William Austin Casey

Personal Data

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Research Interests

I Investigate behaviors in systems using formal methods. Our motivation is to improve efficiencies, in agent systems cooperative behavioral modes are critical, therefore we identify mechanisms suited to enhance and stabilize cooperative modes. Also important is how non-cooperative and deceptive behavior may be predicted and deterrence achieved. Examples include enhancing mutualistic (Müllerian) mimicry and signaling conventions in multi agent systems, dynamic modulation of incentive contracts in Government as the Integrator (GATI) acquisition programs to improve cost/schedule/quality/cooperation outcomes, and the inducement of costly signaling strategies to control deception in cyber-physical-social systems. By considering incentives of adversarial and deceptive actions in their own right (as utility enhancing) we link practical scenarios to classical information asymmetric and signaling game theory. Using a computational approach, we examine system properties from the view point of evolutionary strategies. This approach offers a sound and a formally rigorous scientific foundation over which design problems which treat dynamic/adversarial strategic agents (acting in conflict to goals) can be acheived. Additionally, through simulation and empirical study we may test designs, predict and evaluate resiliency, reliability, trust and stability.

Professional Experience

Current — April 2010

Carnegie Mellon University, Software Engineering Institute, Pittsburgh, PA

Senior Member and Principal Research Scientist

Responsibilities have centered on using applied mathematics and research in the areas of cyber security science, software engineering, and strategic planning for government as the integrator (GATI) acquisition programs. As principal investigator competitively funded projects awarded include:

- "Adversarial Reasoning for Intelligent Information Networks: Blockchains, Causality and Games,"
- "Acquisitions Incentives and Game Theory",
- "Cyber Security via Signaling Games",
- "Visualizing Malware Distribution Networks",
- "Malicious Behavior and Model Checking",
- "Provenance Inference via the Evidence of Code Clones", and
- "Sparse Representation of Software Corpora".

Through these research projects novel general models for cyber security have been realized as information asymmetric signaling game theory, with specific instances of man-in-the-app-software, insider threat, and identity management games undergoing careful evaluation. Novel technical methods to enhance learning and discovery of malicious artifacts and events in software, such as clone mapping algorithms, and machine, agent-based, and active learning systems have been applied to operational cyber security response. Contemporaneously, have been charged with service to multiple conference organization committees, edited volumes, and peer reviews. Outputs include peer reviewed journal and conference publications, technical reports, blogs, and deployed algorithm/software artifacts.

Mar 2010 – Nov 2008 | US Defense Intelligence Agency, ARKLAY LLC, Washington DC
Production Engineer

Responsibilities included principal design and development of an online analytic processing informatics system of threat data. A survey of mission requirements, data sharing agreements and prototype completed in five months. Capabilities include large-scale data, support for model based queries, dynamic modeling, data mining, visualization, analyst annotation, user trace auditing and data provenance. Production system then realized and operational within one year. Results enhance agency information assurance goals and contribute to information security and cyber-security.

Nov 2008 – Oct 2006 | Pacific Northwest National Labs, PROJECT CASCADE, Arlington VA
Senior Scientist

Served as scientific program lead in commissioned efforts (supported by intelligence agencies) to address emerging threats to cyber security. Completed feasibility studies in the area of large-scale dynamic/static code analysis, software validation and malware attribution. Designed and tested feasibility of applying bio-informatics methods to large-scale analysis and attribution problems in malware sets. Participated in and broadened collaborations with US government agencies' working groups. Results impacted the design of contemporary signature based detection/verification technology. Responsibilities included crafting reports and giving presentations to a range of government and federal offices and efforts.

Oct 2006 – Feb 2005 | US Air Force Office of Special Investigations, IPS, AAFB MD
Data Miner and Data Fusion Specialist

Data engineering, modeling/mining support to counter- intelligence and law enforcement investigations into cyber attacks. Analysis and design of methods to perform malicious software and protocol analysis at the defense cyber crime center. Responsibilities included organizing multiagency data sharing and prioritization of malware analysis tasking, authoring and collaborating on reporting, and evaluation of data mining software capabilities.

