Ezhil Kalaimannan, Ph.D.

CONTACT INFORMATION

11000 University Pkwy
Bldg. 4, Rm. 444
Pensacola, FL 32514

850-473-7005
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RESEARCH INTERESTS

Cybersecurity, Digital Forensics, Network Security, Operations Research, Algorithmic Complexity, IoT Security, SmartGrids and Cyber Physical Systems.

EDUCATION

University of Alabama in Huntsville, Huntsville, AL

Ph.D., Computer Engineering; Concentration in Cybersecurity, *Aug 2014*
- Dissertation: *Computational Optimization Models for Investigating Digital Crime and Intrusion Detection Alarms*
- Advisors: Seong-Moo Yoo, Ph.D and Jatinder N.D. Gupta, Ph.D

M.S., Computer Engineering; Concentration in Cybersecurity, Dec 2008
- Advisor: Seong-Moo Yoo, Ph.D

Graduate Certificate., Cybersecurity Studies, Dec 2012

Anna University, TamilNadu, India

B.E., Electrical and Electronics Engineering, May 2006

APPOINTMENTS

Associate Professor   June 2021 to present
Department of Computer Science,
Hal Marcus College of Science and Engineering
University of West Florida

Assistant Professor   Aug 2014 to June 2021
Department of Computer Science,
Hal Marcus College of Science and Engineering
University of West Florida

Adjunct Instructor   Aug 2010 to Aug 2014
Department of Information Systems,
College of Business Administration
University of Alabama in Huntsville

Graduate Teaching Assistant   Aug 2009 to Aug 2012
Department of Electrical and Computer Engineering,
College of Engineering
University of Alabama in Huntsville

GRANTS

1. Ezhil Kalaimannan (co-PI). National Science Foundation (NSF), *Argo Cyber Emerging Scholars (ACES): Developing a Cybersecurity Community of Practice*, **$2.3M**; Period of Performance: 01/01/2020 - 12/31/2024.

2. Ezhil Kalaimannan (PI). Florida Center for Cybersecurity (FC2), *A Novel Framework to Teach Hands-on Laboratory Exercises In Cybersecurity*, **$75,000**; Period of Performance: 07/01/2017 - 12/31/2019.

3. Ezhil Kalaimannan (PI). Florida Center for Cybersecurity (FC2), *Exploring Security Attacks in Cache Enabled Tactical Hybrid Networks*, **$25,000**; Period of Performance: 03/01/2015 - 12/31/2016.

4. Ezhil Kalaimannan (PI). Scholarly and Creative Activities Award – Research and Sponsored Programs, The University of West Florida, *Smart Device Forensics – Acquisition, Analysis and Interpretation of digital evidences in a forensically sound manner*, **$2,000**; Period of Performance: 05/01/2015 - 04/30/2016.

5. Ezhil Kalaimannan (co-PI). Cross College Faculty Research Grant (CCFR) – Office of Vice President for Research, The University of Alabama in Huntsville, *Computational Optimization Models for Investigating Crime in Digital Forensics*, **$5,000**; Period of Performance: 08/01/2013 - 07/31/2014.

BOOK CHAPTERS

1. John, C., Ramachandran, B and **Kalaimannan, E**. "Impact of Targeted Cyber Attacks on Electrical Power Systems," In: Choo KK., Morris T., Peterson G. (eds) National Cyber Summit (NCS) Research Track NCS 2019, Advances in Intelligent Systems and Computing, Vol 1055, Springer, Cham, 2020.

2. Gupta, J.N.D., **Kalaimannan, E** and Yoo, S.M. "A Sequential Investigation Model for Solving Time Critical Digital Forensic Cases Involving a Single Investigator," In: Choo KK., Morris T., Peterson G. (eds) National Cyber Summit (NCS) Research Track NCS 2019, Advances in Intelligent Systems and Computing, Vol 1055, Springer, Cham, 2020.

3. **Kalaimannan, E**., Gupta, J. N. D., and Yoo, S-M. "Maximizing investigation effectiveness for time critical forensic cases," in Operational Excellence: A Key to Performance Excellence, R. K. Jain, B. A. Metri, and J. N. D. Gupta (eds), Excel Books, 2013.

