

Education

- Boston University** BOSTON, MA
PhD in Computer Science 2016 – 2021
Co-advised by Assaf Kfoury and Azer Bestavros. Working in Cyber Security (<http://multiparty.org/>), Foundations of Programming Languages, and Computer Systems. Hariri Institute For Computing Graduate Student Fellow. GPA: 3.9. Graduate Coursework: Distributed Systems, Cryptography II, Secure Multiparty Computation at Scale, Data Privacy in Machine Learning, Formal Reasoning about Programs (MIT), Operating Systems. Formal Verification I & II. Randomness In Computing.
- American University of Beirut** BEIRUT, LEBANON
Masters in Computer Science (transferred) 2015 – 2016
Transferred out of the program to work on my PhD at BU. Advised by Prof. Paul Attie. GPA: 3.83
Fields of interest: Foundations of Programming Languages and Formal Methods/Verification.
Notable Courses: Advanced Design And Analysis of Algorithms, Advanced Topics In Algorithms.
- American University of Beirut** BEIRUT, LEBANON
Bachelors in Computer Science 2012 – 2015
Minor in Mathematics. GPA: 3.58 (Cumulative) 4.00 (Major). Worked with Prof. Paul Attie and Prof. Mohamad Jaber on various research projects. Took 4 extra Computer Science senior-level courses.
Notable Courses: Advanced Software Engineering, Parallel Computing, Artificial Intelligence, Programming Languages, Numerical Computing, Web Development, Advanced Probability & Statistics.
-

Select Research Experience

- Emerald - Cloud Analytics Platform for Non-Contact Sensors** CAMBRIDGE, MA
Computer Systems 11/2018 - Ongoing
I am a visiting student at the Networks @ MIT research group working with Professor Dina Katabi on the Emerald project. A see-through-walls RF signal non-contact sensor developed by the research group, attached to a large scale cloud platform that enables complex Machine Learning analytics to run on the data collected by such sensors. Devices containing these sensors are installed at homes to collect and stream data about residents to the cloud where the analytics are run. Emerald is being used for medical application (e.g. studying sleep patterns, detecting when an aging person falls), and is the basis of a start-up with the same name. I am working on designing and implementing the back-end computer systems running on the device and the cloud, focusing on issues around stream processing, scalability, and security. <https://www.emeraldinno.com/>
- Secure Multi-Party Computation** BOSTON, MA
Cybersecurity 10/2016 - Ongoing
I am working on developing scalable Secure Multi-party Computation solutions for various real life problems. This includes: Network Distance, Max-Flow/Linear Programming. Shortest Path. Route Recommendation. I am developing an open-source cloud-based framework/system for designing, deploying, and scaling MPC protocols in Web and Mobile Apps, and worked on several Web-based MPC deployments with the Boston Women Workforce Council and Boston's Pacesetters Initiative. The work is supported by multiple grants from NSF and Honda Research Institute. <https://multiparty.org/>
- Eshmun: Model Repair via SAT Solving** BEIRUT, LEBANON
Formal Verification 01/2015 - 01/2017
I designed and implemented an algorithm and tool for *subtractive model repair* and model checking through SAT solving, the algorithm was implemented in a user friendly Swing-based GUI tool that supports several types of abstractions suitable for modeling distributed and parallel algorithms, with the aim of making certain formal techniques easier to use. We allow representing parallel and distributed algorithms as a set of models for pairs of processes, which simplifies modeling, reduces the size of the model, and increases the repair efficiency by avoid exponential state explosion. We used Eshmun to model check and repair several algorithms for mutual exclusion, dining philosophers, and a simplified eventually serializable data service. <http://eshmuntool.blogspot.com/>
-

Select Industry Experience

Software Engineering Fellow @ BU Software Application and Innovation Lab (SAIL) BOSTON, MA
Research and Development 06/2017 - Ongoing