Oct 2006 – Sept 2004 | Institute for Physical Sciences, IPS McLean VA
Senior Scientist

Algorithm Design and research in Natural Language Processing (NLP). Designed, implemented (Java and postgreSQL), and documented high throughput named entity extraction methodology for automated content analysis. System achieved high levels of statistical power and throughput using an active learning framework implemented as a flexible pattern language input by human analysts with few rounds of testing. System facilitated specialized applications achieved for entity extraction (including co-references), date (and offsets references), location (and offset references), entity associations and affect modeling. Investigated Spectral Clustering, Diffusion Geometry, Physical Modeling, and Computational Geometry applications in social computation.

Sept 2004 | University of Warwick, MATHEMATICS DEPT. Coventry, UK
Warwick-Zeeman Lecturer

Deferred/Unfullfilled

Sept 2004 – Sept 2003 | University of Warwick, MATHEMATICS DEPT. Coventry, UK
Post-Doctoral Fellow

Research in mathematical modeling of horizontal gene transfer and gene flow in streptomycetes (soil bacteria). Assisted in the development of a novel statistical measure for measuring effect of horizontal vs vertical transfer per gene (or gene tree). Model testing, efficient scientific computing, heuristics, and use of Markov Chain and Monte Carlo (MCMC) methods to estimate variance. Developed capabilities in low dimensional topology and computational geometry. Created simulation and analysis tools for system biology.

Sept 2001
SEPT 2003

Courant Institute NYU, BUD MISHRA BIO-INFORMATICS LAB. NYC, NY
Graduate Research Assistant and Post-Doctoral Fellow

Investigated the use of single molecule methods for population haplotyping; results published in Springer-Verlag LNCS HiPC December 2003. Numerical estimation of cellular dynamics; results reported in W. Casey "Coupled Oscillator Models for a Set of Communicating Cells," CMSB 2003,163. Use of entropy measure for sequence analysis, results reported in J. Math. Biol. 48, No.5, 563-590 (2004) "Minimal entropy probability paths between genome families." Investigated algorithms useful for RFLP phasing; results reported in Lecture Notes in Computer Science, LNCS 2913: 204-215, and "A Nearly Linear-Time General Algorithm for Bi-Allele Haplotype Phasing." Conducted feasibility studies of large scale probe mapping experiments. Developed algorithms and codes written in C, Octave, Matlab, S, Python, and Post–Script, for probe map construction. Research reported in: W. Casey, B. Mishra, and M. Wigler ." Placing Probes along the Genome Using Pairwise Distance Data," WABI 2001, 52–68,2001.

Jun 2001
AUG 2001

Cold Spring Harbor Labs, MIKE WIGGLER LAB. Huntington, NY
Seasonal Computing Specialist

Developed experimental design simulation and verification code providing plausible and realistic outcomes to inform and impact the design of costly hybridization experiments. Results enhanced the probability of success for Oncogenetic studies focused on exposing and elucidating genetic lesion pathways with hybridization technology in combination with genome probe maps. These efforts also suggest the potential for success of whole genome mapping using hybridization technology.

EDUCATION

2002 Ph.D. in APPLIED MATHEMATICS, **Courant Institute of New York University**, New York, NY.
Thesis: "Graph Embeddings with Application in Genomic Experiments,"
Advisor: Prof. Bud MISHRA

2002 M.S. Equivalence in COMPUTER SCIENCE, **Courant Institute NYU**, New York, NY.

1997 M.S. in MATHEMATICS, **Southern Illinois University**, Carbondale IL
Thesis: "Markov Random Fields and Asymptotic Annealing in Image Processing,"
Advisor: Prof. Greg BUDZBAN

