

RAHUL MURMURIA

10524 Rosehaven Street, Apt. 204, Fairfax, VA 22030

Email: rahul@murmuria.in | Phone: (703) 474-1261

PROFILE

Data Science Researcher with 5 years in machine learning and 12 years in software development. Doctoral research in the areas of machine learning and human-computer interaction. Co-inventor of a patent-applied technology to continuously authenticate users on a smartphone using machine learning techniques.

PROFESSIONAL EXPERIENCE

Research Scientist, *Center for Assurance Research and Engineering*, Fairfax, VA January 2017–present
Developed novel machine learning algorithms for anomaly detection to continuously assess unique behavioral traits of an individual. Verified the techniques on 3 independent datasets of unstructured data totaling a size of 600 GB with 275 users. Presented at academic conferences, industry seminars, and local meetup groups of data practitioners for peer review.

Technologies used: Python, Scikit-learn, Pandas, Scipy, Numpy, Matplotlib, Seaborn, HDF5 datastore, High-Performance Clusters (HPCs), Amazon Web Services (AWS), Apache Hadoop

Algorithm Engineer, *Kryptowire*, Fairfax, VA June 2015–December 2016
Fulfilled the technical requirements of a DARPA grant on *Active Authentication* and contributed towards securing a DHS grant for the company. Prototyped a patent-pending technology on Android smartphones that continuously estimates how characteristically users are behaving. Worked with the engineering and management team to deploy my algorithms for the military and other clients.

Technologies used: JAVA, Android SDK, Apache Commons Math Library, C++ linear algebra libraries, Volatility (Android memory forensics tool), DDMS (Android debugging tool), version control systems, trac issue tracking.

Research Assistant, *Center for Secure Information Systems*, Fairfax, VA January 2010–May 2015
Contributed to the DARPA grant on *Transformative Applications*. Collaborated with engineers from Invincea, Inc. and researchers from NIST to develop technologies that supported over 3000 military personnel in Afghanistan. Prepared a regression model on Android smartphones to predict an application's battery power consumption. Conducted performance analysis of an encrypted filesystem for Android devices. Developed the login process and secure-wipe in order to secure the on-device data. Developed a tool for user interface stress testing for Android applications.

Technologies used: JAVA, PHP, C++, Matlab, Android SDK, Android NDK, Apache Ant, gnuplot, APKTool, Beautiful Soup, GDB for Android kernel debugging, version control systems

Technology Consultant, *Federal Trade Commission*, Washington D.C. May 2013–July 2013
Provided technical expertise and guidance as the FTC attorneys performed research in the mobile app stores and analyzed potentially fraudulent mobile applications. Assisted the team with gathering data and developed ways to automate the review processes of preparing technical evidence.

Technologies used: The specifics on the lab and tools are confidential.

Teaching Assistant, *George Mason University*, Fairfax, VA August 2012–May 2013
Conducted classroom lectures, invigilated examinations and prepared homework assignments for graduate-level courses: Security Lab, Intrusion Detection, Network Security, and OS Security

Technologies used: C, Perl, Bash, Wireshark, Snort, Netfilter, Ettercap, Metasploit, JavaMail API

System Administrator, *George Mason University*, Fairfax, VA October 2008–January 2010
Provided second tier technical support to the School of Engineering

Technologies used: Apache HTTP Server, Apache Tomcat, MySQL, Netcat, Deep Freeze, Norton Ghost, Nagios

Lead System Administrator, *National Institute of Technology*, Jaipur, India November 2005–February 2008
Taught system administration and computer programming to 75+ students in a weekend workshop series spanning 2 semesters. 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.

Offshore Web Developer, *Openworld*, Washington D.C. September 2005–May 2007
Built a web portal for online marketplace of telework services

Intern, *Networking Business Unit, HCL Technologies*, Chennai, India May 2006–July 2006
Performed feasibility study for a proposal the unit had prepared to implement the IP security stack in the operating system of an internationally known semiconductor company

EDUCATION

Ph.D. in *Computer Science*, George Mason University, Fairfax, VA
Dissertation - Modeling User Behavior on Smartphones

August 2017
GPA 3.8

M.S. in *Computer Engineering*, George Mason University, Fairfax, VA
Thesis - Energy Profiling and Control for Android Devices

December 2010
GPA 3.8

B. Tech. in *Computer Engineering*, National Institute of Technology, Jaipur, India
Project - Glendix: A Plan 9 / Linux Distribution

May 2008
GPA 7.08 / 10.0

TECHNICAL SKILLS

<i>Analytics Tools:</i>	Scikit-learn, Pandas, Scipy, Numpy, Weka, Apache Commons Math, Matlab
<i>Modeling Techniques:</i>	Pattern Recognition, Cluster Analysis, Anomaly Detection, Hypothesis Testing, Time Series, Predictive Analytics, Regression Techniques
<i>Data Handling:</i>	HDF5, Amazon DynamoDB, Apache Hadoop, MySQL, SQLite, BerkeleyDB, JSON, XML
<i>Visualization Tools:</i>	Matplotlib, Seaborn, Tableau Desktop, Gnuplot
<i>Programming Languages:</i>	Python, Java, C, C++, PHP, Javascript, Lisp
<i>Other Tools and API:</i>	Volatility, Valgrind, gprof, DDMS, Beautiful Soup, Snort, Wireshark

PATENTS

A. Stavrou, R. Murmuria, R. Johnson, D. Barbara. Active Authentication of Users. *USPTO App 15/236049*, filed Aug 2016.

RESEARCH IMPACT

<i>Funding:</i>	DARPA Transformative Applications, DARPA Active Authentication, DHS S&T Mobile Device Security
<i>Publications:</i>	6 in peer-reviewed conferences & workshops, 2 tutorials, 2 white papers, 1 M.S. thesis, 1 Ph.D. dissertation
<i>Citations:</i>	Over 110 independent citations with H-index of 4 (H-index: h publications have at least h citations)
<i>Conferences:</i>	RAID (LNCS), SOUPS (IEEE), PerCom (IEEE): Top 20 academic conferences in computer sciences
<i>Reviewer:</i>	International Journal for Information Security, Elsevier Journal Micropro, ACNS 2011, QRS 2015
<i>Member:</i>	Sigma Xi, IAENG, IEEE Computer Society, Data Community DC

SELECTED 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.