

# Mudhakar Srivatsa

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## RESEARCH INTERESTS

Cognitive Internet of Things, Spatiotemporal Analytics, Big Data, Secure Information Flow

## RESEARCH EXPERIENCE AND EDUCATION

- **IBM T.J. Watson Research Center**, Hawthorne, NY, USA  
Principal Research Staff Member, Cognitive IoT, 2016–present  
Research Manager, IoT Analytics, 2014–present  
Research Staff Member, 2007–present  
Research on *Spatiotemporal and Graph Analytics* – making sense out of large scale network data.
- **US/UK International Technology Alliance (ITA: <http://www.usukita.org/>)**  
Jointly funded by US Army Research Lab (ARL) and UK Ministry of Defence (MoD)  
Consortium technical area leader on *Coalition Interoperable Secure and Hybrid Networks*, May 2011–present  
Principal Investigator and task lead on *Secure Information Flow* and *Game Theoretic Security*, May 2009–2011  
Principal Investigator on *Secure Information Flow*, May 2007–2009
- **Network Science Collaborative Technology Alliance (NS-CTA: <http://www.ns-cta.org/>)**  
Funded by US Army Research Lab (ARL)  
IBM Program Manager for *Information Network Academic Research Center (INARC)*, Jan 2011–present  
Task lead on *Modeling Socio-Information Networks*, Sep 2009–present
- **College of Computing, Georgia Institute of Technology**, Atlanta, GA, USA  
Ph.D. in Computer Science, Spring 2007  
Thesis: *Security Architectures and Protocols for Overlay Network Services*; GPA: 4.0/4
- **Indian Institute of Technology (IIT), Madras**, Chennai, India  
B. Tech in Computer Science and Engineering with a minor in Operations Research, May 2002  
Thesis: *ARM: Adaptive Resource Management*; Major GPA: 9.5/10

## PROFESSIONAL ACTIVITIES

- Editor: ACM/Springer Wireless Networks (2009–present), IJAACS (2008)
- Program chair: SecureComm (2014), CollaborateCom (2012-13), ACITA Workshops (2011), IEEE ICSCN (2008), IEEE QoISN (2008).
- Communication and Networking PIC Chair (Professional Interest Community) at IBM Research (2011–13)
- Member of review panels for NSF: 2012, 2013, 2014, 2015.
- Member of review panel for National Council for Research and Development, Romania: Joint Applied Research Projects 2011-12
- Member of review panel for National Commission for Scientific and Technological Development (CONICYT), Chile: National Research Funding Competition (2011-12)
- Member of review panel for MURI (Multi-University Research Initiative) Trust Program for ONR (Office of Naval Research).

- Program committee member: KDD (2016), CSF (2015), MILCOM (2015), ICNP (2014), SACMAT (2011), ICDCS (2011), GameSec (2010), ICDM (2009), AAAI QGRASA (2009), CoopIS (2008), ICDCS TRAM (2007, 2008), CollaborateCom (2007, 2008, 2009, 2010), EDA-PS (2007).
- External reviewer for journals: ACM TISSEC, ACM TOCS, IEEE Computer, IEEE TPDS, IEEE TKDE, IEEE/ACM ToN, IEEE Intelligent Systems, Wireless Networking Journal, VLDB Journal, JPDC, ACM Transactions on the Web, Elsevier Information Systems, IJCSSE.
- External reviewer for conferences: ACSAC (2004, 2005, 2006), VLDB (2005), ICDCS (2003, 2005, 2007), ICDCN (2006), Globecom (2004), SIGMOD (2004, 2007), ICDE (2004, 2006, 2007), KDD (2006), WWW (2007).
- Senior Member of IEEE, ACM and USENIX.
- Dissertation Committee: Tanvir Al Amin (UIUC)

## SOFTWARE PROTOTYPES

- Spatiotemporal analytics toolkit (C++ and Java): design and development of real-time spatiotemporal analytics (including, support for full Earth ellipsoidal model, motion processing). Ships with IBM InfoSphere Streams v4.0, InfoSphere BigInsights v4.0, SPSS Modeler v16, InfoSphere Sensemaking, System G (graph database) and BlueMix Geospatial services.
- Design of HDFS transparency over GPFS: a zero copy solution that allows both analytical (e.g., Hadoop, Spark) workloads and transactional workloads (e.g., RDBMS) to operate (read/write) concurrently on a shared file. Ships with IBM Spectrum Scale v4.2.
- Streaming algorithms for network analytics (C++): implementation of a suite of wire-speed (1 Gbps) network analytics algorithms (including, opinion mining, social graph mining, trending and tracking popular topics) on both traditional CPUs (x86 and Power PC) and network processors (PowerEN); showed 7x speed up in performance via exploitation of multi-threading and hardware acceleration.
- Streaming network fault diagnosis and prediction (C++ and Java): implementation of temporal sub-graph matching algorithms to handle bursts of network events in large enterprise networks and ISPs; offers a 2.4x speedup and enables incremental and predictive fault diagnosis and localization.
- Distributed root cause analysis module (Perl and SQL) for IBM Tivoli Network Manager: offers super-linear speedup by distributing root cause analysis.
- Distributed network discovery module (Perl) for IBM Tivoli Network Manager: reduces the number of network probes required by 90%.

