Linh Thi Xuan Phan

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Research Interests

Cyber-physical systems; real-time and embedded systems; distributed systems; robotics; security.

Education

Ph.D. in Computer Science, National University of Singapore   Sep. 2009
   Dissertation: "Formal Modeling and Analysis of Streaming Applications"
   Advisors: P S Thiagarajan and Samarjit Chakraborty (UNC)
   Received the Dean's Graduate Research Excellence Award.

B.Comp. (Honors) in Computer Science, National University of Singapore   Aug. 2003

Academic Positions

University of Pennsylvania, Department of Computer and Information Science

Associate Professor	Feb. 2019 – present
Assistant Professor	Jul. 2016 – Mar. 2019
Assistant Research Professor	Jul. 2012 – Jun. 2016
Postdoctoral Researcher	Mar. 2010 – Jun. 2012
Research Associate	Mar. 2009 – Feb. 2010

Industry Position

Roblox, San Mateo, CA

Visiting Professor	January 2023 – present

Honors & Awards

- Best Paper Award, Real-time and IntelliGent Edge Computing Workshop (RAGE), 2023
- Best Paper Award Finalist, IEEE International Conference on Robotics and Automation (ICRA), 2021
- Outstanding Paper Award, International Conference on Real-Time Networks and Systems (RTNS), 2021
- Lindback Award for Distinguished Teaching, 2020
- Best Paper Award, IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), 2019
- Best Student Paper Award, IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), 2019
- CAREER Award, National Science Foundation, 2018
- Outstanding Paper Award, IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), 2018
- Member of the inaugural class of the ACM Future of Computing Academy, 2017
- Best Paper Award Nominee, IEEE Real-Time Systems Symposium (RTSS), 2013
- Best Paper Award Nominee, ACM/IEEE Intl. Conference on Embedded Software (EMSOFT), 2010

- Dean's Graduate Research Excellence Award, National University of Singapore, 2009
  Awarded to PhD students who have made significant research achievements during their PhD studies.
- Graduate Scholarship, National University of Singapore, 2003–2007 (four years)
- Singapore Scholarship, Singapore Ministry of Foreign Affairs, 1999–2003 (four years)
  Awarded to the most outstanding students from ASEAN countries to pursue a full-time undergraduate degree in any of the top two universities in Singapore with full tuition and allowance support.

Publications

Note: Students are underlined; acceptance rates, where available, are in parentheses.

JOURNAL PUBLICATIONS

1. A. Loveless, L. Erickson, **L. T. X. Phan**, R. Dreslinski, and B. Kasikci. *CROSSTALK: Making Low-Latency Fault Tolerance Cheap by Exploiting Redundant Networks.* ACM Transactions on Embedded Computing Systems (**TECS**), 22(5): Sep. 2023. 25 pages.

2. Y. Litman, N. Gandhi, **L. T. X. Phan**, and D. Saldaña. *Vision-Based Self-Assembly for Modular Multirotor Structures.* IEEE Robotics and Automation Letters (**RA-L**), 6(2): Apr. 2021. 8 pages.

3. N. Gandhi, D. Saldana, V. Kumar, and **L. T. X. Phan**. *Self-Reconfiguration in Response to Faults in Modular Aerial Systems.* IEEE Robotics and Automation Letters (**RA-L**), 5(2): Apr. 2020. 8 pages.

4. J. Lee, H. S. Chwa, **L. T. X. Phan**, I. Shin, and I. Lee. *MC-ADAPT: Adaptive Task Dropping in Mixed-Criticality Scheduling.* ACM Transactions on Embedded Computing Systems (**TECS**), 16 (5s): Sep. 2017. 21 pages. **[Special Issue of EMSOFT'17]**

5. D. Soudbakhsh, **L. T. X. Phan**, A. M. Annaswamy, and O. Sokolsky. *Co-Design of Arbitrated Network Control Systems with Overrun Strategies.* IEEE Transactions on Control of Network Systems (**TCNS**), 5 (1): 128-141, Mar. 2018. 14 pages.

6. M. Xu, **L. T. X. Phan**, O. Sokolsky, S. Xi, C. Lu, C. Gill, and I. Lee. *Cache-Aware Compositional Analysis of Real-Time Multicore Virtualization Platforms.* Springer International Journal of Time-Critical Computing Systems, 51(6): 675-723, Nov. 2015. 49 pages.

7. M. Anand, S. Fischmeister, I. Lee and **L. T. X. Phan**. *Analysis and Implementation of Stateful Schedules for Time-Triggered Communication.* Springer International Journal of Time-Critical Computing Systems, 48 (4): 430-462, 2012. 33 pages.

REFEREED CONFERENCE PUBLICATIONS

8. G. A. Bondar, R. Gifford, **L. T. X. Phan**, and A. Halder. *Path Structured Multimarginal Schrödinger Bridge for Probabilistic Learning of Hardware Resource Usage by Control Software.* Proceedings of the 2024 American Control Conference (**ACC**), Toronto, Canada, July 2024.

9. M. Sha, Y. Cai, S. Wang, **L. T. X. Phan**, F. Li, and K. Tan. *Object-oriented Unified Encrypted Memory Management for Heterogeneous Memory Architectures.* Proceedings of the 2024 ACM SIGMOD International Conference on Management of Data (**SIGMOD**), Santiago, Chile, June 2024.

10. R. Gifford, F. Galarza-Jimenez, **L. T. X. Phan**, and M. Zamani. *Decntr: Optimizing Safety and Schedulability with Multi-Mode Control and Resource Allocation Co-Design.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Hong Kong, May 2024.

11. A. Loveless, L. Erickson, **L. T. X. Phan**, R. Dreslinski, and B. Kasikci. *CROSSTALK: Making Low-Latency Fault Tolerance Cheap by Exploiting Redundant Networks.* Proceedings of the ACM/IEEE International Conference on Embedded Software (**EMSOFT**), Hamburg, Germany, Sep. 2023.

12. A. Heaberlen, **L. T. X. Phan**, and M. McGuire. *Metaverse as a Service: Megascale Social 3D on the Cloud.* Proceedings of the ACM Symposium on Cloud Computing (**SoCC**), Santa Cruz, CA, Oct. 2023.

13. A. Loveless, **L. T. X. Phan**, R. Dreslinski, and B. Kasikci *PCspooF: Compromising the Safety of Time-Triggered Ethernet.* Proceedings of the IEEE Symposium on Security and Privacy (**S&P**), San Francisco, CA, May 2023. 16 pages.

14. R. Gifford and **L. T. X. Phan**. *Multi-mode on Multi-core: Making the best of both worlds with Omni.* Proceedings of the IEEE Real-Time Systems Symposium (**RTSS**), Houston, TX, Dec. 2022. 10 pages.