1995 B.A. in MATHEMATICS , **University of Missouri**, Columbia MO
Advisor: Prof. Calvin AHLBRANDT

PUBLICATIONS

Books

1. Cybersecurity and Applied Mathematics. Syngress, 2016. Metcalf, L., & Casey, W. (2016)

Book Chapters

1. "Cyber Security via Signaling Games: Toward a Science of Cyber Security." In International Conference on Distributed Computing and Internet Technology *ICDCIT 2014*: 34-42, Springer International Publishing. Casey, W., Morales, J.A., Nguyen, T., Spring, J., Weaver, R., Wright, E., Metcalf, L. & Mishra, B. (2014).
2. "Placing Probes on the Genome with Pairwise Distance Data." Algorithms in Bioinformatics: First international workshop: proceedings WABI 2001, New York Springer 2001. Casey, W., Mishra, B., & Wigler, M.

Journal

1. "Compliance Signaling Games: Toward Modeling the Deterrence of Insider Threats,"

Springer Journal of Computational and Mathematical Organization Theory, Casey, W., Morales, J.A., Wright, E., Zhu, Q., & Mishra, B. (2016).

2. "Epistatic Signaling and Minority Games, the Adversarial Dynamics in Social Technological Systems," Springer journal of Mobile Networks and Applications, Casey, W., Weaver, R., Metcalf, L., Morales, J.A., Wright, E., & Mishra, B. (2016).
3. "Threats from Inside: Dynamic Utility (Mis)Alignments in an Agent based Model," Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications (JoWUA), Casey, W., Morales, J.A., & Mishra, B. (2016).
4. "Validation of S. Pombe Sequence Assembly by Microarray Hybridization," Journal of Computational Biology 01/2006; 13(1):1-20., DOI:10.1089/cmb.2006.13.1, West J., Healy, J., Wigler, M., Casey, W., Mishra, B. (2006)
5. "Minimal Entropy Probability Paths Between Genome Families, Journal of Mathematical Biology," Journal of Mathematical Biology 48.5 (2004): 563-590. (2004). Ahlbrandt, C., Benson, G., & Casey, W. (2004)
6. "A Sense of Life: Computational & Experimental Investigations with Models of Biochemical & Evolutionary Processes," OMICS - A Journal of Integrative Biology, (Special Issue on BioCOMP, Ed.: S. Kumar), 7(3): 253-268. Mishra, B., Daruwala, R., Zhou, Y., Ugel, N., Policriti, A., Antoniotti, M., Paxia, S., Rejali, M., Rudra, A., Cherepinsky, V., Silver, N., Casey, W., Piazza, C., Simeoni, M., Barbano, P., Spivak, M., Feng, J-W. , Gill, O., Venkatesh, M., Cheng, F., Sun, B., Ioniata, I., Anantharaman, T.S., Hubbard, E.J.A., Pnueli, A., Harel, D., Chandru, V., Hariharan, R. , Wigler, M. , Park,F., Lin, S.-C., Lazebnik, Y., Winkler, F. , Cantor, C., Carbone, A., & Gromov, M. (2003)

Edited Volumes

1. Decision and Game Theory for Security - 7th International Conference, GameSec 2016, New York, NY, USA, November 2-4, 2016, Proceedings. Lecture Notes in Computer Science 9996, Springer 2016, ISBN 978-3-319-47412-0 Zhu, Q., Alpcan, T., Panaousis, E.A., Tambe, M. & Casey W.