## INVITED TALKS

- College of William and Mary and Univ of Maryland: Using Graphs as Side Channels, Oct 2015
- Keynote speaker at IBM Enterprise 2014: Asteroid tracking, Oct 2014
- Singapore Management University: Real-time Spatiotemporal Analytics, Nov 2013.
- Texas Wireless Summit (TWS): On Spatiotemporal Big Data, Oct 2013.
- Contextual computing Workshop and Mobile First Workshop: On Real-time Analytics using Spatiotemporal Toolkit, Apr 2013.
- CMU and UPitt: On Social Networks as Side Channels, Oct 2012.

- Keynote Speaker at IEEE Intl Conference on Advanced Computing (ICoAC): On Spatio-temporal Analytics of Mobile Sensor Network Traces, Dec 2011.
- University of Texas at Austin and University of Washington: Revocation Games, Mar and Jul 2010.
- Plenary Speaker at IEEE ICSCN 2008: Who is Listening? Security in Wireless Networks, Jan 2008
- Texas A&M University: Project SGuard, Apr 2007
- University of Arizona, Tucson: Security Architectures and Protocols for Overlay Network Services, Mar 2007
- AT&T Labs and NEC Labs: Caller Identification Attacks in VoIP Networks, Feb 2007

## **AWARDS AND HONORS**

- IBM Outstanding Science Accomplishment Award for research contributions to location security using graphs as a side-channel.
- IBM Outstanding Technical Accomplishment Award (10M+ research impact) for contributions to automotive (connected car) solutions using spatiotemporal analytics.
- IBM Outstanding Technical Accomplishment Award (10M+ research impact) for contributions to telecommunication solutions using spatiotemporal analytics.
- IBM twelfth invention plateau award, May 2016.
- IBM Master Inventor (Oct 2013-present)
- Certificate of academic distinction for securing the highest GPA from IIT Madras, 2000-01.
- Technical accomplishment award from Cognizant Technologies and Solutions: implemented a one-shot mode real-time scheduler for eCOS (Embeddable and Configurable Operating System), 2001.
- Merit award for top twenty students entering IIT Madras, 1998.
- Silver medals in National Mathematics Olympiad, India, 1996 and 1997.

## **TEACHING EXPERIENCE**

- Graduate Teaching Assistant, Spring 2004, 2005 and 2006.  
Teaching assistant for a graduate level course titled Internet Computing.
- Lectures in graduate level courses, such as: Advanced Internet Computing, Real-time and Embedded Systems and Reliability Theory.

## PUBLICATION LIST

### • Book Chapters

- **Mudhakar Srivatsa**, Dakshi Agrawal and Andrew McDonald. Security across Disparate Management Domains in Coalition MANETs. In *Network Sciences for Military Coalition Operations*, IGI Global Publications (accepted July 2009).
- **Mudhakar Srivatsa** and Dakshi Agrawal. Security in Autonomic Networks. In *Autonomic Computing and Networks*, Springer Publications, 2008.