15. M. Demoulin, J. Fried, I. Pedisich, M. Kogias, B. T. Loo, **L. T. X. Phan**, I. Zhang. *When Idling is Ideal: Optimizing Tail-Latency for Highly-Dispersed Datacenter Workloads with Perséphone.* Proceedings of the ACM Symposium on Operating Systems Principles (**SOSP**), virtual conference, Oct. 2021. 15 pages. (15.5%).

16. Y. Litman, N. Gandhi, **L. T. X. Phan**, and D. Saldana. *Vision-Based Self-Assembly for Modular Multirotor Structures.* Proceedings of the IEEE International Conference on Robotics and Automation (**ICRA**), May 2021. 6 pages. **[Best Paper Award Finalist]**

17. A. Loveless, R. Dreslinski, B. Kasikci, and **L. T. X. Phan**. *IGOR: Accelerating Byzantine Fault Tolerance for Real-Time Systems with Eager Execution.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Virtual, May 2021. 14 pages. (27.0%).

18. R. Gifford, N. Gandhi, **L. T. X. Phan**, and A. Haeberlen. *DNA: Dynamic Resource Allocation for Soft Real-Time Multicore Systems.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Virtual, May 2021. 14 pages. (27.0%).

19. N. Gandhi, E. Roth, B. Sandler, A. Haeberlen, and **L. T. X. Phan**. *REBOUND: Defending Distributed Systems Against Attacks with Bounded-Time Recovery.* Proceedings of the European Conference on Computer Systems (**EuroSys**), Virtual, April 2021. (17.0%).

20. H. Li, M. Xu, C. Li, C. Lu, C. Gill, **L. T. X. Phan**, I. Lee, and O. Sokolsky *Towards Virtualization-Agnostic Latency for Time-Sensitive Applications.* Proceedings of the International Conference on Real-Time Networks and Systems (**RTNS**), Virtual, April 2021. **[Outstanding Paper Award]**

21. N. Gandhi, D. Saldana, V. Kumar, and **L. T. X. Phan**. *Self-Reconfiguration in Response to Faults in Modular Aerial Systems.* Proceedings of the IEEE International Conference on Robotics and Automation (**ICRA**), May 2020. 8 pages

22. N. Gandhi, E. Roth, R. Gifford, **L. T. X. Phan**, and A. Haeberlen. *Bounded-time recovery for distributed real-time systems.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Sydney, Australia, Apr. 2020. 11 pages. (27.1%).

23. H. M. Demoulin, I. Pedisich, N. Vasilakis, V. Liu, B. T. Loo, and **L. T. X. Phan**. *Detecting Application-layer Denial-of-Service Attacks with FineLame.* Proceedings of the USENIX Annual Technical Conference (**ATC**), July 2019. (19.9%).

24. M. Xu, R. Gifford, **L. T. X. Phan**. *Multi-resource allocation for real-time multicore virtualization.* Proceedings of the Design Automation Conference (**DAC**), Las Vegas, NV, Jun. 2019. 6 pages. (18.9%).

25. S. Abedi, N. Gandhi, M. Demoulin, Y. Li, Y. Wu, and **L. T. X. Phan**. *RTNF: Predictable Latency for Network Function Virtualization.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Montreal, Canada, Apr. 2019. 10 pages. (25.8%). **[Best Paper Award]**

26. <u>M. Xu</u>, **L. T. X. Phan**, H. Choi, <u>Y. Lin</u>, <u>H. Li</u>, C. Lu, and I. Lee. *Holistic Resource Allocation for Multicore Real-Time Systems.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Montreal, Canada, Apr. 2019. 10 pages. (25.8%). **[Best Student Paper Award]**

27. <u>Y. Wu</u>, A. Chen, and **L. T. X. Phan**. *Zeno: Diagnosing Performance Problems with Temporal Provenance.* Proceedings of the USENIX Symposium on Networked Systems Design and Implementation (**NSDI**), Boston, MA, Feb. 2019. 12 pages. (20.6%).

28. <u>M. Demoulin</u>, T. Vaidya, I. Pedisich, <u>B. DiMaiolo</u>, <u>J. Qian</u>, <u>C. Shah</u>, Y. Zhang, A. Chen, A. Haeberlen, B. T. Loo, **L. T. X. Phan**, M. Sherr, C. Shields, and W. Zhou. *DeDoS: Defusing DoS with Dispersion Oriented Software.* Proceedings of the Annual Computer Security Applications Conference (**ACSAC**), San Juan, Puerto Rico, Dec. 2018. 10 pages. (20.1%).

29. J. Boudjadar, I. Lee, J. H. Kim, **L. T. X. Phan**, K. G. Larsen and U. Nyman. *Generic Formal Framework for Compositional Analysis of Hierarchical Scheduling Systems.* Proceedings of the 18th IEEE International Symposium on Object/Component/Service-Oriented Real-Time Distributed Computing (**ISORC**), Singapore, May 2018. 8 pages. (37.0%).

30. <u>T. Chen</u> and **L. T. X. Phan**. *SafeMC: A system for the design and evaluation of mode change protocols.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Porto, Portugal, Apr. 2018. 11 pages. (34.0%). **[Outstanding Paper Award]**

31. <u>H. Li</u>, <u>M. Xu</u>, <u>C. Li</u>, C. Lu, C. Gill, **L. T. X. Phan**, I. Lee, and O. Sokolsky. *Multi-Mode Virtualization for Soft Real-Time Systems.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Porto, Portugal, Apr. 2018. 10 pages. (34.0%).

32. H. Nguyen, <u>R. Ivanov</u>, **L. T. X. Phan**, O. Sokolsky, J. Weimer and I. Lee. *LogSafe: Secure and Scalable Data Logger for IoT Devices.* Proceedings of the IEEE International Conference on Internet-of-Things Design and Implementation (**IoTDI**), Orlando, FL, Apr. 2018. 12 pages. (23.6%).

33. Y. Tang, N. Guan, W. Liu, **L. T. X. Phan**, and W. Yi. *Revisiting GPC and AND Connector in Real-Time Calculus.* Proceedings of the IEEE Real-Time Systems Symposium (**RTSS**), Paris, France, Dec. 2017. 10 pages. (23.0%).

34. J. Lee, <u>H. S. Chwa</u>, **L. T. X. Phan**, I. Shin, and I. Lee. *MC-ADAPT: Adaptive Task Dropping in Mixed-Criticality Scheduling.* Proceedings of the IEEE/ACM International Conference on Embedded Software (**EMSOFT**), Seoul, Korea, Oct. 2017. 10 pages. (25.0%).

35. <u>M. Xu</u>, **L. T. X. Phan**, H.-Y. Choi, and Insup Lee. *vCAT: Dynamic Cache Management using CAT Virtualization.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Pittsburgh, PA, Apr. 2017. 10 pages. (34.0%).

36. D. de Niz, B. Andersson, H. Kim, M. Klein, **L. T. X. Phan**, and R. Rajkumar. *Mixed-Criticality Processing Pipelines.* Proceedings of the Design, Automation and Test in Europe (**DATE**), Lausanne, Switzerland, Mar. 2017. 4 pages. (24.0%).

