Rahul Murmuria

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Profile

Researcher and innovator with 10 years of diversified professional experience in software engineering, data science, and human factors. Ph.D. candidate in Computer Science at George Mason University, Fairfax, Virginia. Co-inventor of a patent-applied technology to continuously authenticate users on a smartphone by modeling their physical behavior using machine learning techniques. First author in 2 peer-reviewed conference papers and 2 workshop papers, and co-authored various other conference papers, white papers, grant proposals, and tutorials.

Professional Experience

Kryptowire, Fairfax, VA June 2015–present
Algorithm Engineer

- Fulfilled the technical requirements of a DARPA grant for the Active Authentication project by developing the analytics and prototype implementation
- Managed the data collection process involving 110 participants, prepared analytics using novel machine learning algorithms, and contributed to the final report and other grant proposals extending this work
- Implemented a prototype on Android devices that performs data collection, model generation, and continuous authentication score computation entirely on-device (Patent filed)

Center for Assurance Research and Engineering, Fairfax, VA January 2010–May 2015
Research Assistant

- Prepared a regression based model on Android smartphones to predict battery power consumption using multi-dimensional system resources measurements, achieving a granularity of as low as 1 kernel jiffy in time
- Conducted performance analysis of a custom fuse-based encrypted filesystem for Android devices; Developed the login process and the secure-wipe which was deployed by DARPA into devices used by the military
- Supervised 3 Ph.D. students to create a UX testing tool for Android devices

Federal Trade Commission, Washington D.C. May 2013–July 2013
Tech Intern

- Provided technical expertise and guidance as the FTC attorneys performed research in the mobile app stores and analyzed potentially fraudulent mobile applications
- Developed ways to automate some of the processes of preparing technical evidence

George Mason University, Fairfax, VA August 2012–May 2013
Teaching Assistant

- Conducted classroom lectures and prepared homework assignments for graduate-level courses: Security Lab, Intrusion Detection, Network Security, and OS Security

George Mason University, Fairfax, VA October 2008–January 2010
System Administrator (Graduate Assistant)

- Provided second tier technical support to the School of Engineering

Openworld, Washington D.C. September 2005–May 2007
Offshore Web Developer

- Built a web portal for online marketplace of telework services

Education

Doctorate of Philosophy in Computer Science, GPA 3.54 (All But Dissertation) January 2011–Summer 2017
George Mason University, Fairfax, VA
Proposal - Modeling User Behavior for Context Generation on Mobile Devices

Master of Science in Computer Engineering, GPA 3.8 August 2008–December 2010
George Mason University, Fairfax, VA
Thesis - Energy Profiling and Control for Android Devices

Bachelor of Technology in Computer Engineering, GPA 7.08 / 10.0 July 2004–May 2008
National Institute of Technology, Jaipur, India
Project - Glendix: A Plan 9 / Linux Distribution

Selected Coursework

Quantitative Methods in Computer Science, Theory and Applications of Data Mining, Advanced Artificial Intelligence, Exploratory Data Analysis, Concurrent Software Systems, Operating Systems Security, Distributed Systems, Advanced Computer Networks

Patents

A. Stavrou, R. Murmuria, R. Johnson, D. Barbara. Active Authentication of Users. *USPTO Application 15236049*, filed August 2016. Patent Pending.

Publications

Peer-Reviewed Conference Papers

1. R. Murmuria, A. Stavrou, D. Barbara, D. Fleck. Continuous Authentication on Mobile Devices Using Power Consumption, Touch Gestures and Physical Movement of Users. *Research in Attacks, Intrusions, and Defenses (RAID)*, pp. 405–424. Springer, 2015.
2. R. Murmuria, J. Medsger, A. Stavrou, J.M. Voas. Mobile Application and Device Power Usage Measurements. *Sixth International Conference on Software Security and Reliability (SERE)*, pp. 147–156. IEEE, 2012.
3. Z. Wang, R. Johnson, R. Murmuria, A. Stavrou. Exposing Security Risks for Commercial Mobile Devices. *International Conference on Mathematical Methods, Models, and Architectures for Computer Network Security (MMM-ACNS)*, pp. 3–21. Springer, 2012.
4. Z. Wang, R. Murmuria, A. Stavrou. Implementing and optimizing an encryption filesystem on android. *13th International Conference on Mobile Data Management (MDM)*, pp. 52–62. IEEE, 2012.

Workshop Papers

5. R. Murmuria, A. Stavrou, D. Barbara, V. Sritapan. Your Data in Your Hands: Privacy-preserving User Behavior Models for Context Computation. *International Conference on Pervasive Computing and Communications (PerCom)*, IEEE, 2017.
6. R. Murmuria, A. Stavrou. Authentication Feature and Model Selection using Penalty Algorithms. *Symposium on Usable Privacy and Security (SOUPS)*, USENIX, 2016.

White Papers

7. R. Martin, R. Murmuria, A. Stavrou, N. Nazzicari. MokA: Mobile k-Anonymity (Sender Anonymity Over Untrusted Mobile Network Operators). 2010.
8. M. S. Gaur, A. Narayanan, R. Murmuria. Comparative Analytic Simulation of Peer to Peer Networks. 2007.

Tutorials

9. R. Johnson, R. Murmuria, A. Stavrou, V. Sritapan. Pairing Continuous Authentication with Proactive Platform Hardening. *International Conference on Pervasive Computing and Communications (PerCom)*, IEEE, 2017.
10. A. Narayanan, R. Narasimhan, R. Murmuria, M. Gaur. Institutional Information Management using Open Source Technologies. *1st International Conference on Digital Information Management*, IEEE, 2006.

Computing Skills

Programming and Markup Languages:	Python, Java, R, LaTeX, Bash, C++, PHP, Javascript, Lisp
Data Handling:	SQL, NoSQL, Pandas, HDF5, CSV, JSON, XML
Statistical Analysis Tools:	Scikit-learn, Weka, Matlab, Apache Commons Math, Eigen
Visualization Tools:	Matplotlib, Seaborn, Tableau, Gnuplot
Other Tools and API:	Volatility, Valgrind, gprof, DDMS, Beautiful Soup, Snort, Wireshark

Volunteering

National Institute of Technology, Jaipur, India 2005–2008

- Taught system administration, web scripting, and general programming to 75+ students in a weekend workshop series spanning 2 semesters
- Mentored 10+ students to actively contribute to open source projects within the University
- Developed the University's first electronic course registration system which included some back-office functions, thereby saving the faculty, staff, and students 5000+ man-hours every semester