### • Refereed Journal Publications

- Anthony Etuk, Timothy J. Norman, Murat Sensoy and **Mudhakar Srivatsa**. How to Trust a Few Among Many. In *Journal of Autonomous Agents and Multi-Agent Systems*, May 2016.
- Yongzhi Wang, Jingpeng Wei and **Mudhakar Srivatsa**. IntegrityMR: Integrity Assurance Framework for Big Data Analytics and Management Applications. In *Intl Journal of Networked and Distributed Computing*, 2016 (accepted).
- Shouling Ji, Weiqing Li, **Mudhakar Srivatsa** and Raheem Beyah. General Graph Data De-anonymization: From Mobility Traces to Social Networks. In *ACM Transactions on Information Systems Security (TISSEC)*, 2016 (accepted).
- Shouling Ji, Weiqing Li, **Mudhakar Srivatsa** and Raheem Beyah. Structural Data De-anonymization: Theory and Practice. In *ACM Transactions of Networking (ToN)*, 2016 (accepted).
- Saritha Arunkumar, Murat Sensoy, **Mudhakar Srivatsa**, Muttukrishnan Rajarajan. Reasoning with streamed uncertain information from unreliable sources. In *Journal of Expert Systems and Applications* 42(22): 8381-8392, 2015.
- Saritha Arunkumar, **Mudhakar Srivatsa**, Muttukrishnan Rajarajan. A review paper on preserving privacy in mobile environments. In *Journal of Network and Computer Applications* 53: 74-90, 2015.
- Ziyu Guan, Shengqi Yang, Huan Sun, **Mudhakar Srivatsa** and Xifeng Yan. Fine-Grained Knowledge Sharing in Collaborative Environments. In *IEEE Transactions on Knowledge and Data Engineering (TKDE)* 27(8): 2163-74, Aug 2015.
- Yongzhi Wang, Jinpeng Wei and **Mudhakar Srivatsa**. Cross-cloud Map-Reduce: A Result Integrity Check Framework on Hybrid Clouds. In *International Journal of Cloud Computing (IJCC)* 2014.
- Wei Gao, Arun Iyengar, **Mudhakar Srivatsa** and Guohong Cao. Cooperative Caching for Efficient Data Access in Disruption Tolerant Networks. In *IEEE Transactions on Mobile Computing (TMC)* 13(3): 611-25, Mar 2014.
- Piotr Mardziel, Stephen Magill, Michael Hicks and **Mudhakar Srivatsa**. Dynamic Enforcement of Knowledge-based Security Policies using Abstract Interpretation. In *Journal of Computer Security (JCS)* 21(4): 463-532, Apr 2013.
- Petros Zerfos, **Mudhakar Srivatsa**, Hao Yu, Hubertus Francke and Dakshi Agrawal. Platform for Massive-Scale Streaming Network Analytics. In *IBM Journal for Research and Development: Special Edition on Massive Scale Analytics*, Jun 2012.
- Murtaza Zafer, Dakshi Agrawal and **Mudhakar Srivatsa**. Limitations of Generating a Secret Key Using Wireless Fading under Active Adversary. In *IEEE/ACM Transactions on Networking (ToN)* 20(5): 1440-51, May 2012.
- **Mudhakar Srivatsa**, Ling Liu and Arun Iyengar. EventGuard: A Dependable System Architecture for Securing Publish-Subscribe Networks. In *ACM Transactions on Computer Systems (TOCS)* 29(4) Dec 2011.
- **Mudhakar Srivatsa**, Arun Iyengar, Ling Liu and Hongbo Jiang. Privacy in VoIP Networks: Flow Analysis Attacks and Defense. In *IEEE Transactions on Parallel and Distributed Systems (TPDS)* 22(4): 621-33, Apr 2011.

- Aameek Singh, **Mudhakar Srivatsa** and Ling Liu. Search-as-a-Service: Outsourced Search over Outsourced Storage. In ACM Transactions on the Web (TWEB) 3(4), Dec 2009.
- **Mudhakar Srivatsa**, Arun Iyengar, Jian Yin and Ling Liu. Scalable Key Management Algorithms for Location-Based Services. In IEEE/ACM Transactions on Networking (ToN) 17(5): 1399-1412, May 2009.
- **Mudhakar Srivatsa** and Ling Liu. Mitigating Denial of Service Attacks on an Overlay Network: A Location Hiding Approach. In IEEE Transactions on Parallel and Distributed Systems (TPDS), Vol. 20, No. 4, Apr 2009.
- **Mudhakar Srivatsa**, Arun Iyengar, Jian Yin and Ling Liu. Mitigating Application Level Denial of Service Attacks on Web Servers: A Client Transparent Approach. In ACM Transactions on the Web (TWEB), Vol. 2, No. 3, July 2008.
  - \* Briefing titled ‘A Two-Layer System Stops Intelligent Denial of Service Attacks’ appears in MIT Technology Review, Sept 2008 (<http://www.technologyreview.com/Infotech/21231/>).
  - \* Short summary titled ‘On Smart Denial of Service Attacks’ to appear in IEEE Computer Magazine, 2009.
  - \* Abridged version titled ‘Application Level Denial of Service Attacks’ to appear in Springer Encyclopedia on Cryptography and Security (2<sup>nd</sup> Edition), 2009.
- **Mudhakar Srivatsa**, Nithya Rajamani and Murthy V. Deverakonda. A Policy Evaluation Tool for Multi-Site Resource Management. To appear in IEEE Transactions on Parallel and Distributed Systems (TPDS), Vol. 19, No. 10, Oct 2008.
- **Mudhakar Srivatsa** and Ling Liu. DHTGuard: Security Threats in Structured Overlay Networks. Springer International Journal of Information Security, 2006.
- **Mudhakar Srivatsa** and Ling Liu. Securing Decentralized Reputation Management using TrustGuard. Journal on Parallel and Distributed Computing (JPDC), special issue on Security in Grid and Distributed Systems, Vol. 66, pp 1217-1232, 2006.
- **Mudhakar Srivatsa**, Bugra Gedik and Ling Liu. Scaling Unstructured Peer-to-Peer Networks with Heterogeneity Aware Topology and Routing. IEEE Transactions on Parallel and Distributed Systems, Vol 17, No. 10, Oct 2006.