Conferences

1. "Pheromone Model Based Visualization of Malware Distribution Networks," 17th International Conference on Computational Science *ICCS 2018*, Jun 12, 2018, Cai, Y., Morales, J.A., Wang, S., Pimentel, P., Casey, W., Volkmann, A. (2018)
2. "Inherent Moral Hazards in Acquisition: Improving Contractor Cooperation in Government as the Integrator Programs," 15th Annual Acquisition Research Symposium *ARS NPS*, May 9-10, 2018, Novak, B., Cohen, J., Moore, A., Casey, W., and Mishra, B. (2018)
3. **Awarded Best Paper:** "Malware Finger Printing under Uncertainty," Proceedings of the The 3rd IEEE International Conference of Scalable and Smart Cloud *SSC 2017* , Jun 26-28, 2017, New York, NY. Gosh, K., Casey, W., Morales, J.A., & Mishra, B. (2017).
4. "This Malware Looks Familiar: Laymen Identify Malware Run-time Similarity with Chernoff Faces and Stick Figures," Forthcoming Proceedings of the 13th IEEE Symposium on Visualization for Cyber Security *VizSec 2016*), March 15-16, Hoboken, NJ. VanHoudnos, N., Casey, W., Fench, D., Lindauer, B., Kanal, E., Wright, E., Woods, B., Moon, S., Jansen, P., & Carbonell, J. (2017).
5. "Visualizing a Malware Distribution Network," Proceedings of the 13th IEEE Symposium on Visualization for Cyber Security *VizSec 2016*), October 24th 2016, Baltimore MD, Peryt, S., Morales, J.A., Casey, W., Volkmann, A., Mishra, B., & Cai Y. (2016).

6. **Awarded Best Paper:** "Signature Limits: An Entire Map of Clone Features and their Discovery in Nearly Linear Time," 11th IEEE international Conference on Malicious and Unwanted Software, *MALWARE 2016*, October 11-14, 2016, Fajardo, Puerto Rico. Casey, W., Shelmire, A. (2016).
7. **Awarded Best Paper:** "Identity Deception and Game Deterrence via Signaling Games," Proceedings of the 9th International Conference on Bio- inspired Information and Communications Technologies *BICT 2015*, William Casey, Parisa Memarmoshrefi, Ansgar Kellner, Jose Andre Morales, Bud Mishra, (2015).
8. "Sandboxing and Reasoning on Malware Infection Trees," Proceedings of the 10th IEEE International Conference on Malicious and Unwanted Software *MALWARE 2015*, Gosh, K., Casey, W., Morales, J.A., & Mishra, B. (2015).
9. **Awarded Best Paper:** "Compliance Control: Managed Vulnerability Surface in Social-Technological Systems via Signaling Games," 7th ACM CCS International Workshop on Managing Insider Security Threats *ACM MIST 2015*. Casey, W., Zhu, Q., Morales, J.A., & Mishra, B. (2015).
10. "Weakly Supervised Extraction of Computer Security Events from Twitter," 24th International World Wide Web Conference, *WWW*, Florence, Italy. Ritter, A., Wright, E., Casey, W., & Mitchell, T. (2015).
11. "Cyber Security via Minority Games with Epistatic Signaling," Proceedings of the 8th International Conference on Bio-inspired Information and Communications Technologies, *BICT 2014*, TODO:DATE Boston, MA. Casey, W., Weaver, R., Metcalf, L., Morales, J.A., Wright, E., & Mishra, B. (2014).
12. "Agent Based Trace Learning in a Recommendation-Verification System for Cyber Security," 9th IEEE International Conference on Malicious and Unwanted Software, *MALWARE 2014*, October 28-30, 2014, Fajardo, Puerto Rico. Casey, W., Wright, E., Morales, J.A., Appel, M., Gennari, J., Metcalf, L., Weaver R., & Mishra B. (2014).
13. "A Nearly Linear-Time General Algorithm for genome-wide Bi-Allele Haplotype Phasing," High Performance Computing–HiPC 2003, LNCS: Springer-Verlag, December, Casey, W., & Mishra, B. (2003).
14. "Coupled Oscillator Models for a Set of Communicating Cells," Proceedings, Computational Methods in Systems Biology: First International Workshop, CMSB, February 24-26, 2003: 163, Casey, W.
15. "The Effect of Stable Points on the Convergence of Markov Random Fields," Reprinted from the 1998 International Conference on Image Processing, Oct 4-7, Chicago, Illinois. Budzban, G., & Casey, W., (1998).