37. H. Nguyen, <u>B. Acharya</u>, <u>R. Ivanov</u>, A. Haeberlen, **L. T. X. Phan**, O. Sokolsky, J. Walker, J. Weimer, W. Hanson, and I. Lee. *Cloud-Based Secure Logger For Medical Devices.* Proceedings of the IEEE Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE), Washington, DC, Jun. 2016. 6 pages.

38. <u>M. Xu</u>, **L. T. X. Phan**, H.-Y. Choi, and Insup Lee. *Analysis and Implementation of Global Preemptive Fixed-Priority Scheduling with Dynamic Cache Allocation.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Vienna, Austria, Apr. 2016. 10 pages. (27.0%).

39. Y. Li, **L. T. X. Phan**, and Boon Thau Loo. *NFV-RT: Network Function Virtualization with Soft Real-Time Guarantees.* Proceedings of the IEEE International Conference on Computer Communications (**INFOCOM**), San Francisco, CA, Apr. 2016. 9 pages. (18.2%).

40. J. Ren and **L. T. X. Phan**. *Mixed-Criticality Scheduling on Multiprocessors using Task Grouping.* Proceedings of the Euromicro Conference on Real-Time Systems (**ECRTS**), Lund, Sweden, Jul. 2015. 10 pages. (31%).

41. S. Xi, C. Li, C. Lu, C. Gill, M. Xu, **L. T. X. Phan**, I. Lee, and O. Sokolsky. *RT-OpenStack: CPU Resource Management for Real-Time Cloud Computing.* Proceedings of the IEEE International Conference on Cloud Computing (**CLOUD**), New York, NY, Jun. 2015. 8 pages. (17%).

42. J. Boudjadar, A. David, J. H. Kim, K. G. Larsen, M. Mikucionis, U. Nyman, A. Skou, I. Lee, and **L. T. X. Phan**. *Quantitative Schedulability Analysis of Continuous Probability Tasks in a Hierarchical Context.* Proceedings of the International ACM SIGSOFT Symposium on Component-Based Software Engineering (**CBSE**), Montréal, Canada, May 2015. 10 pages. (33%).

43. J. Boudjadar, A. David, J. H. Kim, K. G. Larsen, M. Mikucionis, U. Nyman, A. Skou, I. Lee, and **L. T. X. Phan**. *Flexible Framework for Statistical Schedulability Analysis of Probabilistic Sporadic Tasks.* Proceedings of the 18th IEEE International Symposium on Object/Component/Service-Oriented Real-Time Distributed Computing (**ISORC**), Auckland, New Zealand, Apr. 2015. 10 pages. (39%).

44. B. Kim, L. Feng, **L. T. X. Phan**, O. Sokoksky, and I. Lee. *Platform-Dependent Timing Verification Framework in Model-Based Implementation.* Proceedings of the Design Automation and Test in Europe (**DATE**) Conference, Grenoble, France, Mar. 2015. 6 pages. (22.4%).

45. A. Chen, W. B. Moore, H. Xiao, A. Haeberlen, **L. T. X. Phan**, M. Sherr, and W. Zhou. *Detecting Covert Timing Channels with Time-Deterministic Replay.* Proceedings of the USENIX Symposium on Operating Systems Design and Implementation (**OSDI**), Broomfield, CO, Oct. 2014. 14 pages. (13.5%).

46. S. Xi, M. Xu, C. Lu, **L. T. X. Phan**, C. Gill, O. Sokolsky and I. Lee. *Global Real-Time Multi-Core Virtual Machine Scheduling in Xen.* Proceedings of the ACM/IEEE International Conference on Embedded Software (**EMSOFT**), New Delhi, India, Oct. 2014. 10 pages. (25%).

47. D. de Niz and **L. T. X. Phan**. *Partitioned Scheduling of Multi-Modal Mixed-Criticality Real-Time Systems on Multiprocessor Platforms.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Berlin, Germany, Apr. 2014. 10 pages. (20%).

48. M. Xu, **L. T. X. Phan**, I. Lee, O. Sokolsky, S. Xi, C. Lu and C. Gill. *Cache-Aware Compositional Analysis of Real-Time Multicore Virtualization Platforms.* Proceedings of the IEEE Real-Time Systems Symposium (**RTSS**), Vancouver, Canada, Dec. 2013. 10 pages. (22%). **[Nominated for the Best Paper award]**

49. B. Kim, **L. T. X. Phan**, O. Sokolsky, and I. Lee. *Platform-Dependent Code Generation for Embedded Real-Time Software.* Proceedings of the International Conference on Compilers, Architectures and Synthesis of Embedded Systems (**CASES**), Montreal, Canada, Sep. 2013. 10 pages. (30.8%).

50. D. Soudbakhsh, **L. T. X. Phan**, O. Sokolsky, I. Lee and A. Annaswamy. *Co-design of Control and Platform with Dropped Signals.* Proceedings of the ACM/IEEE International Conference on Cyber-Physical Systems (**ICCPS**), Philadelphia, PA, Apr. 2013. 10 pages. (23%).

51. **L. T. X. Phan** and I. Lee. *Improving Schedulability of Fixed-Priority Real-Time Systems using Shapers.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Philadelphia, PA, Apr. 2013. 10 pages. (29%).

52. **L. T. X. Phan**, <u>M. Xu</u>, <u>J. Lee</u>, I. Lee and O. Sokolsky. *Overhead-Aware Compositional Analysis of Real-Time Systems.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Philadelphia, PA, Apr. 2013. 10 pages. (29%).

53. <u>C. Lin</u>, M. Di Natale, H. Zeng, **L. T. X. Phan** and A. Sangiovanni-Vincentelli. *Timing Analysis of Process Graphs with Finite Communication Buffers.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Philadelphia, PA, Apr. 2013. 10 pages. (29%).

54. <u>B. Kim</u>, **L. T. X. Phan**, I. Lee and O. Sokolsky. *A Model-Based I/O Interface Synthesis Framework for the Cross-Platform Software Model.* Proceedings of the IEEE International Symposium on Rapid System Prototyping (**RSP**), Tampere, Finland, Oct. 2012. 7 pages.

55. <u>J. Lee</u>, <u>S. Xi</u>, <u>S. Chen</u>, **L. T. X. Phan**, C. Gill, I. Lee, C. Lu and O. Sokolsky. *Realizing Compositional Scheduling through Virtualization.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Beijing, China, Apr. 2012. 10 pages. (23.6%).

56. D. Gangadharan, **L. T. X. Phan**, S. Chakraborty, R. Zimmermann, and I. Lee. *Video Quality Driven Buffer Sizing via Frame Drops.* Proceedings of the ACM Conference on Embedded and Real-Time Computing Systems and Applications (**RTCSA**), Toyama, Japan, Aug. 2011. 10 pages. (31.6%).

57. **L. T. X. Phan**, I. Lee, and O. Sokolsky. *A Semantic Framework for Multi-Mode Systems.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), San Francisco, CA, Apr. 2011. 10 pages. (20.8%).