• **Refereed Conference Publications**

- Raghu Ganti, **Mudhakar Srivatsa**, Dakshi Agrawal, Petros Zerfos, and Jorge Ortiz. MP-trie: Fast Spatial Queries on Moving Objects. In ACM Middleware, Dec 2016.
- Ramya Raghavendra, Pranita Dewan, and **Mudhakar Srivatsa**. Unifying HDFS and GPFS: Enabling Analytics on Software-Defined Storage. In ACM Middleware, Dec 2016.
- Liang Ma, **Mudhakar Srivatsa**, Derya Cansever, Xifeng Yan, Michelle Vanni and Sue Kase. Decentralized Search in Expert Networks: Generic Models and Performance Bounds. In Intl Conference on Network Protocols (ICNP), Nov 2016.
- Yu Su, Huan Sun, Brian Sadler, **Mudhakar Srivatsa**, Izzeddin Gur, Zenghui Yan and Xifeng Yan. On Generating Characteristic-rich Question Sets for QA. In Intl Conference on Empirical Methods in Natural Language Processing (EMNLP), Nov 2016.
- Semih Yavuz, Izzeddin Gur, Yu Su, **Mudhakar Srivatsa** and Xifeng Yan. Improving Semantic Parsing via Answer Type Inference. In Intl Conference on Empirical Methods in Natural Language Processing (EMNLP), Nov 2016.
- Saritha Arunkumar, **Mudhakar Srivatsa**, Berker Soyluoglu, Murat Sensoy and Federico Cerutti. Privacy Enforcement Through Policy Extension. In Military Communications (MILCOM), Nov 2016.
- Liang Ma, **Mudhakar Srivatsa**, Xifeng Yan, Derya Cansever, Sue Kase and Michelle Vanni. Query Answering Efficiency in Expert Networks under Decentralized Search. In Intl Conference on Information and Knowledge Management (CIKM), Oct 2016.

- Liang Ma, **Mudhakar Srivatsa**, Derya Cansever, Xifeng Yan, Sue Kase, and Michelle Vanni. On the Efficiency of Decentralized Search in Expert Networks. In IEEE Intl Conference on Distributed Computing Systems (ICDCS), June 2016 (short paper)
- Palanivel Kodeswaran, Ravindranath Kokku, Sayandeep Sen and **Mudhakar Srivatsa**. Idea: A System for Efficient Failure Management in Smart Home IoT environments. In Intl Conference on Mobile Systems, Applications and Services (MobiSys), June 2016.
- Roger Moussalli, **Mudhakar Srivatsa** and Sameh Asaad. Spatial Predicates Evaluation in the Geohash Domain Using Reconfigurable Hardware. In IEEE Intl Symposium on Field-Programmable Custom Computing Machines (FCCM), May 2016.
- Fangqiu Han, Shulong Tan, Huan Sun, **Mudhakar Srivatsa**, Deng Cai, and Xifeng Yan. Distributed Representations of Expertise. In SIAM International Conference on Data Mining (SDM), May 2016.
- Raghu Ganti, **Mudhakar Srivatsa** and BS Manjunath. Entity Reconciliation in a Multi-camera Network Using Spatiotemporal Analysis. In Intl Conference on Understanding Situations Through Multimodal Sensing (uSitu), Jan 2016.
- Eva Lilly, Jeff Jonas, **Mudhakar Srivatsa**, Raghu Ganti, Dakshi Agrawal, Larry Denneau, M. Kratky and R.J. Wainscoat. Predicting close encounters between asteroids with the STB software. In American Astronomical Society Division of Planetary Sciences Meeting (AAS DPS), Nov 2015.
- Saritha Arunkumar, **Mudhakar Srivatsa**, Murat Sensoy and Muttukrishnan Rajarajan. Global Attestation of Location in Mobile Devices. In Military Communications (MILCOM), Oct 2015.
- Y. Su, S. Yang, H. Sun, **M. Srivatsa**, S. Kase, M. Vanni, X. Yan. Exploiting Relevance Feedback in Knowledge Graph Search. In ACM Conference on Knowledge Discovery and Data Mining (KDD), Aug 2015.
- Shen Li, Raghu Ganti, **Mudhakar Srivatsa** and Tarek Abdelzaher. Pyro: A Spatiotemporal Big Data Storage System for Dynamic Workload Hotspots. In USENIX Annual Technical Conference (ATC), July 2015.
- M. Khouzani, P. Mardziel, C. Cid and **M. Srivatsa**. Picking v.s. Guessing Secrets: A Game-Theoretic Analysis. In IEEE Computer Security Foundations Symposium (CSF), July 2015.
- Md Tanvir Al Amin, Shen Li, Muntasir Raihan Rahman, Panindra Tumkur Seetharamu, Shiguang Wang, Tarek Abdelzaher, Indranil Gupta, **Mudhakar Srivatsa**, Raghu Ganti, Reaz Ahmed and Hieu Le. SocialTrove: A Self-summarizing Storage Service for Social Sensing. In IEEE Intl Conference on Autonomic Computing (ICAC), July 2015 (**best paper award**).
- Roger Moussalli, **Mudhakar Srivatsa** and Sameh Asaad. Fast and Flexible Conversion of Geohash Codes to and from Latitude/Longitude Coordinates. In IEEE Intl Symposium on Field-Programmable Custom Computing Machines (FCCM), May 2015.
- Saritha Arunkumar, **Mudhakar Srivatsa**, Murat Sensoy, and Muthukrishnan Rajarajan. Enforcing Location-based Access Control Policies, TENSYP, May 2015.
- Nikos Anerousis, Yaoping Ruan, **Mudhakar Srivatsa**, Todd Christner, Luis Farrolas and John Short. Measuring Enterprise Network Usage Pattern and Deploying Passive Optical LANs. In IEEE Integrated Management in the Age of Big Data (IM), May 2015.
- Kisung Lee, Raghu Ganti, **Mudhakar Srivatsa** and Ling Liu. When Twitter meets Foursquare: Tweet Location Prediction using Foursquare Information from Unstructured Text. In Mobiquitous, Dec 2014 (**best paper award amongst 160 submissions**). <http://blog.eai.eu/how-the-content-of-your-tweets-can-give-your-location-away>
- Kisung Lee, Raghu Ganti, **Mudhakar Srivatsa** and Ling Liu. Efficient Spatial Query Processing for Big Data Platforms. In ACM Conference on Geographical Information Systems (GIS), Nov 2014.
- Shouling Ji, Weiqing Li, **Mudhakar Srivatsa** and Raheem Beyah. Structural Data De-anonymization: Quantification, Practice and Implications. In ACM Conference on Computer and Communications Security (CCS), Nov 2014.

