KIYOSHI NAKAYAMA

Affiliation
TieSet, Inc.
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RESEARCH INTERESTS

Applications	Computer Vision, Distributed Systems, Blockchain, Anomaly Detection, Optimal Flows, Cloud Computing, Internet of Things, System Resiliency, Fault Tolerance
AI/Theories	Deep Learning, Distributed AI, Federated Learning, Reinforcement Learning, Bandit Learning, Invariant Learning, Graph Theory

PROFESSIONAL EXPERIENCE

Founder & CEO

TieSet Inc., Santa Clara, CA — 6/2020 - Present
Transioning from big data to collective intelligence

Research Scientist

NEC Laboratories America, San Jose, CA — 10/2015 - 5/2020
Media Analytics Department & Energy Management Department

Postdoctoral Research Associate

Fujitsu Laboratories of America, Sunnyvale, CA — 9/2014 - 9/2015
Solutions for Electricity Distribution Networks (SEDN) Group

EDUCATION

Ph.D. in Computer Science

University of California, Irvine — 2014
Research Areas: Distributed Networks, Systems, and Optimization, Graph Theory
Advisors: Prof. Lubomir F. Bic and Prof. Michael B. Dillencourt

M.S. in Engineering

Graduate School of Engineering, Soka University, Tokyo Japan — 2011
Advisors: Prof. Norihiko Shinomiya and Prof. Hitoshi Watanabe (IEEE Life Fellow)

B.S. in Engineering

Department of Information Systems Science, Soka University, Tokyo Japan — 2009

HONORS AND AWARDS

- **Spot Recognition Award** 2018, NEC Laboratories America, Inc.

  In recognition of the contributions to the continued development and successful deployment of a cloud-based online energy management simulation platform at NEC Labs
- **Business Contribution Award** 2017, NEC Laboratories America, Inc.

  In recognition of key contribution to resilient demand charge management technology for distributed energy storage applications

- **Best Paper Award**, IEEE SmartGridComm 2012
  Title: *Complete Automation of Future Grid for Optimal Real-Time Distribution of Renewables*
- **Best Paper Award**, IEEE International Congress on Ultra Modern Telecommunications and Control Systems (ICUMT) 2010
  Title: *Distributed Control Based on Tie-Set Graph Theory for Smart Grid Networks*
- *Da-Vinci Award* from Soka University for 3 consecutive years (2009, 2010, and 2011)

PUBLICATIONS

Book Chapters

1. **K. Nakayama**, *"Chapter 5: Decentralized Models for Real-Time Renewable Integration in Future Grid,"* in *Smarter Energy: from Smart Metering to the Smart Grid*, Vol. 2, pp. 129, IET Press, 2016.

Journals

1. N. Muralidhar, C. Wang, N. Self, M. Momtazpour, **K. Nakayama**, R. Sharma, N. Ramakrishnan, *"illiad: InteLLigent Invariant and Anomaly Detection in Cyber Physical Systems,"* ACM Transactions on Intelligent Systems and Technology (TIST), Vol. 9, No. 3, 2018, pp. 35:1 - 35:20.
2. **K. Nakayama**, C. Zhao, L. Bic, M. Dillencourt, J. Brouwer, *"Distributed Power Flow Loss Minimization Control for Future Grid,"* Wiley International Journal of Circuit Theory and Applications, Vol. 43, No. 9, 2014, pp. 1209 - 1225.
3. **K. Nakayama**, N. Shinomiya, H. Watanabe, *"An Autonomous Distributed Control Method Based on Tie-set Graph Theory in Future Grid,"* Wiley International Journal of Circuit Theory and Applications, Vol. 41, No. 11, 2013, pp. 1154 - 1174.
4. **K. Nakayama**, N. Shinomiya, H. Watanabe, *"An Autonomous Distributed Control Method for Link Failure Based on Tie-Set Graph Theory,"* IEEE Transactions on Circuits and Systems-1: Regular Paper, Vol. 59, No. 11, 2012, pp. 2727 - 2737.