58. <u>S. Chen</u>, **L. T. X. Phan**, <u>J. Lee</u>, I. Lee, and O. Sokolsky. *Removing Abstraction Overhead in the Composition of Hierarchical Real-Time Systems.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), San Francisco, CA, Apr. 2011. 10 pages. (20.8%).

59. Z. Zhang, **L. T. X. Phan**, G. Tan, <u>S. Jain</u>, <u>H. Duong</u>, B. T. Loo, and I. Lee. *On the Feasibility of Dynamic Rescheduling on the Intel Distributed Computing Platform.* Proceedings of the ACM/IFIP/USENIX International Middleware Conference (**Middleware**), Bangalore, India, Nov. 2010. 6 pages. (15.5%).

60. **L. T. X. Phan**, <u>R. Schneider</u>, S. Chakraborty, and I. Lee. *Modeling Buffers with Data Refresh Semantics in Automotive Architectures.* Proceedings of the ACM/IEEE International Conference on Embedded Software (**EMSOFT**), Scottsdale, AZ, Oct. 2010. 10 pages. (21.3%). **[Best Paper Award Nominee]**

61. **L. T. X. Phan**, I. Lee and O. Sokolsky. *Compositional Analysis of Multi-Mode Systems.* Proceedings of the Euromicro Conference on Real-Time Systems (**ECRTS**), Brussels, Belgium, Jul. 2010. 10 pages. (24.1%).

62. **L. T. X. Phan**, S. Chakraborty and I. Lee. *Timing Analysis of Mixed Time/Event-Triggered Multi-Mode Systems.* Proceedings of the IEEE Real-Time Systems Symposium (**RTSS**), Washington, DC, Dec. 2009. 10 pages. (22.3%).

63. A. Bouillard, **L. T. X. Phan** and S. Chakraborty. *Light-weight Modeling of Complex State Dependencies in Stream Processing Systems.* Proceedings of the IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), San Francisco, CA, Apr. 2009. 10 pages. (25.6%).

64. **L. T. X. Phan**, S. Chakraborty and P. S. Thiagarajan. *A Multi-Mode Real-Time Calculus.* Proceedings of the IEEE Real-Time Systems Symposium (**RTSS**), Barcelona, Spain, Dec. 2008. 11 pages. (23.3%).

65. **L. T. X. Phan**, S. Chakraborty, P. S. Thiagarajan, and L. Thiele. *Composing Functional and State-based Performance Models for Analyzing Heterogeneous Real-Time Systems.* Proceedings of the IEEE Real-Time Systems Symposium (**RTSS**), Tucson, AZ, Dec. 2007. 12 pages. (25.7%).

66. S. Chakraborty, **L. T. X. Phan**, and P. S. Thiagarajan. *Event Count Automata: A State-based Model for Stream Processing Systems.* Proceedings of the IEEE Real-Time Systems Symposium (**RTSS**), Miami,

FL, Dec. 2005. 12 pages. (21%). (*Authors are in alphabetical order.*)

Refereed Workshop Publications

67. N. Borgioli, **L. T. X. Phan**, A. Biondi, and G. Buttazzo. *Packet-based Real-Time Intrusion Detection on Edge Devices.* Packet-based Real-Time Intrusion Detection on Edge Devices. Proceedings of Real-time and IntelliGent Edge Computing Workshop (RAGE), May 2023. **[Best Paper Award]**

68. **L. T. X. Phan** and R. Sanfelice. *Mitigating Computational Constraints via Adaptive Control and Resource Allocation Co-design.* 2nd Workshop on Computation-Aware Algorithmic Design for Cyber-Physical Systems (CAADCPS), 2022.

69. H. M. Demoulin, N. Vasilakis, J. Sonchack, I. Pedisich, V. Liu, B. T. Loo, **L. T. X. Phan**, J. M. Smith, and I. Zhang. *TMC: Tunable Multicast Communication.* 3rd Asia-Pacific Workshop on Networking (APNET), Beijing, China, Aug. 2019. 6 pages.

70. M. Demoulin, I. Pedisich, **L. T. X. Phan**, and B. T. Loo. *Automated Detection and Mitigation of Application-level Asymmetric DoS Attacks.* ACM SIGCOMM 2018 Workshop on Self-Driving Networks (SelfDN), Budapest, Hungary, Aug. 2018. 6 pages.

71. **L. T. X. Phan**. *Real-Time Network Function Virtualization with Timing Interfaces.* Proceedings of the IEEE Workshop on Compositional Theory and Technology for Real-Time Embedded Systems (**CRTS**), Porto, Portugal, Nov. 2016. 6 pages.

72. A. Chen, A. Sriraman, T. Vaidya, Y. Zhang, A. Haeberlen, B. T. Loo, L. T. X. Phan, M. Sherr, C. Shields, and W. Zhou *Dispersing Asymmetric DDoS Attacks with SplitStack.* Proceedings of the ACM Workshop on Hot Topics in Networks (**HotNets**), Atlanta, GA, Nov. 2016. 8 pages. (28.0%).

73. **L. T. X. Phan**, M. Xu, and I. Lee. *Cache-aware Interfaces for Compositional Real-Time Systems.* Proceedings of the IEEE Workshop on Compositional Theory and Technology for Real-Time Embedded Systems (**CRTS**), San Antonio, TX, Dec. 2015. 4 pages. **[Invited Paper]**

74. A. Chen, H. Xiao, A. Haeberlen, and **L. T. X. Phan**. *Fault Tolerance and the Five-Second Rule.* Proceedings of the 15th Workshop on Hot Topics in Operating Systems (**HotOS**), Kartause Ittingen, Switzerland, May 2015. 7 pages. (32.2%).

75. **L. T. X. Phan**. *Towards a Safe Compositional Scheduling Theory for Cyber-Physical Systems.* Proceedings of the Analytic Virtual Integration of Cyber-Physical Systems Workshop (**AVICPS**), Vancouver, Canada, Dec. 2013. 4 pages.

76. Y. Li, D. Chiu, C. Liu, **L. T. X. Phan**, T. Gill, S. Aggawal, Z. Zhang, B. T. Loo and B. McManus. *Towards Dynamic Pricing-Based Collaborative Optimization for Green Data Centers.* Proceedings of the International Workshop on Data Management in the Cloud (**DMC**), Brisbane, Australia, Apr. 2013. 7 pages.

77. **L. T. X. Phan**, Z. Zhang, Q. Zheng, B. T. Loo and I. Lee. *An Empirical Analysis of Scheduling Techniques for Real-time Cloud-based Data Processing.* Proceedings of the IEEE International Workshop on Real-Time Service-Oriented Architectures and Applications (**RTSOAA**), UC Irvine, CA, Dec. 2011. 8 pages.

