Brandon Amos

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Research Interests

Machine learning, mobile computing, and distributed systems.

Education

- Ph.D. Student, Computer Science, Carnegie Mellon University, Aug 2014–Present
- B.S., Computer Science, Virginia Tech, Aug 2011–May 2014 (3.99/4.00)

Research Experience

- Research Assistant, Carnegie Mellon University — Aug 2014–Present
  - **Advisor**: Dr. Mahadev Satyanarayanan
  - **Area**: Machine learning, mobile computing, and distributed systems.
- Undergraduate Research Assistant, Magnum Research Group — May 2012–May 2014
  - **Advisor**: Dr. Jules White
  - **Area**: Mobile computing, cyber-physical systems, and security.
  - Android malware detection research implemented with a distributed **Actor-based Scala** system.
  - Manufacturing cyber-physical security research implemented with **VC#** and **Python**.
- Undergraduate Research Assistant, Virginia Tech — Jan 2013–May 2014
  - **Advisor**: Dr. Layne Watson
  - **Area**: Scientific computing, global/stochastic optimization, and bioinformatics.
  - Algorithm development for global and stochastic optimization using quasi-Newton methods for **parameter estimation** in **Fortran 95** and **OpenMP**.
  - Bioinformatics research on yeast cell modeling using **Fortran 95**, **C++**, and **Matlab**.
- Undergraduate Research Assistant, Systems Software Research Group — Nov 2012–Mar 2014
  - **Advisor**: Dr. Binoy Ravindran
  - **Area**: Heterogeneous compilers.
  - Compiler research on a heterogeneous system on automatic **OpenMP** to **CUDA** translation using **C++** and the **ROSE** compiler framework.
  - Polyhedral loop optimization research to restructure **OpenCL** kernels for locality using **LLVM** and **Polly**.

Publications

Conference Proceedings

[C1] Z. Chen, L. Jiang, W. Hu, K. Ha, **B. Amos**, P. Pillai, A. Hauptmann, M. Satyanarayanan, "Early implementation experience with wearable cognitive assistance applications," in *WearSys 2015*, 2015. [Online]. Available: `http://www.cs.cmu.edu/~satya/docdir/chen-wearsys2015.pdf`.

[C2] W. Hu, **B. Amos**, Z. Chen, K. Ha, W. Richter, P. Pillai, B. Gilbert, J. Harkes, M. Satyanarayanan, "The Case for Offload Shaping," in *HotMobile 2015*, 2015. [Online]. Available: `http://www.cs.cmu.edu/~satya/docdir/hu-hotmobile2015.pdf`.

[C3] **B. Amos** and D. Tompkins, "Performance study of Spindle, a web analytics query engine implemented in Spark," in *(Short Paper) Proceedings of the 2014 IEEE International Conference on Cloud Computing Technology and Science (CloudCom)*, 2014.

[C4] T. Andrew, **B. Amos**, D. Easterling, C. Oguz, W. Baumann, J. Tyson, L. Watson, "Global Parameter Estimation for a Eukaryotic Cell Cycle Model in Systems Biology," in *2014 Summer Simulation Multiconference, Society for Modeling and Simulation International*, 2014. [Online]. Available: `http://dl.acm.org/citation.cfm?id=2685662`.

[C5] **B. Amos**, D. Easterling, L. Watson, B. Castle, M. Trosset, W. Thacker, "Fortran 95 implementation of QNSTOP for global and stochastic optimization," in *2014 Spring Simulation Multiconference, 22nd High Performance Computer Symposium, Society for Modeling and Simulation International*, 2014. [Online]. Available: `http://dl.acm.org/citation.cfm?id=2663525`.

[C6] **B. Amos**, H. Turner, J. White, "Applying machine learning classifiers to dynamic Android malware detection at scale," in *IWCMC'13 Security, Trust and Privacy Symposium*, 2013. [Online]. Available: `http://bamos.github.io/data/papers/amos-iwcmc2013.pdf`.

Journal Articles

[J1] **B. Amos**, D. Easterling, L. Watson, W. Thacker, B. Castle, M. Trosset, "QNSTOP-QuasiNewton Algorithm for Stochastic Optimization," submitted, pre-print available as a tech report. [Online]. Available: `https://vtechworks.lib.vt.edu/bitstream/handle/10919/49672/qnTOMS14.pdf`.

