RASMUS FONSECA

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SUMMARY

Computer science Ph.D. with experience in algorithms, statistical analysis, machine learning, computational geometry, data visualization, and high-performance simulations. Builds well-documented, scalable, and tested software that solves some of our hardest known problems. Passionate about disseminating technical topics to experts and novices alike.

EXPERIENCE

Zoox Inc. — Senior Software engineer, Planning and Control

Feb. 2022 - PRESENT

- Tech-lead helping define the decision algorithms of the autonomous vehicle.
- Lead a team to build and maintain GPU data structures and algorithms to represent mapping, mission, and perception features in the decision planner.
- Lead statics group responsible for improving driving behaviors around static objects.

Zoox Inc. — Software engineer, Planning and Control

Oct. 2018 - Jan. 2022

- Improve agent interaction decision algorithms and introspection tools
- Develop real-time motion planning and trajectory generation algorithms for autonomous vehicles.
- Build metrics pipeline, analysis workflows, and visualization tools to support the planner team.

Stanford University — Visiting Scholar

Jan. 2016 - Sep. 2018

- Collaborated with two Nobel laureates to perform computational analysis of high-profile drug targets. Specifically, simulation methods from the Levitt lab were applied to interpret biochemical experiments on GPCR proteins from the Kobilka lab. Machine learning methods were applied to analyze drug binding sites.
- Built shareable, online, interactive, visualization tools for interpreting time-varying networks and used them to compress and analyze molecular dynamics trajectories.
- Designed novel robotics-inspired motion planning algorithms which enable the investigation of hypotheses about large-scale molecular motions.

University of Copenhagen — Postdoc

Apr. 2014 - Dec. 2015

- Designed and implemented euclidean high-dimensional exact and heuristic Steiner tree optimization algorithms in C++ that outperforms all similar methods.

- Implemented the core of the probabilistic Markov-Chain Monte Carlo simulation program, Phaistos, in collaboration with Dept. of Biology.
- Supervised 15 bachelor projects and planned and taught the courses 'Programming Massively Parallel Hardware', 'Python Programming' and 'Interactive Data Exploration'.
- Secured a 600.000USD / 4 year fellowship from the Novo Nordisk Foundation / Stanford BioX to study GPCR dynamics using computational methods.

INRIA Saclay / SLAC Stanford — Postdoc

Dec. 2012 - Mar. 2014

- Adapted robotics-based methods for RNA molecules and established their application to interpret nuclear magnetic resonance data.
- Refactored existing C++ framework for robotics-based molecular modeling making it accessible for incoming graduate students.

EDUCATION

University of Copenhagen — Ph.D. degree

SEPTEMBER 2009 - NOVEMBER 2012,

Focus on computational biology. Ten month visit at UC Santa Cruz. Six publications.

University of Copenhagen — Master's degree (cand. scient.)

DECEMBER 2005 - MAY 2009,

Major in computer science. Focus on machine learning and optimization. Two publications.

University of Copenhagen — Bachelor's degree (bach. scient.)

AUGUST 2001 - NOVEMBER 2005,

Major in physics and minor in computer science

TECHNICAL SKILLS

- C/C++; CUDA, lapack, OpenCV, GSL, Eigen, Intel MKL (10 years)
- Python; numpy, pandas, scikit-learn, pyplot, seaborn (5 years)
- Java; Java3D, Swing, JavaFX (10 years)
- JavaScript; D3.js, Three.js, Vue (5 years)
- Unix data management; bash, sed, grep, make, rsync, etc (15 years)

See https://rasmusfonseca.github.io for a list of my open-source projects.