78. **L. T. X. Phan** and I. Lee. *Towards a Compositional Multi-Modal Framework for Adaptive Cyber-Physical Systems.* Proceedings of the IEEE Workshop on Cyber-Physical Systems, Networks, and Applications (**CPSNA**), Toyama, Japan, Aug. 2011. 7 pages. **[Invited paper]**

79. **L. T. X. Phan**, J. Lee, A. Easwaran, V. Ramaswamy, S. Chen, I. Lee, and O. Sokolsky. *CARTS: A Tool for Compositional Analysis of Real-Time Systems.* Proceedings of the IEEE Workshop on Compositional Theory and Technology for Real-Time Embedded Systems (**CRTS**), San Diego, CA, Nov. 2010. 2 pages. (Tool paper)

80. J. Lee, **L. T. X. Phan**, S. Chen, O. Sokolsky, and I. Lee. *Improving Resource Utilization for Compositional Scheduling using DPRM Interfaces.* Proceedings of the IEEE Workshop on Compositional Theory and Technology for Real-Time Embedded Systems (**CRTS**), San Diego, CA, Nov. 2010. 8 pages.

81. A. Easwaran, M. Anand, I. Lee, **L. T. X. Phan**, and O. Sokolsky. *Simulation Relations, Interface Complexity, and Resource Optimality for Real-Time Hierarchical Systems.* Proceedings of the International Workshop on Reconciling Performance with Predictability (**RePP**), Grenoble, France, Oct. 2009. 6 pages.

82. K. D. Nguyen, I. Cutcutache, E. Sim, **L. T. X. Phan**, N. T. T. Dang, K. Wai, Z. Sun, T. B. Tok, L. Xu, F. E. H. Tay and W.-F. Wong. *BSN Simulator: Optimizing Application Using System Level Simulation.* Proceedings of the International Workshop on Wearable and Implantable Body Sensor Networks (**BSN**), Berkeley, CA, Jun. 2009. 6 pages.

83. K. D. Nguyen, I. Cutcutache, S. Sinnadurai, S. Liu, C. Basol, E. Sim, **L. T. X. Phan**, T. B. Tok, L. Xu, F. E. H. Tay, T. Mitra, W.-F. Wong. *Fast and Accurate Simulation of Biomonitoring Applications on a Wireless Body Area Network.* Proceedings of the International Workshop on Wearable and Implantable Body Sensor Networks (**BSN**), Hong Kong, China, Jun. 2008. 4 pages.

Technical reports

84. **L. T. X. Phan**, Z. Zhang, B. T. Loo, and I. Lee. *Real-time MapReduce Scheduling.* University of Pennsylvania. Technical Report No. MS-CIS-10-32. Jan. 2010. 6 pages.

Demos

85. H. M. Demoulin, T. Vaidya, I. Pedisich, N. Sultana, J. Qian, B. Wang, Y. Zhang, A. Chen, A. Haeberlen, B. T. Loo, **L. T. X. Phan**, M. Sherr, C. Shields, and W. Zhou. *A Demonstration of the DeDoS Platform for Defusing Asymmetric DDoS Attacks in Data Centers.* Presented at SIGCOMM 2017. **[First prize for the ACM Student Research Competition at SIGCOMM'17.]**

Theses

86. *Formal Modeling and Analysis of Streaming Applications.* Ph.D. Thesis, 2009.

87. *Task Event Structure Scheduling in Real-Time Systems.* Bachelor Honours Year Thesis, 2003.

Other Publications

88. **L. T. X. Phan** and I. Lee. *A Multi-Modal Composability Framework for Cyber-Physical Systems.* Safe and Secure Systems and Software Symposium (S5), Beavercreek, Ohio, Jun. 2012. (Extended Abstract)

89. **L. T. X. Phan**, I. Lee, and O. Sokolsky. *Compositional Analysis Framework for Real-Time Systems.* Proceedings of the International Conference on Compilers, Architectures and Synthesis of Embedded Systems (**CASES**), Taipei, Taiwan, Aug. 2011. (Extended Abstract)

90. **L. T. X. Phan**. *Formal Modelling and Analysis of Stream Processing Systems.* EDAA/ACM PhD Forum at DATE, Dresden, Germany, Mar. 2010. (Extended Abstract)

91. **L. T. X. Phan**. *Enhanced Route Advisory Systems.* National Undergraduate Research Opportunities Programme Congress, Singapore, 2001.

92. **L. T. X. Phan**. *Finding Gröbner Bases Visually.* National Undergraduate Research Opportunities Programme Congress, Singapore, 2000.

Patent

93. A. Chen, H. Xiao, W. Moore, A. Haeberlen, **L. T. X. Phan**, M. Sherr, and W. Zhou. *Methods, Systems, and Computer Readable Media for Detecting Covert Timing Channels..* U.S. patent no. 10437993; issued Oct. 8, 2019. 46 pages.

Funding

Current Grants

- *Computation-Aware Algorithmic Design for Cyber-Physical Systems.*
  Co-PI with PI Ricardo Sanfelice (UCSC) and co-PIs Murat Arcak (UC Berkerley), Majid Zamani (CU Boulder), Jonathan Sprinkle (Vanderbilt); Heiner Litz (UCSC) and Abhishek Halder (UCSC).
  NSF CNS CPS Frontier, $5.8M, 01/2022–01/2027.

- *The Synchronous Data Center.*
  Co-PI with PI Andreas Haeberlen. NSF CNS Core Medium, $1.2M, 09/2020–09/2024.

- *CAREER: Resilient Execution with Bounded-Time Recovery (REBOUND).*
  PI. NSF CNS SaTC CAREER, $475K, 9/2018–8/2024.

Past Grants

- *Diagnosing Datacenter Networks with Qualitative Provenance.*
  PI with co-PIs Andreas Haeberlen, Boon Thau Loo, and Wenchao Zhou (Georgetown).
  NSF CSR NeTS Medium, $1.2M, 9/2017–8/2023.

- *Guaranteeing Data Freshness in Distributed Real-Time Systems.*
  Co-PI with PI Insup Lee and co-PI Oleg Sokolsky.
  ONR, $900K, 1/2020–12/2022.

- *Network Functions Virtualization with Timing Guarantees.*
  PI with co-PIs Andreas Haeberlen and Boon Thau Loo.
  NSF CSR NeTS Medium, $1.1M, 9/2016–08/2022.

- *ProNet: Programmable Networks Enabled by Fast In-Path Analytics.*
  Co-PI with Penn PI Boon Thau Loo and co-PIs Andreas Haeberlen and André DeHon.
  Joint project with Applied Communication Sciences and Princeton.
  DARPA DCOMP, $12.5M total (Penn: $1.7M), 4/2017–4/2021.

- *DeDOS: Declarative Dispersion-Oriented Software.*
  Co-PI with PI Boon Thau Loo and co-PI Andreas Haeberlen.
  DARPA XD3, $3.5M, 7/2016–5/2020.