Magazine Articles

[M1] M. Satyanarayanan, P. Simoens, Y. Xiao, P. Pillai, Z. Chen, K. Ha, W. Hu, **B. Amos**, "Edge Analytics in the Internet of Things," *IEEE Pervasive Computing*, to appear. [Online]. Available: `http://www.cs.cmu.edu/~satya/docdir/satya-edge2015.pdf`.

[M2] H. Turner, J. White, J. A. Camelio, C. Williams, **B. Amos**, R. Parker, "Bad parts: are our manufacturing systems at risk of silent cyberattacks?" *Security & Privacy, IEEE*, vol. 13, no. 3, pp. 40–47, 2015. [Online]. Available: `http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=7118094`.

Teaching Experience

- Software Design and Data Structures (CS 2114), Undergraduate TA — VT S2013

Industry Experience

- Data Scientist Intern, Adobe Research — May 2014–Aug 2014
  - **Research Area**: Distributed Systems
  - Built and released *Spindle* as an open source web analytics processing engine using **Scala**, **Spark**, **Spray**, and **Parquet** on **HDFS**. Spindle is available on GitHub at `http://github.com/adobe-research/spindle`.
- Software Engineer Intern, Snowplow Analytics — Dec 2013–Jan 2014
  - Open-source **Scala** development with a startup on the Snowplow analytics platform, available at `http://github.com/snowplow/snowplow`.
  - Developed a new server using **Spray** and **Actors** to store **Apache Thrift** events on **Amazon Kinesis**.
  - Completed project ahead of schedule, and also helped port Snowplow's Scala enrichment process to Kinesis.
- Software Engineer Intern, Qualcomm — May 2013–Aug 2013

- Developed an XML modification **web application** for fuzz vector generation. Implemented with client-side **HTML** and **js**, using **D3** for graphics and **Handlebars** for templating.
- Developed an XML-based grammar translator in **C++** with the **Xerces** XML parser in **Linux**. Reimplemented in **Python** using the **ElementTree** XML API for sophisticated analysis and tree transformations.

- Software Engineer Intern, Phoenix Integration — May 2012–Aug 2012
  - Developed industry software in **VC++**, **VC#**, **Java**, and **Tomcat**.
  - Improved the testing (**JUnit** and **NUnit**) and installation (**Ant**, **InstallShield**, and **Make**) frameworks.
  - Integrated a new licensing mode into CenterLink, a grid computing application, using **FLEXlm** and **Java**.
- Network Administrator Intern, Sunapsys — Jan 2011–Aug 2011
  - Internship in high school to replace Windows domain, mail, DHCP, and DNS servers with virtual **Linux** servers using **KVM** and **virsh**.

Graduate Coursework

- Semantics of Programming Languages (15-812), A. Platzer — CMU S2015
- Optimizing Compilers for Modern Architecture (15-745), T. Mowry — CMU S2015
- Advanced Operating Systems and Distributed Systems (15-712), D. Andersen — CMU F2014
- Mobile and Pervasive Computing (15-812), M. Satyanarayanan and D. Siewiorek — CMU F2014

Skills

- Languages: Bash, C/C++, Haskell, HTML/CSS/JavaScript, Java, LaTeX, Lua, Make, *Mathematica*, Python, R, Scala
- Frameworks: Akka, Android SDK/NDK, Caffe, Node.js, NumPy, Torch7, Pandas, SciPy, scikit-learn, Spark, Spray
- Systems: Linux, OSX

Honors & Awards

- 1st Place Undergraduate Senior Capstone Award, Virginia Tech Computer Science — 2014
- David Heilman Research Award, Virginia Tech Computer Science — 2014
  - Given to the Computer Science student with the most outstanding research experience.
- Senior Scholar Award, Virginia Tech Computer Science — 2014
  - Given to the senior in Computer Science with the most outstanding academic record.
- Honorable Mention, CRA Outstanding Undergraduate Researcher Award — 2014
- Awarded eight undergraduate merit scholarships — 2011–2014