Conference and Symposium Proceedings

1. P. Ramanan, **K. Nakayama**, R. Sharma, *"BAFFLE: Blockchain-Based Aggregator-Free Federated Learning,"* arXiv:1909.07452, under review at ACM SysML, Austin TX USA, 2020.
2. N. Muralidhar, S. Muthiah, **K. Nakayama**, R. Sharma, N. Ramakrishnan, *"Multivariate Long-Term State Forecasting in Cyber-Physical Systems: A Sequence to Sequence Approach,"* under review at IEEE BigData 2019, USA.
3. **K. Nakayama**, N. Muralidhar, C. Jin, R. Sharma, *"Detection of False Data Injection Attacks in Cyber-Physical Systems using Dynamic Invariants,"* IEEE International Conference on Machine Learning and Applications (ICMLA), FL USA, Dec. 2019.
4. Z. Zhao, **K. Nakayama**, R. Sharma, *"Decentralized Transactive Energy Auctions with Bandit Learning,"* IEEE PES Transactive Energy System Conference (TESC), Minneapolis, MN USA, Jul. 2019. (**Selected as Top 4 Papers**)
5. **K. Nakayama**, R. Moslemi, R. Sharma, *"Transactive Energy Management with Blockchain Smart Contracts for P2P Multi-Settlement Markets,"* IEEE Conference on Innovative Smart Grid Technologies (ISGT), Washington DC USA, Feb. 2019.
6. **K. Nakayama**, R. Sharma, *"Demand Charge and Response with Energy Storage,"* IEEE International Conference on Smart Grid Communications (SmartGridComm), pp. 72 - 77, Aalborg Denmark, Oct. 2018.
7. **K. Nakayama**, R. Sharma, *"Energy Management Systems with Intelligent Anomaly Detection and Prediction,"* IEEE Resilience Week, pp. 24 - 29, Wilmington DE USA, Sep. 2017.

8. M. Parandehgheibi, S. A. Pourmousavi Kani, **K. Nakayama**, R. Sharma, *"A Two-Layer Incentive-Based Controller for Aggregating BTM Energy Storage Devices,"* IEEE PES General Meeting, pp. 1 - 5, Chicago IL USA, Jul 2017.
9. **K. Nakayama**, R. Sharma, *"An Autonomous Energy Management Platform for Resilient Operation of MicroGrids,"* IEEE International Conference on Smart Grid Communications (SmartGridComm), pp. 167 - 173, Sydney Australia, Nov. 2016.
10. **K. Nakayama**, N. Dang, L. Bic, M. Dillencourt, E. Bozorgzadeh, N. Venkatasubramanian, *"Distributed Flow Optimization Control for Energy-Harvesting Wireless Sensor Networks,"* IEEE International Conference on Communications (ICC), pp. 4083 - 4088, Sydney Australia, Jun. 2014.
11. **K. Nakayama**, T. Koide, *"A Decentralized Algorithm for Network Flow Optimization in Mesh Networks,"* IEEE Global Communications Conference (Globecom), pp. 1554 - 1559, Atlanta GA USA, Dec. 2013.
12. **K. Nakayama**, C. Zhao, M. Dillencourt, L. Bic, J. Brouwer *"Distributed Real-Time Power Flow Control with Renewable Integration,"* IEEE International Conference on Smart Grid Communications (SmartGridComm), pp. 516 - 521, Vancouver Canada, Oct. 2013.
13. **K. Nakayama**, K. Benson, V. Avagyan, M. Dillencourt, L. Bic, N. Venkatasubramanian, *"Tie-set Based Fault Tolerance for Autonomous Recovery of Double-Link Failures,"* IEEE Symposium on Computers and Communications (ISCC), pp. 391 - 397, Split Croatia, Jul. 2013.
14. Y. Sakai, **K. Nakayama**, N. Shinomiya, *"A Node-Weight Equalization Problem with Circuit-Based Computations,"* IEEE International Symposium on Circuits and Systems (ISCAS), pp. 2525-2528, Beijing China, May 2013.
15. **K. Nakayama**, K. Benson, L. Bic, M. Dillencourt, *"Complete Automation of Future Grid for Optimal Real-Time Distribution of Renewables,"* IEEE International Conference on Smart Grid Communications (SmartGridComm), pp. 418 - 423, Tainan Taiwan, Nov. 2012 (**Best Paper Award**).
16. Y. Sakai, **K. Nakayama**, N. Shinomiya, *"A Property Verification of Node-Weight Equalization Focusing on Cycles of a Graph,"* 27th International Technical Conference on Circuits/Systems, Computers and Communications (ITC-CSCC), Jul. 2012, P-T2-236.
17. **K. Nakayama**, N. Shinomiya, *"Autonomous Recovery for Link Failure Based on Tie-Sets in Information Networks,"* IEEE Symposium on Computers and Communications (ISCC), pp. 671 - 676, Corfu Greece, Jun. 2011.
18. K. Kadena, **K Nakayama**, N. Shinomiya, *"Network Failure Recovery with Tie-Sets,"* IEEE International Conference on Advanced Information Networking and Applications Workshops (WAINA), pp. 467 - 472, Biopolis Singapore, Mar. 2011.
19. **K. Nakayama**, N. Shinomiya, *"Distributed Control Based on Tie-Set Graph Theory for Smart Grid Networks,"* IEEE International Congress on Ultra Modern Telecommunications and Control Systems (ICUMT), pp. 957 - 964, Moscow Russia, Oct. 2010 (**Best Paper Award**).
20. **K. Nakayama**, N. Shinomiya, H. Watanabe, *"Distributed Control for Link Failure Based on Tie-Sets in Information Networks,"* IEEE International Symposium on Circuits and Systems (ISCAS), pp. 3913 - 3916, Paris France, May 2010.
21. **K. Nakayama**, N. Shinomiya, *"Tie-set Graph Theory and its Application to Smart Grid,"* IEICE General Conference, Miyagi Japan, March 2010, BS-3-8, "S-38"-"S-39".
22. K. Kadena, **K Nakayama**, N. Shinomiya, *"A Way of Determining a Fundamental System of Tie-sets Considering a Link Failure Recovery,"* IEICE General Conference, Miyagi Japan, March 2010, BS-3-1, "S-24"-"S-25".
23. **K. Nakayama**, N. Shinomiya, *"A Distributed Control Method based on Tie-sets on a Network,"* Multimedia, Distributed, Cooperative and Mobile Symposium (DICOMO), Oita Japan, July 2009, No. 1, pp. 788 - 796.
24. **K. Nakayama**, N. Shinomiya, *"Autonomous Distributed Control for Optical Sensory Nerve Networks,"* IEICE General Conference, Ehime Japan, March 2009, B-20-32.

