

## Final Project Report

(Publication list and summary of students supported)

**NSF Award 0545912: CAREER: A Trust-based Access Control Management Framework for Secure Information Sharing and Multimedia Workflows in Heterogeneous Environments**

**Start date: Jan, 2006**

**Principal Investigator: James Joshi**

**Project Homepage: <http://www.sis.pitt.edu/~jjoshi/nsfcareer/>**

Below, I list the following

- Research students & postdocs that have been involved in this project
- the publication list (and Invited Talk/Presentation)
- Summary of dissemination related activities.

### PhD Students Involved

1. Yue Zhang, Thesis Title: "An Access Control and Trust Management Framework for loosely-coupled multidomain environments" (Graduated in 2010, Currently at Google)
2. Planned thesis from this project (Students supported partly by this grant)
  - a. Amirreza Masoumzadeh, thesis topic related to *Access Control and Anonymization in Online Social Networks (Expected to finish in Spring, 2013)*
  - b. Hassan Takabi, these topic related to *Policy Based Access Management in Mobile Cloud Computing Environment (Expected to finish in Spring, 2013)*
  - c. Nathalie Baracaldo, thesis topic related to *Risk and Trust Aware Access Management in Distributed Systems (Expected to finish in Spring, 2014)*
  - d. Lei Jin, thesis topic related to *Privacy vulnerabilities and approaches for Social networks (Expected to finish in Spring, 2014)*
3. The following students were partly supported by the project
  - a. Michael Chuang
  - b. Saubhagya Ram Joshi
4. Other PhD students who contributed to this project, but not supported by this project:
  - a. Jesus Gonzales
  - b. Saman Taghavi Zarghar
  - c. Xuelian Long
  - d. Siginq Du
  - e. Korporn Panyim
  - f. Carlos E. C. Bastidas

### MS Students Involved

1. Summit Tuladhar, MS Thesis: *Inter-domain Authentication for Seamless Roaming in Heterogeneous Wireless Networks*, 2007
2. Suroop Mohan Chandran

**Post Doc Student Involved** – not funded by the project but contributed in the project related research

1. Dr. Youna Jung
2. Dr. Minsoo Kim

## PUBLICATIONS

### **Book Chapter**

1. Hassan Takabi and James B. D. Joshi, Gail-Joon Ahn, "Security and Privacy in Cloud Computing: Towards a Comprehensive Framework," *Service-Oriented Methodology and Technologies for Cloud Computing*, IGI Global (*Accepted*)
2. Amirreza Masoumzadeh, Mohd Anwar and James Joshi, "Security and Privacy in Location Based Services," *Advances in Location-Based Computing and Services*, Taylor & Francis; Editor: Hassan Karimi (*Accepted*)
3. Hassan Takabi, "Policy Management in Cloud: Challenges and Approaches," in *Security Engineering for Cloud Computing: Approaches and Tools*, ??? (*In Press*)

### **Year 2009**

4. Yue Zhang, James Joshi, "Access Control and Trust Management for Emerging Multidomain Environments," in *Annals of Emerging Research in Information Assurance, Security and Privacy Services*, Editors: S. Upadhyaya, R. O. Rao 2009.
5. Yue Zhang, James B. D. Joshi: GEO-RBAC Model. *Encyclopedia of Database Systems*, Editors-in-Chief: Ling Liu, M. Tamer Özsu, Springer, 2009: 1244-1245
6. Yue Zhang, James B. D. Joshi: Administration Model for RBAC. *Encyclopedia of Database Systems*, Editors-in-Chief: Ling Liu, M. Tamer Özsu, Springer, 2009: 58-59
7. Yue Zhang, James B. D. Joshi: ANSI/INCITS RBAC Standard. *Encyclopedia of Database Systems*, Editors-in-Chief: Ling Liu, M. Tamer Özsu, Springer, 2009: 91-92
8. Yue Zhang, James Joshi, "Temporal Access Control," *Encyclopedia of Database Systems*, Editors-in-Chief: Ling Liu, M. Tamer Özsu, Springer, 2009.
9. Yue Zhang, James Joshi, "Role based Access Control", *Encyclopedia of Database Systems*, Editors-in-Chief: Ling Liu, M. Tamer Özsu Springer, 2009.

