

Amy Babay

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Education

Doctor of Philosophy in Computer Science

Johns Hopkins University

September 2018

Baltimore, MD

Thesis: *Timely, Reliable, and Cost-Effective Internet Transport Service using Structured Overlay Networks*

Master of Science in Engineering in Computer Science

Johns Hopkins University

May 2014

Baltimore, MD

Thesis: *The Accelerated Ring Protocol: Ordered Multicast for Modern Data Centers*

Bachelor of Arts in Cognitive Science, minor in Classics

Johns Hopkins University

May 2012

Baltimore, MD

GPA: 4.00. Phi Beta Kappa, University Honors, Departmental Honors, Dean's List

Academic Appointments

Assistant Professor

University of Pittsburgh, School of Computing and Information

Department of Informatics and Networked Systems

Department of Computer Science

August 2019-Present

Pittsburgh, PA

Additional Experience

Partner

Spread Concepts LLC

July 2018-Present

Savage, MD

Bridging the gap between academic research and technologies and the commercial world. Exploring commercialization of research on low latency Internet transport and intrusion-tolerant critical infrastructure.

Software Engineer

LTN Global Communications

May 2014-August 2014

Savage, MD

Worked on access control system for global-scale video flow transport and delivery service.

Wrote Python scripts to automatically organize, compress, and collect logs from remote appliances across the globe.

Honors and Awards

- **Professor Joel Dean Excellence in Teaching Award** **May 2018**
Johns Hopkins University Computer Science Department
For “outstanding teaching contributions to the department”
- **Finalist for Graduate Teaching Assistant Award** **March 2018**
Johns Hopkins University Whiting School of Engineering
- **Best Paper Award** **June 2017**
IEEE International Conference on Distributed Computing Systems (ICDCS 2017)
For *Timely, Reliable, and Cost-Effective Internet Transport Service using Dissemination Graphs*, selected out of 531 submissions
- **Special Service Award** **May 2015**
Johns Hopkins University Computer Science Department
For “outstanding work to benefit the department, Johns Hopkins University, and the community”
- **Excellence in Cognitive Science Award** **May 2012**
Johns Hopkins University Cognitive Science Department
Awarded annually to a graduating Cognitive Science major for academic excellence and outstanding accomplishment in research

Publications and Products

Released Software

- **Spire intrusion-tolerant SCADA system for the power grid**, co-creator
Yair Amir, Trevor Aron, Amy Babay, and Thomas Tantillo. First release May 2017, latest release December 2020 (creator since version 1.0, May 2017). An intrusion-tolerant SCADA system with performance guarantees under attack. Successfully withstood a red-team attack conducted by Sandia National Laboratories at Pacific Northwest National Laboratory from March 27 to April 7, 2017. Demonstrated in a test-deployment at the Hawaiian Electric Company from January 22 to February 1, 2018. (www.dsn.jhu.edu/spire).
- **Spines overlay network platform**, co-creator
Yair Amir, Claudiu Danilov, John Schultz, Daniel Obenshain, Thomas Tantillo, and Amy Babay. First release February 2003, latest release December 2020 (creator since version 5.3, March 2018). A framework for deploying innovative networks to provide services not available on the native Internet and improve performance for existing services (www.spines.org).
- **Prime intrusion-tolerant replication engine**, co-creator
Yair Amir, Jonathan Kirsch, John Lane, Marco Platania, Amy Babay, and Thomas Tantillo. First release June 2010, latest release December 2020 (creator since version 3.0, May 2017).

An intrusion-tolerant replication engine. Implements the first Byzantine-fault-tolerant replication protocol with performance guarantees under attack. (www.dsn.jhu.edu/prime).

- **Spread toolkit**, major contributor

Yair Amir, Michal Miskin-Amir, Jonathan Stanton, and John Schultz. First release October 1997, latest release May 2018 (major contributor since version 4.4.0, May 2014). Group Communication toolkit providing reliable, high performance, resilient messaging for local and wide-area networks. (www.spread.org).