REFEREED JOURNAL PUBLICATIONS

1. Choudhury, N., Matam, R., Mukherjee, M., Lloret, J and **Kalaimannan, E**. "NCHR: A Nonthreshold-Based Cluster-Head Rotation Scheme for IEEE 802.15.4 Cluster-Tree Networks," *IEEE Internet of Things Journal*, Vol. 8, No. 1, pp. 168-178, 2020.

2. Mishra, A., Reichherzer, T., **Kalaimannan, E**., Wilde, N and Ramirez, R. "Trade-offs involved in the choice of cloud service configurations when building secure, scalable, and efficient Internet-of-Things networks," *International Journal of Distributed Sensor Networks, Sage Journal*, Vol. 16, No. 2, pp. 1550147720908199, 2020.

3. Bagui, S., **Kalaimannan, E**., Bagui, S., Nandi, D and Pinto, A. "Using machine learning techniques to identify rare cyber-attacks on the UNSW-NB15 dataset," *Security and Privacy, Wiley*, Vol. 2, No. 6, pp. e91, 2019.

4. Tetarave, S.K., Tripathy, S., **Kalaimannan, E**., John, C and Srivastava, A. "A Routing Table Poisoning Model for Peer-to-Peer (P2P) Botnets," *Access, IEEE*, Vol. 7, No. 1, pp. 67983-67995, 2019.

5. Hopkins, S and **Kalaimannan, E**. "Towards establishing a security engineered SCADA framework," *Journal of Cybersecurity Technology, Taylor & Francis*, Vol. 3, No. 1, pp. 47-59, 2019.

6. Bagui, S., Fang, X., **Kalaimannan, E**., Bagui, S and Sheehan, J. "Comparison of Machine Learning Algorithms for Classification of VPN Network Traffic Flow Using Time-Related Features," Journal of Cybersecurity Technology, Taylor & Francis, Vol. 1, No. 2, pp. 108-126, 2017.

7. **Kalaimannan, E** and Gupta, J.N.D. "The Security Development Lifecycle in the Context of Accreditation Policies and Standards," Security and Privacy, IEEE, Vol. 15, No. 1, pp. 52-57, 2017.

8. **Kalaimannan, E**., John, S.K., DuBose, T and Pinto, A. "Influences on ransomware's evolution and predictions for the future challenges," Journal of Cybersecurity Technology, Taylor & Francis, Vol. 1, No. 1, pp. 23-31, 2016.

9. **Kalaimannan, E** and John, C. "Security Development Life Cycle framework for web-based applications," National Cybersecurity Institute Journal, Vol. 3, No. 1, pp. 23-29, 2016.

10. Gupta, J.N.D., **Kalaimannan, E** and Yoo, S-M. "A heuristic for maximizing investigation effectiveness of digital forensic cases involving multiple investigators," Computers and Operations Research, Elsevier (Science Direct), Vol. 69, No. 1, pp. 1-9, 2015.

PEER REVIEWED CONFERENCE PROCEEDINGS

1. Hopkins, S., **Kalaimannan, E** and John, C. "Sub-Erroneous Outlier Detection of Cyber Attacks in a Smart Grid State Estimation System," Proceedings of the 11th IEEE Annual Ubiquitous Computing, Electronics Mobile Communication Conference (UEMCON), pp. 0447-0454, New York, NY, 2020.

2. Hopkins, S., **Kalaimannan, E** and John, C. "Application of Regression Analysis Towards Identifying Cyber-Attacks upon a Smart Grid Augmented Electric Grid," Proceedings of the 24th World Multi-Conference on Systemics, Cybernetics and Informatics (WMSCI 2020), pp. 85-90, 2020.

3. Hopkins, S., **Kalaimannan, E** and John, C. "Cyber Resilience using State Estimation Updates Based on Cyber Attack Matrix Classification," Proceedings of the 2020 IEEE Kansas Power and Energy Conference (KPEC), pp. 1-6, Manhattan, KS, 2020.

4. Chakraborty, N and **Kalaimannan, E**. "Optimal Sizing of Hybrid Renewable Energy Sources via Efficient Demand Response in Microgrid," Proceedings of the Eleventh ACM International Conference on Future Energy Systems (e-Energy '20), pp. 415–416, New York, NY, 2020.