- Shouling Ji, Weiqing Li, **Mudhakar Srivatsa**, Jing (Selena) He, and Raheem Beyah, Structure based Data De-anonymization of Social Networks and Mobility Traces, Information Security Conference (ISC), Oct 2014.
- Jing Zhao, Xiaomei Zhang, Guohong Cao, **Mudhakar Srivatsa** and Xifeng Yan. Query Answering in Content-Based Mobile Opportunistic Networks. In 11<sup>th</sup> IEEE Intl Conference on Mobile Ad Hoc and Sensor Systems (MASS), Oct 2014.
- Shengqi Yang, Yinghui Wu, **Mudhakar Srivatsa** and Xifeng Yan. Summarizing Answer Graphs Induced by Keyword Searches. In Very Large Databases (VLDB), Sep 2014.
- Huan Sun, **Mudhakar Srivatsa**, Shulong Tan, Yang Li, Lance M. Kaplan, Shu Tao and Xifeng Yan. Analyzing Expert Behaviors in Collaborative Networks. In ACM Conference on Knowledge Discovery and Data Mining (KDD), Aug 2014.
- Raghu Ganti, **Mudhakar Srivatsa** and Tarek Abdelzaher. On Limits of Travel Time Predictions: Insights from a New York City Case Study. In IEEE Intl Conference on Distributed Computing Systems (ICDCS), Jun 2014.
- Siyu Gu, Chenji Pan, Hengchang Liu, Shen Li, Shaohan Hu, Lu Su, Shiguang Wang, Dong Wang, Tanvir Amin, Ramesh Govindan, Charu Aggarwal, Raghu Ganti, **Mudhakar Srivatsa**, Amotz Barnoy, Peter Terlecky, and Tarek Abdelzaher. Data Extrapolation in Social Sensing for Disaster Response. In IEEE Intl Conference on Distributed Computing in Sensor Systems (DCOSS), May 2014.
- Shouling Ji, Weiqing Li, Jing He, **Mudhakar Srivatsa** and Raheem Beyah. Optimization-based Data De-anonymization. In IEEE Symposium on Security and Privacy (short paper), May 2014.
- Bo Zong, Ramya Raghavendra, **Mudhakar Srivatsa**, Kang-Won Lee, Xifeng Yan and Ambuj Singh. Cloud Service Placement via Graph Matching. In Intl Conference on Data Engineering (ICDE), Apr 2014.
- **Mudhakar Srivatsa**, Raghu Ganti, Steve Borbash and Dakshi Agrawal. A BSP Approach to Composite Network Analysis. In IEEE Information Quality and Quality of Service for Pervasive Computing (IQ2S), Mar 2014.
- Shouling Ji, Weiqing Li, **Mudhakar Srivatsa**, Jing He and Raheem Beyah. De-anonymizing Mobility Traces and Social Data using Social Auxiliary Information. In Network and Distributed Systems Security (NDSS), Feb 2014 (short paper).
- Zubair Shafiq, Franck Le, **Mudhakar Srivatsa** and Alex Liu. Cross-path Inference Attacks on Multipath TCP. In ACM Hot Topics in Networking (HotNets), Nov 2013.
- **Mudhakar Srivatsa**, Raghu Ganti, Vinay Kolar and Jingjing Wang. Map Matching: Facts and Myths. In ACM SIGSPATIAL Conference on Geographical Information System (GIS), Nov 2013.
- Raghu Ganti, **Mudhakar Srivatsa** and Tarek Abdelzaher. Spatio-Temporal Spread of Events in Social Networks: A Gas Shortage Case Study. In Military Communications Conference (MILCOM), Oct 2013.
- Yongzhi Wang, Jinpeng Wei, **Mudhakar Srivatsa**, Yucong Duan and Wencai Du. IntegrityMR: Integrity Assurance Framework for Big Data Analytic and Management Applications. In Big Data Workshop on Knowledge Management and Big Data Analytics (KMBA), Oct 2013.
- Saritha Arunkumar, **Mudhakar Srivatsa**, Murat Sensoy and Dave Braines. Assessing Trust over Uncertain Rules and Streaming Data. In Fusion, Jul 2013.
- Anthony A. Etuk, Chatschik Bisdikian, **Mudhakar Srivatsa** and Tim Norman. TIDY: A Trust-Based Approach to Information Fusion through Diversity. In Fusion, Jul 2013.
- Raghu Ganti, **Mudhakar Srivatsa**, Anand Ranganathan and Jiawei Han. Inferring Human Mobility Patterns from Taxicab Location Traces. In ACM Conference on Pervasive and Ubiquitous Computing (UbiComp), Sep 2013.
- Yongzhi Wang, Jinpeng Wei and **Mudhakar Srivatsa**. Result Integrity Check for MapReduce Computation on Hybrid Clouds. In IEEE Cloud, Jun 2013.