### **Year 2008**

10. James B. D. Joshi, Mei-Ling Shyu, Shu-Ching Chen, Walid Aref, Arif Ghafoor, "A Multimedia-Based Threat Management and Information Security Framework," in *Multimedia Technologies: Concepts, Methodologies, Tools, and Applications* (3 Volumes) Edited By: Mahbubur Rahman Syed, Minnesota State University, Mankato, USA, June, 2008

### **Year 2007**

11. James B. D. Joshi, Siqing Du, Saubhagya R Joshi, "A Trust Based Access Control Management Framework for a Secure Grid Environment" in Book titled: *Security in Distributed, Grid, and Pervasive Computing*, Edited by Dr. Yang Xiao, to be published by Auerbach Publications, CRC Press 2007.

### **Year 2006**

12. James B. D. Joshi, S. R. Joshi, and S. M. Chandran, "Information Security Issues and Challenges," in *Encyclopedia of Digital Government*, 2006.
13. James B. D. Joshi, S. R. Joshi, and S. M. Chandran, "Identity Management and Privacy Issues," in *Encyclopedia of Digital Government*, 2006.
14. James B. D. Joshi, S. M. Chandran, A. Ghafoor, and W. G. Aref, "Survivability Issues and Challenges," in *Encyclopedia of Digital Government*, 2006.

### **Special Issue Guest Editor (2011, 2012)**

1. Weisong Shi, James Joshi, Tao Zhang, Eun K. Park, Juan Quemada: ACM/Springer Mobile Networks and Applications (MONET) Special Issue on "Collaborative Computing: Networking, Applications and Worksharing(2010)". MONET 17(3): 376-377 (2012)

2. James Joshi, Elisa Bertino, Calton Pu, Heri Ramampiaro: ACM/Springer Mobile Networks and Applications (MONET) Special Issue on "Collaborative Computing: Networking, Applications and Worksharing (2009)". MONET 17(3): 325-326 (2012)
3. Songqing Chen, Le Gruenwald, James Joshi, Karl Aberer (2011): ACM/Springer Mobile Networks and Applications (MONET) Special Issue on "Collaborative Computing: Networking, Applications and Worksharing". Mobile Networks and Applications, 17 (4). pp. 506-507; (2012)
4. James Joshi, Barbara Carminati: Guest Editorial SACMAT 2009 and 2010. *ACM Transactions on Information Systems Security*, 14(3): 22 (2011).
5. Dimitris Gritzalis and James Joshi (Editors); Special Issue on Access Control Methods and Technologies, Computer and Security, Volume 30, Issues 2–3, Pages 89-170 (March–May 2011)
6. Mehmet Kaya, James B. D. Joshi, Mei-Ling Shyu: Guest Editorial - Introduction to the *Special Issue on Information Reuse and Integration*. JIKM 10(3): (2011)

### **Refereed Journal /Articles**

#### Accepted

1. Mohd, Anwar, James Joshi, Towards Secure and Privacy-aware Anytime, Anywhere Access to Health Services: Issues, Approaches, and Challenges, *Computer and Security (Accepted with Major Revision)*
2. Amirreza Masoumzadeh and James Joshi, "Preserving Structural Properties in Edge-Perturbing Anonymization Techniques for Social Networks," *IEEE Transactions on Secure and Dependable Computing (Accepted, in Print)*.

#### Year 2012

3. Youna Jung and James B.D. Joshi, "CRiBAC: Community based Role interaction Access Control Model", *Computers & Security*, Elsevier, 2012.
4. Youna Jung, Minsoo Kim, Amirreza Masoumzadeh, James B.D Joshi, "A Survey of Security for Multiagent Systems", *Artificial Intelligence Review*, Springer Netherlands, 37(3): 239-260 (2012)

#### Year 2011

5. Lei Jin, Hassan Takabi, James B. D. Joshi, "Analyzing Security and Privacy Issues of Using E-mail Address as Identity" *International Journal Information Privacy, Security and Integrity*, Vol. 1, No. 1, 2011
6. Amirreza Masoumzadeh and James Joshi, "Ontology-Based Access Control for Social Network Systems," , *International Journal Information Privacy, Security and Integrity*, Vol. 1, No. 1, 2011
7. Xuelian Long, James Joshi, "BaRMS: A Bayesian Reputation Management Approach for P2P Systems, *Journal of Information & Knowledge Management*, Vol: 10, No: 3, pp 273-283 (2011)
8. Hassan Takabi, James Joshi, Gail-Joon Ahn, "Security and Privacy Challenges in Cloud Computing Environments," *IEEE Security and Privacy*, Jan-Feb, 2011.