US Patents

1. **K. Nakayama**, P. Ramanan, R. Sharma, *"Decentralized Aggregator-Less Blockchain Based Federated Learning,"* U.S. Patent Application Under Review.
2. **K. Nakayama**, R. Moslemi, H. Hosseini, R. Sharma, *"A Decentralized IoT Infrastructure Management Platform with Distributed Ledger Technology Integrating AI Models,"* U.S. Patent Application Under Review.
3. **K. Nakayama**, R. Sharma, *"Autonomous Blockchain-Based Smart Warranty Management for Energy Storages,"* U.S. Patent Application Under Review.
4. **K. Nakayama**, Z. Zhao, R. Sharma, *"Autonomous Blockchain-Based Peer-To-Peer Energy Trading Platform for Transactive Energy Management in Distribution Network using Reinforcement Bandit Learning,"* U.S. Patent Application Under Review.
5. **K. Nakayama**, R. Moslemi, R. Sharma, *"Blockchain-Based Peer-To-Peer Transactive Energy Management for Multi-Settlement Markets,"* U.S. Patent Application Under Review.
6. **K. Nakayama**, R. Sharma, *"Decentralized Energy Management Utilizing Blockchain Technology,"* U.S. Patent Application Under Review.
7. **K. Nakayama**, R. Sharma, *"Demand Charge and Response Management using Energy Storage,"* U.S. Patent, No. 16/185,373.
8. **K. Nakayama**, N. Muralidhar, C. Jin, R. Sharma, *"Detection of False Data Injection Attacks in Power Systems using Multiplex Invariant Networks and Domain Knowledge,"* U.S. Patent, No. 16/151,544.
9. **K. Nakayama**, R. Sharma, *"Energy Management System with Intelligent Anomaly Detection and Prediction,"* U.S. Patent, No. 15/974,155.
10. **K. Nakayama**, R. Sharma, *"Autonomous Operational Platform for Micro-Grid Energy Management,"* U.S. Patent, No. 15/436,274.
11. **K. Nakayama**, W.P. Chen, *"Aggregated and Optimized Virtual Power Plant Control,"* U.S. Patent, No. 15/000,970.