Blog Articles and Selected Technical Reports

1. "What Ant Colonies Can Teach Us About Securing the Internet," CMU SEI Blog, April 4th, 2016, Casey, W. (2016).
2. "Provenance Inference in Software," CMU SEI Blog, Feb 3, 2014, Casey, W. (2014).
3. "Deterrence for Malware: Towards a Deception-Free Internet," CMU SEI Blog, Sept 23, 2013, Casey, W. (2013).
4. "Modeling Malware with Suffix Trees," CMU SEI Blog, Jan 9, 2012, Casey, W. (2012).
5. "A New Approach to Modeling Malware using Sparse Representation," CMU SEI Blog, March 21, 2011, Casey, W., (2012).

6. "Sparse Representation Modeling for Software Corpora," CMU SEI Technical Report, CMU/SEI-2012-TR-004: 43-57. Casey, W. (2012).
7. "Fuzzy Hashing Techniques in Applied Malware Analysis,", CMU SEI Technical Report, CMU/SEI-2012-TR-004: 2-16. French, D, & Casey, W. (2012).
8. "Malware Family Analysis: Correlating Static Features and Dynamic Characteristics on Large-Scale Projects," CMU SEI Technical Report, 2010 CERT Research Report: 61-64. Casey, W. , Cohen, C., & Hines, C. (2010).
9. "Characteristics in the Zeus Family of Malware," CMU SEI Technical Report, CMU/SEI-2010-SR-030, Casey, W. , Cohen, C., French, D., Hines, C., Havrilla, J., & Kinder, R. (2010).
10. "Techniques Characterizing the Aliser Malware Family," CMU SEI Technical Report, CMU/SEI-2010-SR-031, Casey, W. , Cohen, C., French, D., Hines, C., & Havrilla, J. (2010).
11. "Distinguishing high mobility genes from a clustering of gene histories: evidence for selection of streptomycin resistance within antibiotic-producing bacteria in soil," in pre-print, Casey, W., Tolba, S.,Ul-Hassan, A. , Jow, H., Bryan, S., Wellington, E.M.H. & Burroughs, N.J. (2005).
12. "Multiple Biological Model Classification: From System Biology to Synthetic Biology," Technical Report *BioCONCUR 04*, Antoniotti, M., Barbano, P. E., Casey, W., Feng, J. W., Ugel, N., & Mishra, B. (2005).
13. "NYU BioWave & NYU BioSim: Automating Analysis of BioChemical Pathways," Technical report, 2005. Mishra, B., Antoniotti, M., Barbano, P.E., Casey, W., Feng, J., Rejali, M. , Spivak, M. & Ugel, N. (2005).
14. "Mutual Information Clustering Algorithms for Haplotyping," Technical report, 2005, Caianiello, P., Casey, W., & Sabetta, A. (2005).

Thesis and Academic Artifacts

1. "Graph Embeddings with Applications in Genomic Experiments," Ph.D. Thesis in applied mathematics at **Courant Institute**, Casey, W. (2002)
2. "Markov Random Fields and Asymptotic Annealing in Image Processing," Master's Thesis **SIUC**, Casey, W. (1997)

Patents

1. Process, software arrangement and computer-accessible medium for obtaining information associated with a haplotype. Ref. No: US8473221B2, Year: 06/2013 Casey W., Anantharaman, T., Mishra, B.
2. System, method and software arrangement for bi-allele haplotype phasing. Ref No: US 20050255508, Year: 11/2005 Casey W., Anantharaman, T., Mishra, B.
3. System, Method and Computer-Accessible Medium for Deterrence of Malware, United States Patent Application 20160088012 241923.US.02 – 32882227184, filed on September 23, 2013, Casey W., Mishra B., (2013)

Selected Working Papers

1. "Measuring Observational Provenance Signaling Games in Cyber Security Data," with Jose A. Morales, Eric Hatleback, Rhiannon Weaver, Leigh Metcalf, and Bud Mishra

2. "Optimizing Government as the Integration in Partially Informed Coordination Games," with Bill Novak, Andrew Moore, Julie Cohen and Bud Mishra
3. "A Cartography for the Simulated Multiverse," With Eric Hatleback
4. "Bag of Actions and Topical Behavior Modeling, Game Theoretic Utility Alignments," with Jose A. Morales, and Bud Mishra
5. "False Alibi, measuring credibility in ubiquitous but erroneous sensory," with Jose A. Morales, Alessio Merlo, Aniello Castiglione, and Bud Mishra