- Xin Chen, Harshal Patankar, **Mudhakar Srivatsa**, Sencun Zhu and Jeff Opper. Zigzag: Partial Mutual Revocation Based Trust Management in Tactical Ad Hoc Networks. In IEEE Conference on Sensing, Communication and Networking (SECON), Jun 2013.
- Anthony Etuk, Chatschik Bisdikian, **Mudhakar Srivatsa** and Timothy J. Norman. TAF: A Trust Assessment Framework for Inferencing with Uncertain Streaming Information. In IEEE Information Quality and Quality of Service for Pervasive Computing (IQ2S), Mar 2013.
- Kisung Lee, Raghu Ganti, **Mudhakar Srivatsa** and Prasant Mohapatra. Spatio-Temporal Provenance: Identifying Location Information from Unstructured Text. In IEEE Information Quality and Quality of Service for Pervasive Computing (IQ2S), Mar 2013.
- **Mudhakar Srivatsa** and Mike Hicks. Deanonymizing Mobility Traces: Using Social Network as a Side-Channel. In ACM Conference on Computer and Communication Security (CCS), Oct 2012.
  - \* Article in Network World titled ‘Deanonymizing You: I know who you are after 1 click online or a mobile call’. <http://www.networkworld.com/community/blog/deanonymizing-you-i-know-who-you-are-after-1-click-online-or-mobile-call>, Oct 2012.
- **Mudhakar Srivatsa**, Sihyung Lee and Tarek Abdelzaher. Mining Diverse Opinions. In Military Communications Conference (MILCOM), Oct 2012.
- Ting Wang, **Mudhakar Srivatsa** and Ling Liu. Fine-Grained Access Control of Personal Data. In ACM Symposium on Access Control Models and Technologies (SACMAT), June 2012.
- Wei Gao, **Mudhakar Srivatsa**, Arun Iyengar and Guohong Cao. Distributed Maintenance of Cache Freshness in Opportunistic Mobile Networks. In Intl Conference on Distributed Computing Systems (ICDCS), Jun 2012.
- Franck Le, **Mudhakar Srivatsa** and Arun Iyengar. Byte Caching in Wireless Networks. In Intl Conference on Distributed Computing Systems (ICDCS), Jun 2012.
- Piotr Mardziel, Mike Hicks, Jonathan Katz and **Mudhakar Srivatsa**. Knowledge-Oriented Secure Multiparty Computation. In Programming Languages Analysis and Security (PLAS), June 2012.
- Murat Sensoy, Jeff Pan, Achille Fokoue, **Mudhakar Srivatsa** and Felipe Meneguzzi. Using Subjective Logic to Handle Uncertainty and Conflict. In Intl Conference on Trust, Security and Privacy in Computing and Communications (TrustCom), Jun 2012.
- Yongzhi Wang, Jinpeng Wei and **Mudhakar Srivatsa**. Cross Cloud MapReduce: an Uncheatable MapReduce. In IEEE Symposium on Security and Privacy (S&P) (short paper), May 2012.
- Vivek Natarajan, Sencun Zhu, **Mudhakar Srivatsa** and Jeff Opper. Semantics-Aware Storage and Replication of Trust Metadata in Mobile Ad-Hoc Networks. In 26th IEEE International Conference on Advanced Information Networking and Applications (AINA), Mar 2012.
- **Mudhakar Srivatsa**, Vikas Kawadia and Shengqi Yang. Distributed Graph Query Processing in Dynamic Networks. In Information Quality and Quality of Service for Pervasive Computing (IQ2S), Mar 2012.
- Ting Wang, **Mudhakar Srivatsa**, Dakshi Agrawal and Ling Liu. Modeling Microscopic Social Influence. In SIAM Conference on Data Mining (SDM), Apr 2012.
- Murat Sensoy, Achille Fokoue, **Mudhakar Srivatsa** and Jeff Pan. Probabilistic Abox Abduction in Description Logics. In Scalable Semantic Web Knowledgebase Systems (SSWS), Oct 2011.
- Ji Zhu and **Mudhakar Srivatsa**. On Quantitative Information Flow Metrics. In ACM Conference on Computer and Communication Security (CCS), Oct 2011 (short paper).
- Achille Fokoue, **Mudhakar Srivatsa** and Robert Young. Trust-based Probabilistic Query Answering. In Web Information Systems Engineering (WISE), Oct 2011.
- Raghu K. Ganti, Iqbal Mohamed, Anand Ranganathan and **Mudhakar Srivatsa**. An Analysis of a Mobile Taxicab based Sensor Network. In ACM MobiCom, Sep 2011 (demo).