5. Hopkins, S., **Kalaimannan, E** and John, C. "Foundations for Research in Cyber-Physical System Cyber Resilience using State Estimation," Proceedings of the 2020 SoutheastCon, pp. 1-2, Raleigh, NC, 2020.

6. Hopkins, S., Henry, C, Bagui, S., Mishra, A., **Kalaimannan, E**., and John, C. "Applying a Verified Trusted Computing Base to Cyber Protect a Vulnerable Traffic Control Cyber-Physical System," Proceedings of the 2020 SoutheastCon, pp. 1-8, Raleigh, NC, 2020.

7. Hopkins, S., Bagui, S., **Kalaimannan, E**., Mishra, A., Mishra, B and Kelly D. "Test Bed Development for a Security Engineered SCADA Laboratory", Proceedings of the 2019 SoutheastCon, Huntsville, AL, 2019.

8. Chi, H., Aderibigbe, T and **Kalaimannan, E**. "Design of Cybersecurity Hands-On Laboratory Exercises using SecDLC Framework," Proceedings of the ACM 2018 Conference, Article No. 36, Richmond, KY, 2018.

9. Tetarave, S.K., Tripathy, S., **Kalaimannan, E** and John, C. "eBot: Approach Towards Modeling an Advanced P2P Botnet," Proceedings of the 17th IEEE International Conference On Trust, Security And Privacy In Computing And Communications (TrustCom), Newark, NJ, 2018.

10. Chakraborty, N and **Kalaimannan, E**. "Minimum cost security measurements for attack tree based threat models in smart grid," Proceedings of the IEEE 8th Annual Ubiquitous Computing, Electronics and Mobile Communication Conference (UEMCON), New York City, NY, 2017.

11. Prithviraj, S., Sameer, V.U., Naskar, R and **Kalaimannan, E**. "Source Anonymization of Digital Images: A Counter–Forensic Attack on PRNU based Source Identification Techniques," Proceedings of the 2017 Annual Conference on Digital Forensics, Security, and Law (ADFSL), Daytona Beach, 2017.

12. Chakraborty, N and **Kalaimannan, E**. "Selective Scheduling: Controlling Non-Preemptive Devices in Smart Grid Environment," Proceedings of the Power and Energy Society Innovative Smart Grid Technologies Conference (ISGT), Arlington, VA, 2017.

13. Chi, H., Welch, S., Vasserman, E and **Kalaimannan, E**. "A Framework of Cybersecurity Approaches in Precision Agriculture," Proceedings of the 12th International Conference on Cyber Warfare and Security (ICCWS), Dayton, OH, 2017.

14. Reichherzer, T., Mishra, A., **Kalaimannan, E** and Wilde, N. "A Case Study on the Trade-Offs Between Security, Scalability, and Efficiency in Smart Home Sensor Networks," Proceedings of the 2016 International Conference on Computational Science and Computational Intelligence (CSCI), Las Vegas, NV, 2016.

15. Chi, H., **Kalaimannan, E** and Hubbard, D. "Integrate Text Mining into Computer and Information Security Education," KSU Conference on Cybersecurity Education, Research, and Practice, Paper 11, Kennesaw, GA, 2016.

16. **Kalaimannan, E**. "Smart Device Forensics - Acquisition, Analysis and Interpretation of Digital Evidences," Proceedings of the 2015 International Conference on Computational Science and Computational Intelligence (CSCI), Las Vegas, NV, 2015.

17. Pandey, A., **Kalaimannan, E** and Venkatesan, S. "An Information Diffusion Model to analyze the Behavior of Online Social Network based Malwares," Proceedings of the 2015 International Conference on Computational Science and Computational Intelligence (CSCI), Las Vegas, NV, 2015.

18. **Kalaimannan, E**., Mitchell, C., Bagui, S., and Bagui, S. "An Automated Method of Classifying and Analyzing Malware based Operating System Calls," Work-in-Progress Abstract in the Annual Computer Security Applications Conference 2015 (ACSAC'15), Los Angeles, CA, 2015.

19. **Kalaimannan, E**., Gupta, J. N. D., and Yoo, S-M. "Maximizing investigation effectiveness in digital forensic cases," Proceedings of the 5th Annual ASE/IEEE International Conference on Privacy, Security, Risk and Trust (PASSAT- 2013), Washington D.C., 2013.