#### Year 2009

9. Carlos E. Caicedo, James Joshi, Sumit Tuladhar, "IPv6 Security Challenges," Vol(42), Issue(2), (Feb, 2009), *IEEE Computer*, Page(s): 36-42.

#### Year 2008

10. James, B.D. Joshi, Elisa Bertino, Arif Ghafoor and Yue Zhang, "Formal Foundations for hybrid hierarchies in GTRBAC", *ACM Transactions on Information and System Security (TISSEC)*, Vol. 10, No. 4, Jan, 2008, pp. 1-39.
11. Yue Zhang, James Joshi, "SRBAC-HH: A Scoped Administration Model for RBAC with Hybrid Hierarchy," *Journal of Information Assurance and Security* 2007 (Volume 3, issue 2), June, 2008, pp. 128 -139.

#### *Submitted/Being Submitted*

12. Nathalie Baracaldo, Amirreza Masoumzadeh, James Joshi, Extension of paper "A Secure, Constraint-aware Role-based Access control Interoperation Framework" NSS2011 (*Computer & Security*)

13. Nathalie Baracaldo, James Joshi, extension of paper : “A Trust-and-Risk Aware RBAC Framework: Tackling Insider Threat,” ACM SACMAT 2012 (TDSC or Computer & Security)
14. Yue Zhang, Hassan Takabi and James Joshi, “Simplified Distributed Proof for Secure Interoperations in Multi-Domain Environments” (Being submitted to IEEE TDSC or Computer & Security)
15. Amirreza Masoumzadeh, James Joshi, “Preventing Location Signature Attacks on Geo-social Network Datasets,” invited to special issue of *Transactions on Data Privacy*.
16. Lei Jin, James Joshi, “Mutual Friend Based Attacks on Online Social Networks,” (Being submitted to IEEE TDSC).
17. Lei Jin, Hassan Takabi, James Joshi, “Active Detection of Identity Clone Attacks on Online Social Networks,” (Being submitted to IEEE TDSC/Computer & Security).
18. Jesus, Gonzales, James Joshi “A Trust-based Approach to Detection and Defense against IP-spoofing Attacks,” which is an extension of “A Trust-based Approach Against IP-spoofing Attacks.” *Ninth Annual Conference on Privacy, Security and Trust (PST 2011)* (Computer & Security)

### **Refereed Symposium/Conferences/Workshop**

#### **Year 2012**

1. Xuelian Long, Lei Jin, James Joshi, “Exploring Trajectory-Driven Local Geographic Topics in Foursquare,” in the *4th International Workshop on Location-Based Social Networks (LBSN 2012)*, Sept 8, 2012 - Pittsburgh, Pennsylvania, USA (Held in conjunction with UbiComp 2012).
2. Lei Jin, Xuelian Long, Mohd Anwar, James Joshi, “Analysis of Access Control Mechanisms for Users’ Check-ins in Location-based Social Network Systems,” 2<sup>nd</sup> *International Workshop on Issues and Challenges on Social Computing (WICSOC)*, 2012 (with IEEE IRI2012).
3. Nathalie Baracaldo, James Joshi, “A Trust-and-Risk Aware RBAC Framework: Tackling Insider Threat,” ACM SACMAT 2012: 167-176.
4. Hassan Takabi and James B. D. Joshi. Policy Management as a Service: An Approach to Manage Policy Heterogeneity in Cloud Computing Environment. In Proc. *45th Hawaii International Conference on System Sciences (HICSS)*, Hawaii, USA, January 4-7, 2012.
5. Hassan Takabi and James B. D. Joshi. Toward a Semantic Based Policy Management Framework for Interoperable Cloud Environments. In Proc. *1st International IBM Cloud Academy Conference (ICA CON 2012)*, Research Triangle Park (RTP), North Carolina, USA, April 19-20, 2012.