- Steven Okamoto, Praveen Paruchuri, Yonghong Wang, Katia Sycara, Janusz Marecki, and **Mudhakar Srivatsa**. A Game Theoretic Approach to Secure Network Routing. In Intelligent Agent Technologies (IAT), Aug 2011.
- **Mudhakar Srivatsa**, Wei Gao and Arun Iyengar. Provenance-driven Data Dissemination in Disruption Tolerant Networks. In FUSION, July 2011.
- Piotr Mardziel, Stephen Magill, Mike Hicks and **Mudhakar Srivatsa**. Dynamic Enforcement of Knowledge-based Security Policies. In Computer Security Foundations (CSF), June 2011.
- Ting Wang, **Mudhakar Srivatsa**, Dakshi Agrawal and Ling Liu. Modeling Data Flow in Socio-Information Networks: A Risk Estimation Approach. In ACM Symposium on Access Control Models and Technologies (SACMAT), June 2011.
- Wei Gao, Arun Iyengar, **Mudhakar Srivatsa** and Guohong Cao. Supporting Cooperative Caching in Disruption Tolerant Networks. In IEEE Intl Conference on Distributed Computing Systems (ICDCS), June 2011.
- Ji Zhu, **Mudhakar Srivatsa** and Bruce Hajek. Quantitative Information Flow Metrics. In IEEE Symposium on Security and Privacy (S&P), May 2011 (short paper).
- Juan E. Tapiador, **Mudhakar Srivatsa**, John A. Clark and John A. McDermid. Decorrelating WSN Traffic Patterns Through Maximally Uninformative Constrained Routing. In Wireless Cooperative Network Security (WCNS), May 2011.
- Ji Zhu and **Mudhakar Srivatsa**. Quantifying Information Leakage in Finite Order Deterministic Programs. IEEE Intl Conference on Communications - Communications and Information System Security Symposium (ICC CISS), May 2011.
- Ting Wang, **Mudhakar Srivatsa**, Dakshi Agrawal and Ling Liu. Spatio-Temporal Patterns in Network Events. In 6<sup>th</sup> ACM Conference on Emerging Networking Experiments and Technologies (CoNEXT), Dec 2010.
- Achille Fokoue, **Mudhakar Srivatsa** and Robert Young. Assessing Trust in Uncertain Information using Bayesian Description Logic. In 9<sup>th</sup> International Semantic Web Conference (ISWC), Nov 2010.
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- Ting Wang, **Mudhakar Srivatsa**, Dakshi Agrawal and Ling Liu. Learning, Indexing and Diagnosing Network Faults. 15<sup>th</sup> ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), Jul 2009.
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- **Mudhakar Srivatsa**, Ling Liu and Arun Iyengar. Timing-Based Caller Identification Attacks on VoIP Networks. 29<sup>th</sup> IEEE Symposium on Security and Privacy (Oakland), Apr 2008 (AR: 11%).
- **Mudhakar Srivatsa**, Pankaj Rohatgi and Shane Balfe. Securing Information Flows: A Quantitative Risk Analysis Approach. 27<sup>th</sup> IEEE Milcom, Nov 2008.
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- **Mudhakar Srivatsa** and Ling Liu. Secure Event Dissemination in Content-Based Publish-Subscribe Networks. 27<sup>th</sup> IEEE International Conference on Distributed Computing Systems (ICDCS), Jun 2007 (AR: 13%).
- Bhuvan Bamba, Ling Liu, James Caverlee, Vaibhav Padliya, Mahesh Palekar, Joseph Patrao, Suiyang Li, Aameek Singh and **Mudhakar Srivatsa**. DSphere: A Source Centric Approach to Crawling, Indexing and Searching the World Wide Web. 23<sup>rd</sup> IEEE International Conference on Data Engineering (ICDE), Apr 2007.
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- **Mudhakar Srivatsa**, Arun Iyengar, Thomas Mikalsen, Isabelle Rouvellou and Jian Yin. An Access Control Model for Web Service Compositions. 5<sup>th</sup> IEEE International Conference on Web Services (ICWS), Jul 2007 (AR: 18%). **Nominated for best paper award.**
- **Mudhakar Srivatsa** and Ling Liu. Key Derivation Algorithms for Monotone Access Structures in Cryptographic File Systems. 11<sup>th</sup> European Symposium on Research in Computer Security (ESORICS), Sep 2006 (AR: 17%).
- **Mudhakar Srivatsa**, Arun Iyengar, Jian Yin and Ling Liu. A Client-Transparent Approach to Defend Against Denial of Service Attacks. 25<sup>th</sup> IEEE Symposium on Reliable and Distributed Systems (SRDS), Oct 2006 (AR: 24%).
- **Mudhakar Srivatsa**, Arun Iyengar, Jian Yin and Ling Liu. A Middleware System for Protecting Against Application Level Denial of Service Attacks. 7<sup>th</sup> ACM/IFIP/USENIX International Middleware Conference, Dec 2006 (AR: 14%).
- **Mudhakar Srivatsa** and Ling Liu. EventGuard: Secure Event Notification Architecture for Publish-Subscribe Networks. 12<sup>th</sup> ACM Conference on Computer and Communication Security (CCS), Nov 2005 (AR: 15%).

