed **5** papers and **3** artifacts for the following conferences (sorted by research area):

Algorithms and Data Structures

ALENEX 25 † , SEA 23

Formal Methods

CONCUR 21 , FMICS 24 , SPIN 24 , TACAS 20

† *Member of Artifact Evaluation Comittee.*

GRANTS

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

PUBLICATIONS

1. Steffan Christ Sølvsten
   "I/O-efficient Symbolic Model Checking" (PhD Thesis).
   In: *Royal Library, Denmark*. 2025.

   `https://soeg.kb.dk/permalink/45KBDK_KGL/1pioq0f/alma99126389524805763`

Conference Proceedings

Unlike many other areas of research, computer scientists primarily publish their research results in *conference proceedings* rather than *journals*. This is not at the cost of quality of the research since these publications are thoroughly peer reviewed. Similar to journals, conferences are *ranked*, e.g. our publication at *TACAS* [5] is at an *A*-tier conferences.

2. 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)*. 2024.

   doi:10.1007/978-3-031-66149-5_7

3. 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* (ATVA). 2023.

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

4. Steffan Christ Sølvsten and Jaco van de Pol.
   "Adiar 1.1: Zero-suppressed Decision Diagrams in External Memory".
   In: *NASA Formal Methods* (NFM). 2023.

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

5. 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* (TACAS). 2022.

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

6. Kristoffer Arnsfelt Hansen and Steffan Christ Sølvsten.
   "∃R-Completeness of Stationary Nash Equilibria in Perfect Information Stochastic Games".
   In: *Mathematical Foundations of Computer Science* (MFCS). 2020.

   doi:10.4230/LIPIcs.MFCS.2020.45 *youtu.be/CXC2UMi6hg0*

EXTRACURRICULAR

Kitchen Responsible

Regnecentralen, Aarhus University

May 2017 – Present

Regnecentralen is a third place for students. I took care of the practical things, organised events, mediated with the university, and created social media content.

Theatrical Technician

TÅGEKAMMERETs Revy, Aarhus University

December 2021 – December 2024

I joined on short notice to livestream the revue. Since then, I have taken care of the camera and more at the live shows.

Preprints

7. Steffan Christ Sølvsten and Jaco van de Pol.
   “Symbolic Model Checking in External Memory”.
   2025.

   doi:10.48550/arXiv.2505.11229

8. Steffan Christ Sølvsten and Jaco van de Pol.
   “Multi-variable Quantification of BDDs in External Memory using Nested Sweeping”.
   2024.

   doi:10.48550/arXiv.2408.14216