#### **Year 2011**

6. Baracaldo, Nathalie; Masoumzadeh, Amirreza; Joshi, James; “A Secure, Constraint-aware Role-based Access control Interoperation Framework,” *The 5<sup>th</sup> International Conference on Network and System Security (NSS)*, Italy, 2011
7. Youna Jung, Minsoo Kim, James B. D. Joshi, “DRiBAC: Context-Aware Dynamic Role Interaction Access Control”, In Proc. of *12th International Conference of Information Reuse and Integration*, pp. 88 – 93, USA, 2011
8. Jesus M. Gonzalez, Mohd Anwar, James B. D. Joshi, “A Trust-based Approach Against IP-spoofing Attacks.” *Ninth Annual Conference on Privacy, Security and Trust (PST 2011)*, 19-21 July, 2011, Montreal, Québec, Canada.(pg 63-70)
9. Amirreza Masoumzadeh, James Joshi, Anonymizing Geo-Social Network Datasets, *4th ACM SIGSPATIAL International Workshop on Security and Privacy in GIS and LBS*, November 1st, 2011, Chicago, IL, USA (**Best Student Paper Award**)
10. Hassan Takabi and James Joshi, “An Approach to manage Policy Heterogeneity in Cloud Computing Environment,” *The 27th Annual Computer Security Applications Conference (ACSAC 2011)*, Orlando, FL, USA, December 5-9, 2011.
11. Amirreza Masoumzadeh, James Joshi, “An Alternative Approach to k-Anonymity for Location-Based Services,” *The 8th International Conference on Mobile Web Information Systems (MobiWIS 2011)*, Procedia CS Vol:5: 522-530 (2011)

12. Baracaldo, Nathalie; Masoumzadeh, Amirreza; Joshi, James; "A Secure, Constraint-aware Role-based Access Control Interoperation Framework," *The 5<sup>th</sup> International Conference on Network and System Security (NSS)*, Italy, 2011
13. Lei Jin, Hassan Takabi, and James B.D Joshi, "Towards Active Detection of Identity Clone Attacks on Online Social Networks", *In Proc. of the ACM Conference on Data and Application Security and Privacy (CODASPY 2011)*, San Antonio, TX, USA, 21-23 February 2011. (Best Paper Award)

#### Year 2010

14. Amirreza Masoumzadeh and James Joshi, "Preserving Structural Properties in Anonymization of Social Networks," *in Proc. 6th International Conference on Collaborative Computing: Networking, Applications and Worksharing (CollaborateCom 2010)*, Chicago, IL, USA, Oct. 9-12, 2010.
15. Amirreza Masoumzadeh and James Joshi, "OSNAC: An Ontology-Based Access Control Model for Social Networking Systems," *in Proc. 2nd IEEE Int'l Conference on Information Privacy, Security, Risk and Trust (PASSAT 2010)*, Minneapolis, MN, USA, Aug. 20-22, 2010.
16. Hassan Takabi, James B. D. Joshi, and Gail-Joon Ahn, "SecureCloud: Towards a Comprehensive Security Framework for Cloud Computing Environments", *In Proc. of the First IEEE International Workshop on Emerging Applications for Cloud Computing (CloudApp2010)*. Held in conjunction (COMPSAC 2010), Seoul, Korea, July 19-23, 2010.
17. Lei Jin, Hassan Takabi, and James B.D Joshi, "Security and Privacy Risks: Using Email Address as Identity", *In Proc. of the Second IEEE International Conference on Information Privacy, Security, Risk and Trust (PASSAT2010)*, Minneapolis, USA, August 20-22, 2010.
18. Xuelian Long and James Joshi. "Enhanced One-Pass IP Multimedia Subsystem Authentication Protocol for UMTS." *International Communications Conference (ICC2010)*, South Africa, May 23-27, 2010
19. Hassan Takabi and James Joshi. "StateMiner: An Efficient Similarity-Based Approach for Optimal Mining of Role Hierarchy." *In Proc. ACM Symposium on Access Control Models and Technologies (SACMAT)*, Pittsburgh, June 9-11, 2010.
20. Yue Zhang and James B.D. Joshi, "An Implementation Architecture of the GTRBAC Model", 2010 *International Conference on Computer Design and Applications (ICDDA-10)*, Jun. 2010, Qinghuangdao, Hebei, China
21. Yue Zhang and James B.D. Joshi, "Understanding Access Control Challenges in Loosely-Coupled Multidomain Environment", *12th International Conference on Enterprise Information Systems (ICEIS-10)*, Jun. 2010, Funchal, Madeira, Portugal
22. Yue Zhang and James B.D. Joshi, "Role Based Domain Discovery in Decentralized Secure Interoperations", *2010 International Symposium on Collaborative Technologies and Systems (CTS-10)*, May. 2010, Chicago, IL