- **Mudhakar Srivatsa** and Ling Liu. LocationGuard: Countering Targeted File Attacks Using Location Keys. 14<sup>th</sup> USENIX Security Symposium, Aug 2005 (AR: 15%).
- **Mudhakar Srivatsa**, Li Xiong and Ling Liu. TrustGuard: A Dependable Reputation Management for Large Scale Distributed Systems. 14<sup>th</sup> World Wide Web Conference (WWW), May 2005 (AR: 14%).
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- Sungkeun Park, Ling Liu, Calton Pu, **Mudhakar Srivatsa** and Jianjun Zhang. Resilient Trust Management for Web Service Integration. 3<sup>rd</sup> International Conferences on Web Services (ICWS), Jul 2005 (AR: 19%).
- **Mudhakar Srivatsa** and Ling Liu. Vulnerabilities and Security Threats in DHT-Based Peer-to-Peer Systems: A Quantitative Analysis. 20<sup>th</sup> IEEE Security Applications Conference (ACSAC), Dec 2004 (AR: 26%).
- **Mudhakar Srivatsa**, Bugra Gedik and Ling Liu. Improving Peer-to-Peer Search Using Multi-Tier Capability-Aware Overlay Topologies. 10<sup>th</sup> IEEE International Conference on Parallel and Distributed Systems (ICPADS), Jul 2004 (AR: 28%).

#### • Refereed Workshop Publications

- Sayandeep Sen, Palani Kodeswaran and **Mudhakar Srivatsa**. Robust Activity Detection from Sensor Streams. In Consumer Electronics Show (CES), June 2015.
- **Mudhakar Srivatsa**. Accumulating Context over Streaming Spatiotemporal Data. In Contextual Computing Workshop, Feb 2013.
- Dakshi Agrawal, Raghu Ganti, **Mudhakar Srivatsa** and Petros Zerfos. Spatio-temporal Analytics for User Demographics and Route Avoidance. Information on Demand (IoD) demo, Oct 2012.
- Achille Fokoue and **Mudhakar Srivatsa**. Trust-based Decision-Making with Uncertain Information. Discrete Mathematics and Theoretical Computer Science Workshop on Adversarial Decision Making, Sep 2010.
- **Mudhakar Srivatsa**, Pankaj Rohatgi, Shane Balfe and Steffen Reidt. Securing Information Flows: A Metadata Model. 1<sup>st</sup> IEEE Workshop on Quality of Information (QoI) for Sensor Networks (QoISN), Sep 2008.
- **Mudhakar Srivatsa**, James Caverlee and Ling Liu. Security Architectures and Algorithms for Publish-Subscribe Network Services. 2<sup>nd</sup> Annual Cyber Security and Information Infrastructure Research Workshop, Jul 2006.
- James Caverlee, **Mudhakar Srivatsa** and Ling Liu. Countering Web Spam Using Link-Based Analysis. 2<sup>nd</sup> Annual Cyber Security and Information Infrastructure Research Workshop, Jul 2006.
- Aameek Singh, **Mudhakar Srivatsa**, Ling Liu and Todd Miller. Apoidea: A Decentralized Peer-to-Peer Architecture for Crawling the World Wide Web. 26<sup>th</sup> ACM Distributed Information Retrieval workshop (SIGIR), Aug 2003. An extended version appears in Lecture Notes of Computer Science (LNCS) Series, Springer Verlag.
- **Mudhakar Srivatsa**, Nithya Rajamani, Daniel M. Dias, Avraham Leff, James T. Rayfield and Peng Ye. A Multi-Site Transactional Grid. IBM Technical EXPO Poster (with Demo) and IBM Research Report, Aug 2003.

#### • Patents

- Granted: 25; Pending: 18 (<http://www.uspto.gov/>)