Conference Presentations and Invited Seminars

2018 CMU NSF ICORPS Spring Cohort, Pittsburgh PA,
2017 CMU CYLAB Partners Workshop, Pittsburgh PA,
BICT Stevens Institute, Hoboken NJ,
2016 GAMESEC2016, NYU Tandon, NYC NY,
IEEE MALWARE, Fajardo PR,
2015 BICT2015 Columbia University, NYC NY,
CMU SEI Research Review, Pittsburgh PA,
ACM CCS MIST, Denver CO,
2014 BICT2014, Boston University, Boston MA
CMU SEI Research Review, Pittsburgh PA,
2011 MTEM hosted by MITRE Corp., McLean VA
2010 CMU SEI Malware Analysis Conference, Arlington VA
CMU Software Engineering Institute, Pittsburgh PA
2009 NAVY NAVAIR Lab Distinguished Visitor and guest of command, China Lake, CA
NGA workshop, Washington DC
2008 University of Minnesota Institute for Mathematics and its Applications, Minneapolis MN
CMU SEI Malware Analysis Conference, Arlington VA
MITRE Corp., McLean VA
DoD JIOPO research conference, Fort Meade MD
2007 DoD JTFGNO Malware Group Hug DoD, Arlington VA
2006 DoD NCIJTF, Linthicum MD
2004 Institute for Physical Sciences, McLean VA
Max Plank Institute, Leipzig DE
Max Plank Institute, Magdeburg DE
2003 Università Degli Studi dell'Aquila, L'Aquila IT
University of Warwick, Coventry UK
William and Mary, Williamsburg VA
University of Maryland UMBC, Baltimore, MD
University Libre de Bruxelles, Bruxelles BE
CMSB 2003 Rovereto, IT
2001 Rockefeller University, NYC NY
Università Degli Studi Di Catania, Catania IT
Universitet Aarhus, Aarhus DK

Fellowships and awards

Research Funding Awards

2018 "Adversarial Reasoning for Intelligent Information Networks: Blockchains, Causality and Games," AFRL researach award with B. Mishra, (2018-)

2018 CMU NSF ICORPS Spring Cohort Award, Pittsburgh PA,

2017 "Game theory and Incentives for Government as the Integrator," CMU SEI line funding research award with B. Novak, (2017-)

2015 "Cyber Security via Signaling Games," CMU SEI line funding research award, (2014-2016)

2013 "Malicious Behavior and Model Checking," Air Force Contract (In collaboration with NYU) and CMU SEI LENS and LINE research funding awards, (2013-2014)

2013 "Provenance Inference via the evidence of code clones," CMU SEI LENS research funding award, (2013)

2012 "Malicious Distribution Networks," CMU SEI LENS research funding award with J. A. Morales, (2012)

2011 "Sparse Representation of Software Corpora (2011)," SEI LENS research funding award, (2011)

2011 "Fuzzy Hashing Techniques (2011)", SEI LENS research funding award with D. French, (2011)

Honors

2017 Best Paper Award for the 3rd IEEE International Conference of Scalable and Smart Cloud SSC 2017.

2016 Best Paper Award for the 11th IEEE international Conference on Malicious and Unwanted Software.

2015 Best Paper Award for the 9th International Conference on Bio-inspired Information and Communications Technologies.

2015 Best Paper Award for the 7th ACM CCS International Workshop on Managing Insider Security Threats.

2010 U.S. Defense Intelligence Agency awarded recognition of accomplishment conferred by DAC4.

2006 U.S. Air Force Office of Special Investigations recognition conferred for contributions within DZOM.

2003 University of Warwick: Warwick Zeeman Lecturer Awardee, University of Warwick UK.

2003 Courant Institute: Wilhelm T. Magnus Prize for significant contribution to math sciences.

2001 Courant Institute: Harold Grad Memorial Prize for Outstanding performance and promise as a graduate student.

Professional Service

Organizer

2018 Program Committee Chair for 11th International Bio-inspired Information and Communications Technologies Conference (BICT 2019).