#### Year 2009

23. Amirreza Masoumzadeh, James Joshi, and Hassan A. Karimi, "LBS (k,T)-Anonymity: A Spatio-Temporal Approach to Anonymity for Location-Based Service Users," *in Proc. 17th ACM SIGSPATIAL GIS*, Seattle, WA, USA, Nov. 4-6 2009.
24. Hassan Takabi, James B. D. Joshi, and Hassan A. Karimi. A Collaborative K-anonymity Approach for Location Privacy in Location-Based Services. *In Proc. the 5th Int'l Conference on Collaborative Computing: Networking, Applications and Worksharing (CollaborateCom 2009)*, Crystal City, Washington D.C., USA, November 11-14, 2009.
25. Hassan Takabi, Minsoo Kim, James B. D. Joshi, and Michael B. Spring. An Architecture for Specification and Enforcement of Temporal Access Control Constraints using OWL. *In Proc. 2009 ACM Workshop on Secure Web Services (SWS 2009)*, Held in conjunction with the 16th ACM Conference on Computer and Communications Security (CCS 2009), pages 21–28. Chicago, IL, USA, November 13, 2009.

#### Year 2008

26. Amirreza Masoumzadeh and James B. D. Joshi, "PuRBAC: Purpose-aware role-based access control," in *Proc. 3rd Int'l Symposium on Information Security*, Lecture Notes in Computer Science. Springer, Nov. 10-11 2008.
27. Yue Zhang and James B.D. Joshi, "Temporal UAS: Supporting Efficient RBAC Authorization in Presence of the Temporal Role Hierarchy", *IEEE/IFIP International Symposium on Trust, Security and Privacy for Pervasive Applications (TSP-08)*, Dec. 2008, ShangHai, China
28. Youna Jung, Amirreza Masoumzadeh, James B.D. Joshi, Minkoo Kim, " RiBAC: Role Interaction based Access Control Model for Community Computing", *The 4th International Conference on Collaborative Computing: Networking, Applications and Worksharing (CollaborateCom2008)*, Nov.13-16, 2008, Orlando, FL, USA.
29. Minsoo Kim, James B.D. Joshi, Minkoo Kim, " Access Control for Cooperation Systems based on Group Situation", *The 4th International Conference on Collaborative Computing: Networking, Applications and Worksharing (CollaborateCom2008)*, Nov. 13-16, 2008, Orlando, FL, USA
30. Yue Zhang and James B.D. Joshi, "A Framework for User Authorization Query Processing in RBAC extended with Hybrid Hierarchy and Constraints", *ACM symposium on access control models and technologies (SACMAT)*, Jun. 2008, Estes Park, CO.

#### Year 2007

31. Yue Zhang, James Joshi, "SRBAC07: A Scoped Administration Model for RBAC with Hybrid Hierarchy," *The Third International Symposium on Information Assurance and Security*, August 29-31, 2007, Manchester, United Kingdom.
32. Yue Zhang, James Joshi, "ARBAC07: A Role-based Administration Model for RBAC with Hybrid Hierarchy," *IEEE Proceedings of the International Conference on Information Reuse and Integration*, Las Vegas, Aug13-15, 2007.
33. Kai Ouyang James B. D. Joshi, "CT-RBAC: A Temporal RBAC Model with Conditional Periodic Time," *Third International Workshop on Information Assurance*, New Orleans, April 2007.
34. Yue Zhang, James B. D. Joshi: A Request-driven Secure Interoperation Framework in Loosely-coupled Multi-domain Environments Employing RBAC Policies. *CollaborateCom 2007*: 25-32