BU SAIL is a professional software design and development lab that serves as a collaborative resource for computational and data-driven research efforts across Boston University. I am working with the SAIL team on implementing a variety of open-source back-end / full-stack projects that use Secure Multi-party Computation (MPC) to allow clients to compute aggregates and analysis on their collective private inputs without revealing the inputs. During this work, I have collaborated with several researchers and software engineers, and mentored and managed several interns. I am leading the development of the JIFF framework. <https://github.com/multiparty/jiff>

Senior Software Engineer @ Interactive Life BEIRUT, LEBANON
Fullstack Android and Web Development 08/2015 - 08/2016

Interactivelife is a start-up based in Mercer Island, Washington with a team of developers located in Beirut. The start-up provides mobile and web applications for real-time event-based engagement and content-delivery to users. We worked with many businesses including TV Channels, Hospitals and Clinics, Conferences/Events, Education, Churches, and Live-streaming. I worked on designing a general-purpose web and mobile architecture made out of: 1) A mobile-side SDK that implements common features between the many apps. 2) Mobile apps that provide specializations and extensions to the SDK. 3) A web-CMS where clients can manage their applications' contents, appearances, and settings. 4) A Scalable back-end which is responsible for content delivery to the mobile apps and storing end-users' data. <https://www.interactivelife.com/>

Skills

Java, Python, JavaScript, Golang, C, Coq, ATS, Bash. MySQL, POSTGRES, SQLALCHEMY, MongoDB, Familiar with Neo4j. BSP, MPI, CILK, Amazon AWS, Hadoop. \LaTeX , HTML5, CSS. Git, Eclipse, Gradle, Android Studio, Jasmin, BCEL. Javax Swing, Flask, JQuery, ANTLR, Processing and Processing.js. Node.js. Android Development. Teaching. Technical Writing. Presentation. Communication Skills.

Publications reverse chronological order

- Lapets, Andrei; Jansen, Frederick; Dak Albab, Kinan; Issa, Rawane; Qin, Lucy; Varia, Mayank; Bestavros, Azer. *Accessible Privacy-Preserving Web-Based Data Analysis for Assessing and Addressing Economic Inequalities. Proceedings of the 1st ACM SIGCAS Conference on Computing and Sustainable Societies*. San Jose, CA, USA, 2018. Article 48.
- Jansen, Frederick; Dak Albab, Kinan; Lapets Andrei; Varia, Mayank. *Brief Announcement: Federated Code Auditing and Delivery for MPC. Stabilization, Safety, and Security of Distributed Systems*. SSS 2017. Lecture Notes in Computer Science, vol 10616. Springer, Cham.
- Dak Albab, Kinan; Issa, Rawane; Lapets, Andrei; Bestavros, Azer; Volgushev, Nikolaj. *Scalable Secure Multi-Party Network Vulnerability Analysis via Symbolic Optimization*. In *Proceedings of Security and Privacy Workshops (SPW), 2017 IEEE*. San Jose, CA, USA, 2017. Pages 211-216.
- Attie, Paul; Dak Al Bab, Kinan; Sakr, Mohamad. *Model and Program Repair via SAT Solving*. *ACM TECS: Transactions on Embedded Computing Systems*. Volume 17, Issue 2, December 2017.
- Abou-Jaoudeh, John; Dak-Al-Bab, Kinan; El-Katerji, Mostafa; Falcone, Yliès; Jaber, Mohamad. *A High-Level Modeling Language for the Efficient Design, Implementation, and Testing of Android Applications*. *STTT: International Journal on Software Tools for Technology Transfer*. Volume 20, Issue 1, PP 1-18. November 2016.
- Attie, Paul; Cherri, Ali; Dak Al Bab, Kinan; Sakr, Mohamad; Saklawi, Jad, *Model and program repair via SAT solving*. *Proceedings of MEMODCODE 2015: The ACM/IEEE International Conference on Formal Methods and Models for Codesign*. Austin, Texas, USA. September 2015.

Please visit my website and extended CV at <https://cs-people.bu.edu/babman/> for a complete list of research, industry, and teaching experiences, courses, publications, projects, talks, and awards.