- *Dynamic Real-Time Virtualization and Cloud Computing.*
  Co-PI with PI Insup Lee and co-PI Oleg Sokolsky.
  ONR, $750K, 2/2016–1/2019.

- *Security and Privacy-Aware Cyber-Physical Systems.*
  Co-PI with PI Insup Lee and co-PIs Andreas Haeberlen, Nadia Heninger, George Pappas, Oleg Sokolsky, Kang Shin (University of Michigan), and Miroslav Pajic (Duke University).
  NSF/Intel CPS Security, $2.25M, 09/2015–08/2018.

- *Safety-Feature Modeling and Adaptive Resource Management for Mixed-Criticality CPS.*
  Co-PI with PI Oleg Sokolsky and co-PI Insup Lee.
  NSF CNS CPS Synergy, $600K, 09/2013–08/2017.

- *Resource Management for Real-Time Cloud Computing.*
  PI with co-PIs Boon Thau Loo and Insup Lee.
  NSF CNS CSR Small, $450K, 09/2011–08/2016.

- *Co-Design of Multimodal CPS Architectures and Adaptive Controllers.*
  Co-PI with PI Oleg Sokolsky.
  NSF ECCS CPS Medium, $900K, 09/2011–08/2016.

- *Theory and Virtualization Platform for Compositional Real-Time Systems.*
  Co-PI with PI Insup Lee and co-PI Oleg Sokolsky.
  ONR, $456K, 08/2013–07/2016.

- *Compositional Framework for Complex Real-time Systems on Multicore Platforms.*
  Co-PI with PI Insup Lee and co-PI Oleg Sokolsky.
  ARO, $368K, 09/2011–08/2014.

Teaching Experience

Instructor, University of Pennsylvania

- CIS 5050: Software Systems, Spring 2024 (Enrollment: 120)
  Instructor quality: N/A; Course quality: N/A.
- CIS 4550/5550: Internet & Web Systems, Fall 2023 (Enrollment: 78)
  Instructor quality: 3.51/4; Course quality: 3.39/4.
- CIS 5050: Software Systems, Spring 2023 (Enrollment: 90)
  Instructor quality: 3.57/4; Course quality: 3.49/4.
- CIS 5050: Software Systems, Fall 2022 (Enrollment: 106)
  Instructor quality: 3.67/4; Course quality: 3.56/4.
- CIS 505: Software Systems, Fall 2021 (Enrollment: 104)
  Instructor quality: 3.51/4; Course quality: 3.52/4.
- CIS 505: Software Systems, Fall 2020 (Enrollment: 113)
  Instructor quality: 3.71/4; Course quality: 3.63/4.
- CIS 505: Software Systems, Fall 2019 (Enrollment: 106)
  Instructor quality: 3.51/4; Course quality: 3.47/4.
- CIS 505: Software Systems, Fall 2018 (Enrollment: 80)
  Instructor quality: 3.51/4; Course quality: 3.45/4.
- CIS 505: Software Systems, Spring 2018 (Enrollment: 103)
  Instructor quality: 3.45/4; Course quality: 3.42/4.
- CIS 505: Software Systems, Fall 2017 (Enrollment: 72)
  Instructor quality: 3.53/4; Course quality: 3.44/4.
- CIS 505: Software Systems, Spring 2017 (Enrollment: 87)
  Instructor quality: 3.09/4; Course quality: 3.09/4.
- CIS 505: Software Systems, Fall 2016 (Enrollment: 37)
  Instructor quality 3.35/4; Course quality 3.24/4.

Teaching Assistant, National University of Singapore

- CS 4271: Critical Systems and their Verification, 2008
- CS 4272: Hardware-software Co-design, 2004, 2005, and 2006
- CS 5270: Verification of Real-time Systems, 2002, 2004, and 2005
- CS 1101S: Programming Methodology (Scheme), 2000 and 2001

University and Departmental Service

- Co-Director, MSE in Data Science (DATS), 2019 – present
- SEAS Faculty Council, 2019 – 2022
- Lindback Award Selection Committee, 2022
- CIS Distinguished Lecture Series Chair, 2018 – 2020
- MSE CIS Admissions Committee, 2016 and 2017

Research Community Leadership

- Steering Committee, ACM SIGBED International Conference on Embedded Software (EMSOFT), 2021 – present
- Steering Committee, International Conference on Real-Time Networks and Systems (RTNS), 2022 – present
- Secretary/Treasurer, ACM SIGBED, July 2019 – July 2021
- Executive Committee, ACM SIGBED, July 2019 – July 2021
- Executive Committee, IEEE Technical Committee on Real-Time Systems (TCRTS), 2016 – 2019
- Steering Committee, IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), 2016 – 2019
- Steering Committee, IEEE Real-Time Systems Symposium (RTSS), 2016 – 2019
- Diversity Subcommittee, IEEE Technical Committee on Real-Time Systems (TCRTS), 2016 – 2019
- Expert Advisor, Hiring Committee, Faculty of Science and Technology, Uppsala University, 2021
- ACM Future of Computing Academy, 2017 – 2020

Advising & Committees

Graduated Doctoral Students

- Henri Max Demoulin (co-advised with Boon Thau Loo)
  First employment: Senior software engineer at Astronomer.
- Meng Xu (co-advised with Insup Lee)
  First employment: Senior software engineer at Apple.
- Yang Li (co-advised with Boon Thau Loo and Sanjeev Khanna)
  First employment: Research scientist at Facebook.
- Jaewoo Lee (co-advised with Insup Lee)
  First employment: Assistant professor at Chung-Ang University, Korea.

Current Doctoral Students

- Neeraj Gandhi (expected graduation: Spring 2024)
- Robert Gifford (co-advised with Andreas Haeberlen; expected graduation: Fall 2024)
- Karan Newatia (co-advised with Andreas Haeberlen)
- Yifan Cai (co-advised with Andreas Haeberlen)

Master's Research Advisees

- Jiaqi Lian (MSE ROBO Master's Thesis, Fall 2023-Spring 2024)
- Yifan Wang (MSE ROBO Master's Thesis, Fall 2023-Spring 2024)
- Ruirui Ma (MSE ROBO, Independent study, Spring 2024)
- Duy Duc Doan (Independent study, Spring 2023)
- Shubhendra Pal Singhal (Independent study, Spring 2022)
- Mauricio Sifontes (Independent study, Spring 2020)
- Alice Cheng (Independent study, Spring 2019)
- Saeed Abedi (Research assistant; graduated in May 2019). First employment: Oracle.
- Sarvesh Surana (Independent study, Spring 2018)
- Animesh Shah (Independent study, Spring 2018)
- Bhairavi Mehta (Independent study, Spring 2018)
- Swachhand Lokhande (Independent study, Spring 2018)
- Tilak Raj Singh (Independent study, Spring 2018)

- Kenny Foner (Independent study, Spring 2018)
- Venkata Bharath Reddy Karnati (Research assistant, 2017)
- Ruifu Zhang (Independent studies, Fall 2016 and Spring 2017)
- Tianyang Chen (Master's thesis; graduated in May 2017). First employment: Oracle.
- Shengda Ding (Master's thesis; graduated in May 2015). First employment: Oracle.
- Meng Xu (Master's thesis; graduated in May 2013)

Undergraduate Research Advisees
- Current: Paul Loh, Eduardo Gonzalez, Hetvi Shah, Ana Izecksohn Moreira, Aarushi Singh
- Past: Sidharth Sankhe, Liana Patel, Sanjit Kalapatapu, Claudia Zhu, Victoria Huang, Victoria Xao, Akash Subramanian, Deepan Saravanan, Jiahui Jiao, Razzi Abuissa, Alex Lyons, Alex Brashear, Dong Young Kim, Albert Shu, Indu Subbaraj, Thanat Owlarn, Cheng Luo.