GRANTS AND RESEARCH SUPPORT

- Full Scholarship from Japanese Student Services Organization (JASSO) — 3,583,000 JPY/Year
  Covering all the tuition and living expenses for Ph.D. program from 2011 to 2014
  Elected as one of top 22 students from nationwide applicants
- Student Travel Grant, IEEE SmartGridComm held in Tainan Taiwan, — $1000, 2012
- Research Fellowship from Soka University — 1,000,000 JPY, 2012
- Grants from NEC C&C Foundation — 250,000 JPY, 2010
  For Researchers Attending Prestigious International Conferences

PROFESSIONAL SERVICES

- TCF Independent Reviewer in support of U.S. Department of Energy, 2019
- TPC Member: IEEE International Conference on Smart Grid Communications (SmartGridComm), 2017, 2018, 2019
- TPC Member: IEEE Wireless Communications and Networking Conference (WCNC), 2019
- Invited Reviewer: IEEE Transactions on Vehicular Technology, 2018
- Guest Editor: IEEE Communications Magazine on Internet of Electric Vehicles and Smart Grid, 2018
- Associate Editor: IET Smart Grid Journals, 2018
- Guest Editor: IEEE Communications Magazine on Internet of Things and Information Processing in Smart Energy Applications, 2017

- TPC Member: IEEE Global Communications Conference (Globecom), 2017, 2018
- TPC Member: IEEE International Conference on Communications (ICC), 2015, 2016, 2017
- Guest Editor: IEEE Communications Magazine on Integrated Communications, Control, and Computing Technologies for Enabling Autonomous Smart Grid, 2016
- Invited Reviewer: IEEE Transactions on Smart Grid, 2016
- TPC Member: International Workshop on Integrating Communications, Control, and Computing Technologies for Smart Grid (ICT4SG) held in conjunction with IEEE ICC 2016
- Invited Reviewer: IEEE Transactions on Communications, 2014

CONFERENCE AND INVITED TALKS

- July 2019: Plenary Session Presentation, IEEE Transactive Energy System Conference, Minneapolis, MN.
- October 2018: Oral Presentation, IEEE SmartGridComm, Aalborg, Denmark.
- September 2017: Oral Presentation, IEEE Resilience Week, Wilmington, DE.
- November 2016: Oral Presentation, IEEE SmartGridComm, Sydney, Australia.
- July 2014: Invited Talk, Network Systems Research Group Seminar, Fujitsu Labs, Dallas, TX.
- June 2014: Invited Talk, CRISP Seminar, UC Davis, CA.
  Hosted by Prof. Anna Scaglione
- January 2014: Invited Talk, RSRG Seminar, Caltech, Pasadena, CA.
  Hosted by Prof. Steven Low
- December 2013: Invited Talk, Center for Nonlinear Studies, Los Alamos National Laboratory, NM.
  Hosted by Dr. Misha Chertkov
- December 2013: Oral Presentation, IEEE Globecom, Atlanta, GA.
- October 2013: Oral Presentation, IEEE SmartGridComm, Vancouver, Canada.
- November 2012: Invited Talk, Global Citizenship Program, Soka University, Tokyo, Japan.
- November 2012: Oral Presentation, IEEE SmartGridComm, Tainan, Taiwan.
- June 2011: Oral Presentation, IEEE ISCC, Corfu Greece.
- October 2010: Oral Presentation, IEEE ICUMT, Moscow, Russia.

MENTORING/SERVICE

- Paritosh Ramanan from Georgia Tech — Summer Intern 2019
  Project: Decentralized Blockchain-Based Aggregator-Less Federated Learning
- Zibo Zhao from Purdue University — Summer Intern 2018
  Project: Decentralized Pricing in Transactive Energy Trading by Bandit Learning
- Ehsan Raoufat from University of Tennessee — Summer Intern 2017
  Project: Energy Storage for PV-utilization and Demand Charge Management
- Nikhil Muralidhar from Virginia Tech — Summer Intern 2017
  Project: Detection of False Data Injection Attacks on Power Systems with Multilayer Invariant Networks and Domain Knowledge
- Marzieh Parandehgheibi from MIT — Summer Intern 2016
  Project: A Two-Layer Incentive-Based Controller for Aggregating BTM Energy Storage Devices

TEACHING EXPERIENCE

- Teaching Assistant at UC Irvine
  Project in Operating Systems (CS 143B), Spring 2014
  Discrete Mathematics (ICS 6D), Winter 2014
- Teaching Assistant at Soka University
  Physics Experiment, Spring 2011 and 2010
  Networking Experiment, Fall 2009
  Information Engineering Experiment, Spring 2009

TECHNICAL SKILLS

Machine Learning	DNN, Q-Learning, Bandit Learning, Invariant Learning
Programming	Java, Python, C/C++, Javascript, Solidity
Database	Blockchain, MongoDB, MySQL
Dist. Systems	MPI, IPFS, Ethereum Frameworks, Web3 Libraries
Web Frameworks	RESTful, HTTP, HTML, JSP, AJAX, Flask, Eclipse (Dynamic Web App)

REFERENCES

Available Upon Request.