Program Committee Member for the 13th IEEE international Conference on Malicious and Unwanted Software, IEEE Malware 2018.

2017 Organized a Special Session titled 'Bio-Inspired Approaches to Cyber Security (BACS)' for the 10th International Conference on Bio-inspired Information and Communications Technologies

Program Committee Member for the 12th IEEE international Conference on Malicious and Unwanted Software, IEEE Malware 2017.

Technical Program Committee Member for The 12th International Conference on Green, Pervasive and Cloud Computing, GPC2017

Technical Program Committee Chair and organizer for 10th International Conference on Bio-inspired Information and Communications Technologies, BICT2017

2016 Publication Chair and organizer for GAMESEC2016, and Editor for Proceedings of Decision and Game Theory for Security 2016

Technical Program Committee Member for the 8th ACM CCS International Workshop on Managing Insider Security Threats 2016 (MIST)

2015 Program committee chair for Bio-inspired Information and Communications Technologies BICT2015

2014 Program committee member for Bio-inspired Information and Communications Technologies BICT2014

Referee and Editor

- The International Bio-inspired Information and Communications Technologies Conference during years 2014-current. Referee for Springer Journal of Computational and Mathematical Organization Theory.
- Volume Editor for Proceedings of Decision and Game Theory for Security (2016).
- IEEE Transactions on Information and Forensic Security (2016).
- Referee for El-sevier Nano Communications Network Journal (2015).

Joint Task Forces for US Government

Direct support with expertise and analysis code to perform data manipulation, analysis, and discovery techniques to: National Cyber Investigative Joint Task Force (Feb 2006- Nov 2008). Contribution to multiple US government sponsored workshops focused on cyber security, cyber attacks and malware (2006-2011), including Malware group hug meetings organized by JTFGNO (2007), and by JIOPO(2008) and the Malware Technical Exchange Meeting (MTEM 2011) organized by MITRE.

Teaching Experience

My teaching experiences have informed and refined my own teaching philosophy which is centered on honesty and trust, i.e., trust in the learner's intellectual and emotional abilities. Learner experiences are important, thus I design challenges to engage active thought and lead to spontaneous problem solving and peer discussion. The demonstration of peer ability is a positive driver for group average achievement and can be strategically planned by the teacher. The learning environment is critical and I focus to prevent excessive anxiety and unnecessary tension therein. Outside of the classroom setting, teaching and learning are embedded within any research, development, and operational activities. For example clear and coherent documentation for analysis systems facilitates learners of all types to more rapidly gain capabilities.

Irregardless of the setting, when teaching mathematical and computer science concepts or skills, it will remain important to relate conceptual knowledge to real world meaning by demonstrating the value of applications.

Course Title	Institute
College algebra	University of Missouri
Math Think	NYU Arts and Science
Quantitative Reasoning	Morse Academic Program NYU
Advanced Analysis	Courant Institute
Tutoring and Special Topics	University of Warwick

Affiliations

Association of Computing Machinery, American Mathematical Society, Society for Industrial and Applied Mathematics.

Computer Skills

Languages: C, C++, Fortran, Java, LaTeX, LISP, Linux, Matlab, S, Mathematica, Maple, m4, Maple, Mat{hematica|lab}, {HT|SG|X[HT]}ML, Octave, Pascal, Perl, Python, PHP, PostScript, S, Scheme, [{postgre|My}]SQL[Server]

Concepts: active learning (human/machine), adversarial learning, agent based models, behavioral analysis, binary instrumentation, data mining, data provenance, evolutionary game theory, empirical game theory, formal methods, game theoretic simulation, high throughput computing, multi agent system, numerical methods, parallel/distributed processing, online analytic processing, ontology and knowledge representation, risk/reliability estimation, scientific computing, simulation, software architecture and development lifecycle, software properties and formal verification, succinct algorithms, temporal logic, virtualization and visualization