Aleksandar Zeljić

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Summary

Experienced researcher (**9+ years**) in formal methods with interests in formal verification, satisfiability, satisfiability modulo theories and theorem proving. Skilled in development of verification tools. Enjoys solving challenging problems, team work and mentoring.

Professional Experience

Postodoctoral Scholar, **Stanford University**, California, USA *Dec 2018 — Present*

- Research in **verification of deep neural networks** with a focus on scalability.
- Development of **Marabou** — a neural network verification framework:
  - Lead design and implementation of a **major architecture refactor** of Marabou.
  - Guide development of parallelization, optimization, and local search features.
- Manage DARPA's **Assured Autonomy** program for Marabou:
  - Identify project needs and direct research and development efforts to meet them.
  - Present Marabou's progress in PI meetings, site visits and quarterly reports.
- Manage Stanford's **AI Safety Center**:
  - Represent ongoing research at the center and manage members and website.
  - Collaborate with industry partners — **Collins Aerospace, GE, Ford**.
- Mentor and supervise PhD students — guide coding efforts, research and publications.
- Taught a graduate course on **Advanced Topics in Formal Methods**.

PhD Student, **Uppsala University**, Sweden *2012 — 2018*

- *PhD thesis* proposed **approximation- and abstraction-based techniques** for reasoning about machine arithmetic data types in SMT.
- Introduced a general **approximation-based framework** for decision procedures and implemented it for Floating-Point Arithmetic as **Smallfloats** and **UppSAT**.
- Designed a **model-constructing calculus** for bit-vectors — implemented as **mcBV**.
- Published **5 papers** — 4 in highly ranked international conferences, 1 in a top journal.
- Teaching - TA'd for 14 courses and lectured/organized 2.

Research Intern, SGT, Inc. at **NASA Ames**, California, USA *2017*

- Scalable support for floating-point arithmetic in SeaHorn verification framework.

Research Intern, **Microsoft Research**, Cambridge, UK *2014*

- Instantiation of Model Constructing Satisfiability Calculus for theory of bit-vectors.

Research trainee, **Mathematical Institute**, Belgrade, Serbia *2011— 2012*

- Formalization of the Chord network protocol in Isabelle proof assistant.

Software test engineer (50%), **Pexim Solutions**, Belgrade, Serbia *2008 — 2010*

- UI automation, integration testing, writing and maintenance of test plans, procedures.

Education

Uppsala University, Uppsala, Sweden *2012 — 2018*
Doctorate of Philosophy in Computer Science with specialization in Embedded Systems

Belgrade University, Belgrade, Serbia *2006 — 2011*
Bachelor of Science and *Master of Science* in Information Science

Languages

C/C++, Scala, F#, Python, Dafny, Isabelle

Systems Development

Marabou [C++, Python] https://NeuralNetworkVerification.github.io/Marabou
UppSAT [Scala] https://github.com/uuverifiers/uppsat
MCBV [F#] https://github.com/microsoft/mcBV
SmallFloats [C++] https://github.com/AleksandarZeljic/z3
Princess [Scala] http://www.philipp.ruemmer.org/princess.shtml

Professional Service

PC Member: VSTTE 2018, PAAR 2020, FOMLAS 2020, FOMLAS 2021.
Reviewer: 32 international conferences and journals.

Awards

IJCAR Best paper award (2014) for paper "Approximations for Model Construction"