20. Gupta, J. N. D., **Kalaimannan, E** and Patnayakuni, R. "IDS Alarms investigation with limited resources," Pre-ICIS Workshop on Information Security and Privacy (WISP), Orlando, FL, 2012.

STUDENT POSTERS	1. Henry, C., Electrical Engineering. Applying a Verified Trusted Computing Base to Cyber Protect a Vulnerable Traffic Control Cyber Physical System, NCUR Conference, Bozeman, MT, 2020.

STUDENT POSTERS

1. Henry, C., Electrical Engineering. Applying a Verified Trusted Computing Base to Cyber Protect a Vulnerable Traffic Control Cyber Physical System, NCUR Conference, Bozeman, MT, 2020.

2. Rosier, D., Information Technology. Analysis of Password Cracking Mechanisms on Windows and Linux based Operating Systems, Cyber Florida Annual Research Symposium, Tampa, FL, 2019.

3. Benenati, D., and Mueller, Z., Computer Science. Passive Operating System Fingerprinting Analysis using Artificial Intelligence Techniques, Cyber Florida Annual Research Symposium, Tampa, FL, 2019.

4. Kelley, D., Computer Science. Development of a Security Engineered SCADA Testbed, NCUR Conference, Kennesaw, GA, 2019.

5. Mishra, B., Kelley, and Chamblee, J, Department of Computer Science. Secure SCADA, SURP Annual Symposium, Pensacola, FL, 2019.

6. William, B., Electrical Engineering. Impacts of Coordinated Cyber attacks on an Electric Power Grid, SURP Annual Symposium, Pensacola, FL, 2018.

7. Mitchell, C., Computer Science. Malware Analysis using Data Mining, SURP Annual Symposium, Pensacola, FL, 2015.

TEACHING EXPERIENCE

Cybersecurity
- CIS2530 - Introduction to Cybersecurity (Undergraduate-Level)
- CNT4403 - Computer and Network Security (Undergraduate-Level)
- CNT5407 - System and Network Security (Graduate-Level)
- CIS5775 - Cybersecurity Principles (Graduate-Level)
- CIS6379 - Applied Information Security (Graduate-Level)

Computer Science
- CNT4007 - Theory and Fundamentals of Computer Networking (Undergraduate-Level)
- COP3014 - Algorithm and Program Design (Undergraduate-Level)
- COP3022 - Intermediate Programming (Undergraduate-Level)
- COP2830 - Script Programming (Undergraduate-Level)

SERVICE

Visiting Research Scientist - Courtesy Appointment
- Institute of Human & Machine Cognition, Pensacola, FL, USA.

Research Subcommittee Member
- Cyber Florida at the University of South Florida, Tampa, FL, USA.

Technical Program Committee Member for Regional, National and International Conferences
- Pre-ICIS Workshop on Information Security and Privacy (WISP) [2012]
- Annual Conference on Digital Forensics, Security and Law (ADFSL) [2015, 2016, 2017, 2018, 2019]
- Annual International Conference on Computer and Information Technology (ICCIT) [2014, 2015]
- Annual Digital Forensics Research Conference (DFRWS USA) [2015, 2016, 2017]
- High Performance Computing, Data and Analytics (HiPC) [2018]
- National Cybersecurity Summit (NCS) [2017, 2018, 2019]
- Seed Grant Program funded by the Florida Center for Cybersecurity (FC2) [2015]

Journal Reviewer
- Security and Privacy; IEEE
- Access; IEEE
- Journal of Parallel and Distributed Computing; Elsevier (Science Direct)
- International Journal of Communication Systems; Wiley
- Computers and Electrical Engineering; Elsevier (Science Direct)
- Information System Frontiers; Springer
- Security and Privacy; Wiley
- Social Network Analysis and Mining; Springer
- Information Processing and Management; Elsevier (Science Direct)

University and College Level Committee Member; University of West Florida, Pensacola, FL, USA
- University Research Council [2019-22]
- Search Committee for faculty and staff positions
- Hal Marcus College of Science and Engineering [HMCSE] Council Chair [2019-20]
- Program Advisor for the Masters program in Cybersecurity
- University Web Advisory Committee [2018-Present]

REFERENCES   Available upon Request.