

HEILA BOTHA

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EDUCATION

Stellenbosch University, Stellenbosch, South Africa.

PhD Computer Science. Submitted. Graduation Dec. 2017.

BSc (Honours) Computer Science (Cum Laude). Mar. 2012.

BSc Computer Science (Cum Laude). Minor: Applied Mathematics. Dec 2010.

LANGUAGES & SKILLS

Java (*Expert*) Java has been my main programming language since 2009. I used it in an Algorithms course in 2nd year to develop a browser using common data structures and the Swing GUI toolkit and in an advanced Algorithms course in honours to implement dynamic programming assignments. My honours project as well as my PhD project is developed in Java.

Python (*Fluent*) In Computational Physics (2nd yr) and Computer Vision (3rd yr) I worked with SciPy and Matplotlib. I also developed a chat client/server application in Python as part of a Networking course (3rd yr) and used it in a Machine Learning course (3rd yr). I was the assistant for Scientific Computation (2nd and 3rd yr courses) presented in Python from 2011 to 2015 and wrote an automated marking script for these courses in Python.

Other Proir experience with C, C++, Objective C, LISP, Fortran, Perl, HTML, CSS, NodeJs and Ruby-on-Rails.

Linux I ran Linux (mainly Ubuntu) on my personal computer from 2008 until 2013 after which I switched to OSX for more stability. I frequently work with remote servers running Linux at home and at work.

Tools Experience with Docker, MySQL, MongoDB, Elasticsearch, HyperSQL, Git, Gradle, Ant and Google Web ToolKit.

Android In-depth knowledge on the internals of the Android application framework and understanding of the Android Open Source Project (AOSP).

Software Analysis and Verification Techniques Model checking, dynamic analysis, static analysis, runtime monitoring, and symbolic execution.

EXPERIENCE

PhD Topic: Verifying Android Applications using Java PathFinder (2012 - 2017)

Developed a tool to apply model checking to Android applications to improve the effectiveness (measured using code coverage) and efficiency (measured using number and length of event sequences) of current dynamic analysis tools.

- Eight peer-reviewed papers published internationally, six of which I presented at workshops and symposiums.
- Attended eight international conferences on Software Engineering and Verification (Student volunteer at two).
- Best presentation/presenter award at Java Pathfinder workshop (2012).
- Managed two student interns (Jun - August 2016).

NASA Ames Internship (Jul - Sept 2014)

Research Intern at the Robust Software Engineering group at NASA Ames, Mountain View, California.

- Evaluated tools for automatically generating environment models and extended static analysis tool OCSEGen to work on Android applications.

Developer Google Summer of Code (May - Aug 2012)

Student developer working with the Java PathFinder (JPF) team researching how to extend JPF to run basic Android applications.

Computer Science Honours Project (Jan 2011 – Mar 2012)

Developed a web-based, classroom and content management system focused on the education of autistic children. Written in Google Web Toolkit 2.4 and utilizes a MySQL database.

Awards and Achievements

Best web application in Ruby-on-Rails for course on web development (2010).

Merit bursary for BSc honours degree (2011).

TATA Scholarship for masters degree at the South African Women in Science Awards (2013).

Member of the MIH MediaLab at Stellenbosch University (2012 – 2014).

Studentship at Council for Scientific and Industrial Research (CSIR) (2014 - 2017).

REFERENCES

Prof. Willem Visser

(PhD Supervisor)

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Prof. Brink van der Merwe

(PhD Supervisor)

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Dr. Oksana Tkachuk

(NASA Internship Advisor & Co-author)

Automated Reasoning Group,

Amazon Web Services

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AUTHORED AND CO-AUTHORED PUBLICATIONS

Heila Botha, Oksana Tkachuk, Brink van der Merwe, and Willem Visser. **Addressing Challenges in Obtaining High Coverage When Model Checking Android Applications.** In Proceedings of International SPIN Symposium on Model Checking of Software, Santa Barbara, CA, USA, July 2017 (SPIN'17), 10 pages. <http://dl.acm.org/citation.cfm?id=3092302>

G. Bai; Q. Ye; Y. Wu; H. Merwe; J. Sun; Y. Liu; J. S. Dong; W. Visser, Towards **Model Checking Android Applications.** IEEE Transactions on Software Engineering, doi: 10.1109/TSE.2017.2697848. (To appear.)

Heila Botha, Brink van der Merwe, Willem Visser, and Oksana Tkachuk. **StateComparator: Detecting Unbounded Variables Using JPF.** SIGSOFT Softw. Eng. Notes 41, 6 (January 2017), 1-5. <https://doi.org/10.1145/3011286.3011299>

Heila van der Merwe, Oksana Tkachuk, Sean Nel, Brink van der Merwe, and Willem Visser. **Environment Modeling Using Runtime Values for JPF-Android.** SIGSOFT Softw. Eng. Notes 40, 6 (November 2015), 1-5. <http://dx.doi.org/10.1145/2830719.2830727>

Heila van der Merwe. **Verification of Android Applications.** In Proceedings of the 37th International Conference on Software Engineering - Volume 2 (ICSE '15), Vol. 2. IEEE Press, Piscataway, NJ, USA, 931-934.

Heila van der Merwe, Oksana Tkachuk, Brink van der Merwe, and Willem Visser. **Generation of Library Models for Verification of Android Applications.** SIGSOFT Softw. Eng. Notes 40, 1 (February 2015), 1-5. <http://dx.doi.org/10.1145/2693208.2693247>

Heila van der Merwe, Brink van der Merwe, and Willem Visser. **Execution and property specifications for JPF-Android.** SIGSOFT Softw. Eng. Notes 39, 1 (February 2014), 1-5. <http://dx.doi.org/10.1145/2557833.2560576>

Heila van der Merwe, Brink van der Merwe, and Willem Visser. **Verifying Android Applications using Java PathFinder.** SIGSOFT Softw. Eng. Notes 37, 6 (November 2012), 1-5. <https://doi.org/10.1145/2382756.2382797>