Refereed Conference Papers

- **Toward Intrusion Tolerance as a Service: Confidentiality in Partially Cloud-Based BFT Systems**
Maher Khan and Amy Babay, in *Proceedings of the IEEE/IFIP International Conference on Dependable Systems and Networks (DSN)*, Virtual Event, June 2021 (Accepted).
- **Identifying Vulnerable Critical Infrastructure Zones in Smart Cities**
Abdulaziz Alqahtani, David Tipper, Katrina Kelly-Pitou and Amy Babay, in *Proceedings of the 16th International Conference on the Design of Reliable Communication Networks (DRCN)*, Milano, Italy, 2020, pp. 1-7.
- **Deploying Intrusion-Tolerant SCADA for the Power Grid**
Amy Babay, John Schultz, Thomas Tantillo, Samuel Beckley, Eamon Jordan, Kevin Ruddell, Kevin Jordan, and Yair Amir, in *Proceedings of the IEEE/IFIP International Conference on Dependable Systems and Networks (DSN)*, Portland, OR, June 2019, pp. 328-335.
- **Characterizing Demand Graphs for (Fixed-Parameter) Shallow-Light Steiner Network**
Amy Babay, Michael Dinitz, and Zeyu Zhang, in *Proceedings of the 38th IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS)*, Ahmedabad, India, December 2018, pp. 33:1-33:22.
- **Network-Attack-Resilient Intrusion-Tolerant SCADA for the Power Grid**
Amy Babay, Thomas Tantillo, Trevor Aron, Marco Platania, and Yair Amir, in *Proceedings of the IEEE/IFIP International Conference on Dependable Systems and Networks (DSN)*, Luxembourg City, Luxembourg, June 2018, pp. 255-266.
- **Timely, Reliable, and Cost-Effective Internet Transport Service using Dissemination Graphs**
Amy Babay, Emily Wagner, Michael Dinitz, and Yair Amir, in *Proceedings of the 37th IEEE International Conference on Distributed Computing Systems (ICDCS)*, Atlanta, GA, June 2017, pp. 1-12. **Best paper award.**
- **Practical Intrusion-Tolerant Networks**
Daniel Obenshain, Thomas Tantillo, Amy Babay, John Schultz, Andrew Newell, Md. Endadul Hoque, Yair Amir, and Cristina Nita-Rotaru, in *Proceedings of the 36th IEEE International Conference on Distributed Computing Systems (ICDCS)*, Nara, Japan, June 2016, pp. 45-56.

- **Fast Total Ordering for Modern Data Centers**
Amy Babay and Yair Amir, in *Proceedings of the 36th IEEE International Conference on Distributed Computing Systems (ICDCS)*, Nara, Japan, June 2016, pp. 669-679.

Invited Papers

- **Toward an Intrusion-Tolerant Power Grid: Challenges and Opportunities**
Amy Babay, John Schultz, Thomas Tantillo, and Yair Amir, in *Proceedings of the 38th IEEE International Conference on Distributed Computing Systems (ICDCS)*, Vienna, Austria, July 2018, pp. 1321-1326. (Vision Track, Invited).
- **Structured Overlay Networks for a New Generation of Internet Services**
Amy Babay, Claudiu Danilov, John Lane, Michal Miskin-Amir, Daniel Obenshain, John Schultz, Jonathan Stanton, Thomas Tantillo, and Yair Amir, in *Proceedings of the 37th IEEE International Conference on Distributed Computing Systems (ICDCS)*, Atlanta, GA, June 2017, pp. 1771-1779. (Vision Track, Invited).

Posters and Student Forum Papers

- **Timely, Reliable, and Cost-Effective Internet Transport Service using Dissemination Graphs**
Amy Babay, Emily Wagner, Michael Dinitz, and Yair Amir, *N2Women Workshop*, New York, NY, October 2016. (Poster).
- **Timely, Reliable, and Cost-effective Transport Service Using Dissemination Graphs**
Amy Babay, in *IEEE/IFIP International Conference Dependable Systems and Networks (DSN)*, Rio de Janeiro, Brazil, June 2015. (Student Forum).
- **Fast Total Ordering for Modern Data Centers**
Amy Babay and Yair Amir, in *Proceedings of the 35th IEEE International Conference on Distributed Computing Systems (ICDCS)*, Columbus, OH, June 2015, pp. 762-763. (Extended Abstract and Poster).

Patent Applications

- **Systems and Methods for Cloud-Based Control and Data Acquisition with Abstract State**
Yair Amir, Amy Babay, and Thomas Tantillo, International Patent Application PCT/US18/15451, filed January 2018, allowed December 2020.
- **Network-Attack-Resilient Intrusion-Tolerant SCADA Architecture**
Yair Amir, Amy Babay, and Thomas Tantillo, International Patent Application PCT/US17/38565, filed June 2017.