#### Year 2006

35. Michael Chuang, Suronapee Phoomvuthisarn, James B. D. Joshi, "An Integrated Framework for Trust-Based Access Control for Open Systems," *CollaborateCom 2006*, GA, USA.
36. Siqing Du, James B. D. Joshi, "Supporting Authorization Query and Inter-domain Role Mapping in Presence of Hybrid Role Hierarchy," *The 11<sup>th</sup> ACM Symposium on Access Control Models and Technologies*, USA, June 2006.
37. James B. D. Joshi, Elisa Bertino, "Fine-grained Role-based Delegation in Presence of Hybrid Role Hierarchy," *The 11<sup>th</sup> ACM Symposium on Access Control Models and Technologies*, USA, June 2006.
38. Suroop M Chandran, Korporn Panyim, James B. D. Joshi, "A Requirements-Driven Trust Framework for Secure Interoperation in Open Environments", *The Fourth International Conference on Trust Management*, (iTrust-06), May 16-19, Italy, 2006.

#### Posters

1. Jesus M. Gonzalez, Mohd Anwar, James B. D. Joshi, "A Trust-based Approach to Mitigate Rerouting Attacks," *COLLABORATECOM*, poster version, International Conference on, 15-18 October 2011.
2. Hassan Takabi and James B. D. Joshi. An Efficient Similarity-Based Approach for Optimal Mining of Role Hierarchy. In *Proc. 16th ACM Conference on Computer and Communications Security (CCS 2009)*(Poster), Chicago, IL, USA, November 9-13, 2009.

#### TALKS/PRESENTATION

1. "Towards Defending Against Identity Clone Attacks on Online Social Networks ," Emory University, GA, USA, 2012

2. "Towards Defending Against Identity Clone Attacks on Online Social Networks", Siam University, Thailand, June, 2011
3. "GTRBAC and Expressiveness Design Issues in Advanced RBAC models," Siam University, Thailand, June, 2011
4. "Towards Defending Against Identity Clone Attacks on Online Social Networks" Kathmandu University, Nepal, June 12, 2011
5. Guest Lecture on RBAC models, Computer Science, University of Pittsburgh,.
6. Guest Lecture on Advanced RBAC models, Carnegie Mellon University, April, 2007.
7. Invited talk related to Advanced RBAC models, Department of Electrical and Computer Engineering, University of Florida, Gainesville, March, 2007
8. Invited talk related to Advanced RBAC models, Department Software and Information Systems, University of North Carolina, Charlotte, March, 2007
9. Invited talk related to Advanced RBAC models, School of Computer and Information Sciences, Florida International University, Miami, Feb, 2007
10. Guest Lecture on Access Control models, Department Electrical and Computer Engineering, University of Pittsburgh, March 23, 2006
11. Guest Lecture on Access Control models/RBAC, Department of Electrical and Computer Engineering, Virginia Tech, March 14, 2006
12. Guest Lecture on Access Control models/RBAC, Department of Computer Science, University of Pittsburgh, Nov 2, 2005

### **Some Activities related to Dissemination of Results**

1. Organized TrustCol-2006, Organized TrustCol-2007, TrustCol 2009 – 2012 (directly related to the topic of this project)
2. As a PC Co-chair of CollaborateCom2008 - actively emphasized the area of collaborative access control and presented two papers there.
3. As PC Chair of SACMAT2009 - working towards further dissemination and support of the project related issues.
4. Guest Editorial role – please see above. Special issue in Computer & Security directly emphasized the topics of this project. The other special issues focused on the integration and collaboration issues included security, privacy and trust.
5. General C-chair of CollaborateCom2010, CollaborateCom2011, CollaborateCom2012 – emphasized security for collaboration systems and networks.
6. Program Co-Chair for IEEE IRI2010, IRI2011 and IRI2012 – emphasized secure integration issues
7. Various invited talks (please see above)