Committees
- Ph.D. thesis committee: Niccoló Borgioli, 2024 (Scuola Universitaria Superiore Pisa, Italy); Andrew Loveless, 2023 (University of Michigan); Omar Navarro Leija, 2022 (Penn, Comittee Chair); Saravanan Ramanathan, 2021 (Nanyang Technological University, Singapore); Arpan Gujarati, 2019 (MPI-SWS, Germany); Baek-Gyu Kim, 2015 (Penn, Comittee Chair).
- WPE-2 committee: Bhavana Mehta, 2023; Yuxuan Zhang, 2022; Dagaen Golomb, 2022; Kelvin Ng, 2021 (Chair); Jaewoo Lee, 2015; Baek-Gyu Kim, 2014; Andrew King, 2013.
- Master's thesis committee: Charu Jangid, 2014; Sanchit Aggarwal, 2013; Tanveer Gill, 2013.

Academic Advisees
- As Co-Director of the MSE in Data Science program, I serve as an academic advisor for a large number of students (several dozens to 100) each semester.

Tutorials, Invited Talks & Conference Presentations

Tutorials
1. *Compositional Real-Time Analysis for Cyber-Physical Systems.* Given at the Cyber-Physical Systems Week, Beijing, China, Apr. 2012.
2. *Compositional Analysis Framework for Real-Time Systems.* Given at the Embedded Systems Week, Taipei, Taiwan, Aug. 2011.

Invited Talks
1. *Resilient Cyber-Physical Systems.*
   University of California at Santa Cruz, Joint CPS Center and ECE Department Seminar Series, May 2022.

2. *Foundations of Time-Critical Cyber-Physical Systems.*
   University of California at Berkeley, DREAMS/CPAR Seminar, Apr. 2021.

3. *Reliable Real-Time Infrastructure for Cyber-Physical Systems.*
   University of Illinois at Urbana-Champaign, CS Colloquium, Nov. 2019.

4. *Timing Guarantees for Cyber-Physical Systems.*
   University of North Carolina at Chapel Hill, CS Department, Apr. 2016.

5. *Timing Guarantees for Cyber-Physical Systems.*
   Carnegie Mellon University, ECE Department, Pittsburgh, Apr. 2016.

6. *Timing Guarantees for Cyber-Physical Systems.*
   University of Pennsylvania, CS Department, Apr. 2016.

7. *Timing Guarantees for Cyber-Physical Systems.*
   University of Maryland at College Park, joint CS/ECE talk, Apr. 2016.

8. *Timing Guarantees for Cyber-Physical Systems.*
   Washington University in St. Louis, CS Department, Mar. 2016.

9. *Timing Guarantees for Cyber-Physical Systems.*
   University of Southern California, CS Department, Mar. 2016.

10. *Timing Guarantees for Cyber-Physical Systems.*
    Max Planck Institute for Software Systems, Feb 2016.

11. *Timing Guarantees for Cyber-Physical Systems.*
    Carnegie Mellon University, Silicon Valley, Feb 2016.

12. *Timing Guarantees for Cyber-Physical Systems.*
    Boston University, CS Department, Feb 2016.

13. *Timing Guarantees for Cyber-Physical Systems.*
    Duke University, ECE Department, Jan 2016.

14. *Compositional Design and Analysis of Cyber-Physical Systems.*
    Department of Computer and Information Science, Temple University, Sep. 2013.

15. *Platform Design and Compositional Analysis of Real-Time Embedded Systems.*
    DREAMS Seminar, EECS Department, University of California at Berkeley, Feb. 2013.

16. *A Multi-Modal Composability Framework for Cyber-Physical Systems.*
    Safe and Secure Systems and Software Symposium (S5), Beavercreek, Ohio, Jun. 2012.

17. *Compositional and Multi-Modal Analysis of Cyber-Physical Systems.*
    Department of Computer and Information Science, University of Pennsylvania, Dec. 2011.

18. *Compositional Analysis of Multi-Mode Systems.*
    Institut fuer Datentechnik und Kommunikationsnetze (IDA), Germany, Jul. 2010.

19. *Formal Analysis of Multi-Mode Systems.*
    Max Planck Institute for Software Systems, Germany, Jul. 2010.

20. *Timing Analysis of Mixed Time/Event-Triggered Multi-Mode Systems.*
    Department of Computer Science, Saarland University, Germany, Jul. 2010.

21. *Timing Analysis of Multi-Mode Systems.*
    Institute for Real-Time Computer Systems, TU Munich, Germany, Mar. 2010.

22. *Formal Modeling and Analysis of Stream Processing Systems.*
    Department of Electrical and Computer Engineering, University of Waterloo, Canada, Oct. 2009.

23. *Formal Analysis of Streaming Applications.*
    Department of Computer Science, National University of Singapore, Feb. 2009.

Conference Presentations

1. *Holistic Resource Allocation for Multicore Real-Time Systems.* IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Montreal, Canada, April 2019.

2. *SafeMC: A system for the design and evaluation of mode-change protocols.* IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Porto, Portugal, April 2018.

3. *Real-Time Network Function Virtualization with Timing Interfaces.* IEEE Workshop on Compositional Theory and Technology for Real-Time Embedded Systems (**CRTS**), Porto, Portugal, Nov. 2016.

4. *Cache-aware Interfaces for Compositional Real-Time Systems.* IEEE Workshop on Compositional Theory and Technology for Real-Time Embedded Systems (**CRTS**), San Antonio, TX, Dec. 2015.

5. *Mixed-Criticality Scheduling on Multiprocessors using Task Grouping.* Euromicro Conference on Real-Time Systems (**ECRTS**), Lund, Sweden, Jul. 2015.

6. *Improving Schedulability of Fixed-Priority Real-Time Systems using Shapers.* IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Philadelphia, Apr. 2013

7. *Video Quality Driven Buffer Sizing via Frame Drops.* ACM Conference on Embedded and Real-Time Computing Systems and Applications (**RTCSA**), Toyama, Japan, Aug. 2011

8. *Towards a Compositional Multi-Modal Framework for Adaptive Cyber-Physical Systems.* IEEE Workshop on Cyber-Physical Systems, Networks, and Applications (**CPSNA**), Toyama, Japan, Aug. 2011.