Graduate Student Advising

- Maher Khan. PhD in progress, Computer Science, University of Pittsburgh.
- Abhishek Viswanathan. PhD in progress, Information Science with a concentration in Telecommunications, University of Pittsburgh.

Research Project Advising

- Gerasimos Palaiopoulos, CS 2002 Project (Computer Science PhD) **Spring 2021**
- Jian Liu, CS 2002 Project (Computer Science PhD) **Spring 2021**
- Maxwell Trdina, INFSCI 1730 Independent Study (Information Science BS) **Spring 2021**
- Ismael Alonso, CS 2910 MS Project (Computer Science MS) **Fall 2020**
- Erhu He, CS 2002 Project (Computer Science PhD) **Spring 2020**
“Power-Aware Operator Placement Based on Overlay Network”
- Edmund (Ned) Duhaime. MSE May 2017, Johns Hopkins University. Co-advised with Yair Amir. Study: “Seamless Overlays for Application Use.”
- Emily Wagner. MSE December 2016, Johns Hopkins University. Co-advised with Yair Amir. Project: “The Playback Network Simulator: Overlay Performance Simulations with Captured Data.”

Teaching

- **Instructor**, Communication Networks (INFSCI 1630) **Spring 2021, Fall 2020**
Applications of Networks (TELCOM 2310)
University of Pittsburgh
Cross-listed undergraduate and masters course on computer networks.
- **Instructor**, Advanced Topics in Distributed Information Systems (CS 3551) **Spring 2020**
University of Pittsburgh
Seminar course focusing on recent results in distributed systems research.
- **Instructor**, Fundamentals of Object-Oriented Programming (INFSCI 0017) **Fall 2019**
University of Pittsburgh
First programming course for Information Science majors. Covers basic concepts of object-oriented programming using Java.
- **Co-Instructor**, Software for Resilient Communities **Spring 2018**
Johns Hopkins University
Co-taught and designed the new project-based undergraduate course. Students work in small teams to design and develop useful open-source software products that support our communities.
- **Co-Instructor**, Intermediate Programming (C/C++) **Fall 2017, Fall 2015, Spring 2014, Fall 2013**
Johns Hopkins University

Co-taught all aspects of the 60 – 90 student undergraduate course (divided into 30-student sections), including lectures, assignments, tests and grading. Worked with a team of course and teaching assistants to provide a hands-on interactive experience for students.

- **Special help**, Distributed Systems **Fall 2016, Fall 2014, Fall 2012**
Johns Hopkins University

Met with students to answer questions and review project designs, graded programming and theoretical assignments.

- **Undergraduate Course Assistant**, Intermediate Programming (C/C++) **Spring 2012**
Johns Hopkins University

Assisted students one-on-one during tutorials and graded programming assignments, providing individualized feedback based on careful code review.

Funded External Grants

University of Pittsburgh PI (with DoD PI Imes Chiu) on DoD SERDP grant “**Severe Impact Resilience: Framework for Adaptive Compound Threats**”, October 2020 – September 2023, \$1,715,040 (University of Pittsburgh contract \$515,614).

Student participant, co-author (PI Michael Dinitz and Co-PI Yair Amir) “**AitF: EXPL: Wide-area Dissemination under Strict Reliability, Timeliness, and Cost Constraints**,” National Science Foundation, September 2015 – August 2018, \$400,000.

External Professional Service

- **Conference Organization**
 - Demo & Poster Co-Chair: IEEE Int. Symposium on Reliable Distributed Systems (SRDS)* 2021
 - Publication Chair: ACM Internet Measurement Conference (IMC)* 2020
 - Publicity Co-Chair: IEEE Int. Symposium on Reliable Distributed Systems (SRDS)* 2020
- **Conference Program Committees**
 - IEEE/IFIP Int. Conference on Dependable Systems and Networks (DSN)* 2021
 - IEEE Int. Symposium on Reliable Distributed Systems (SRDS)* 2021, 2020, 2019
 - IEEE Int. Conference on the Design of Reliable Communication Networks (DRCN)* 2020, 2021
 - IEEE/IFIP Int. Conference on Dependable Systems and Networks (DSN), Doctoral Forum* 2020
 - IEEE Int. Conference on Distributed Computing Systems (ICDCS)* 2020
- **Journal Reviews**
 - ACM Computing Surveys (CSUR)* 2020
 - IEEE Transactions on Dependable and Secure Computing (TDSC)* 2020, 2019
 - IEEE Transactions on Cloud Computing (TCC)* 2020