9. *An Empirical Analysis of Scheduling Techniques for Real-time Cloud-based Data Processing.* IEEE International Workshop on Real-Time Service-Oriented Architectures and Applications (**RTSOAA**), UC Irvine, California, Dec. 2011.

10. *Formal Semantic Framework for Multi-Mode Systems.* IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), Chicago, Apr. 2011.

11. *CARTS: A Tool for Compositional Analysis of Real-Time Systems.* IEEE Workshop on Compositional Theory and Technology for Real-Time Embedded Systems (**CRTS**), San Diego, Nov. 2011.

12. *Modeling Buffers with Data Refresh Semantics in Automotive Architectures.* ACM/IEEE International Conference on Embedded Software (**EMSOFT**), Scottsdale, Arizona, Oct. 2010.

13. *Compositional Analysis of Multi-Mode Systems.* Euromicro Conference on Real-Time Systems (**ECRTS**), Brussels, Belgium, Jul. 2010.

14. *Timing Analysis of Mixed Time/Event-Triggered Multi-Mode Systems.* IEEE Real-Time Systems Symposium (**RTSS**), Washington D.C., Dec. 2009.

15. *Functional Modeling of Complex State Dependencies in Stream Processing Systems.* IEEE Real-Time and Embedded Technology and Applications Symposium (**RTAS**), San Francisco, California, Apr. 2009.

16. *A Multi-Mode Real-Time Calculus.* IEEE Real-Time Systems Symposium (**RTSS**), Barcelona, Spain, Dec. 2008.

17. *Composing Functional and State-based Performance Models for Analyzing Heterogeneous Real-Time Systems.* IEEE Real-Time Systems Symposium (**RTSS**), Tucson, Arizona, Dec. 2007.

Software

- **RT-Xen**: An open-source real-time virtualization platform based on Xen. Part of the VMM real-time schedulers in RT-Xen are included in the Xen 4.5 release.
  https://sites.google.com/site/realtimexen/
  http://wiki.xenproject.org/wiki/RTDS-Based-Scheduler/

- **CARTS**: An open-source tool for the compositional analysis of real-time embedded systems.
  http://rtg.cis.upenn.edu/carts/

Press Coverage

- Penn Today, Identifying a vulnerability in critical spacecraft networks (Jan. 5, 2023)
- Technology Org, Identifying a vulnerability in critical spacecraft networks (Jan 9, 2023)
- The Aerospace Corporation, Introducing SPARTA using PCSpooF: Cyber Security for Space Missions (Dec. 5, 2022)
- Ars Technica, Researchers break security guarantees of TTE networking used in spacecraft (Nov. 15, 2022)
- Security Week, Networking Tech Vulnerability Could Be Used to Hack Spacecraft (Nov. 16, 2022)

- The Daily Pennsylvanian, Penn researcher joins $5.7 million multi-institutional cyber-physical systems program (Aug. 30, 2022)
- Penn Engineering, Linh Thi Xuan Phan Joins NSF Project on Cyber-Physical Systems for Transportation Technology (Jun. 30, 2022)
- Penn Engineering, Linh Thi Xuan Phan Receives Lindback Award for Distinguished Teaching (May 4, 2020)
- Penn Engineering, Penn Engineering's Linh Phan is Protecting Cyber-Physical Systems (Mar. 3, 2017)

Professional Activities

Editorship
- Associate Editor, ACM Transactions on Embedded Computing Systems (TECS), 2020 – present
- Associate Editor, ACM Transactions on Cyber-Physical Systems (TCPS), 2021 – present

Conference Organization
- Co-organizer, Workshop on Computation-Aware Algorithmic Design for Cyber-Physical Systems (CAADCPS), 2021–2024
- PC Chair, ACM SIGBED International Conference on Embedded Software (EMSOFT), 2021
- PC Co-Chair, ACM SIGBED International Conference on Embedded Software (EMSOFT), 2020
- Track Chair, IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), 2018
- Publication Chair, Embedded Systems Week (ESWeek), 2017
- Topic Chair, Topic E3, Design Automation and Test in Europe Conference (DATE), 2016
- Topic Co-Chair, Topic E3, Design Automation and Test in Europe Conference (DATE), 2015
- Web Chair and Poster Chair, Cyber-Physical Systems Week (CPSWeek), 2013
- Work-In-Progress Chair, Euromicro Conference on Real-Time Systems (ECRTS), 2013
- Publicity Chair, IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA), 2013
- PC Chair, Compositional Theory and Technology for Real-Time Embedded Systems Workshop (CRTS), co-located with RTSS, 2011
- PC Co-Chair, Adaptive and Reconfigurable Embedded Systems Workshop (APRES), CPS Week, 2011

Program Committees (Conferences)
1. IEEE Real-Time Systems Symposium (RTSS), 2012, 2013, 2015, 2016, 2017, 2021, 2024
2. ACM/IEEE International Conference on Embedded Software (EMSOFT), 2015, 2016, 2020, 2021, 2023, 2024
3. Euromicro Conference on Real-Time Systems (ECRTS), 2013, 2015, 2016, 2022, 2024
4. Design Automation Conference (DAC), 2015, 2016, 2020, 2024
5. ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), 2024
6. IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), 2014, 2015, 2017, 2018, 2020
7. IEEE International Conference on Sensing, Communication and Networking (SECON), 2020
8. Design Automation and Test in Europe Conference (DATE), 2014, 2015, 2016
9. ACM Conference on Languages, Compilers, Tools and Theory for Embedded Systems (LCTES), 2015
10. IEEE/ACM International Conference on Computer-Aided Design (ICCAD), 2013
11. IEEE International Conference on Industrial Informatics (INDIN), Special Session on Automotive Communication, 2016

12. IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA), 2013, 2016
13. IEEE International Conference on Emerging Technologies and Factory Automation (ETFA), 2011, 2012, 2013
14. IEEE International Conference on Parallel and Distributed Systems (ICPADS), 2013
15. IEEE International Conference on Cyber-Physical Systems, Networks, and Applications (CPSNA), 2011, 2012, 2013
16. International Conference on Embedded and Multimedia Computing (EMC), 2010, 2011

PROGRAM COMMITTEES (WORKSHOPS)

1. Workshop on Computation-Aware Algorithmic Design for Cyber-Physical Systems (CAADCPS), 2021, 2022
2. Workshop on Compositional Theory and Technology for RTES (CRTS), 2011, 2012, 2013, 2014, 2015, 2018
3. Workshop on Analytic Virtual Integration of Cyber-Physical Systems (AVICPS), 2013, 2014
4. Workshop on Adaptive and Reconfigurable Embedded Systems (APRES), 2012, 2013
5. Workshop on Mobile Cloud Computing in Healthcare, 2013
6. Workshop on Grid-Friendly Computing, 2013
7. International Workshop on Worst-case Traverse Time, 2011, 2012
8. IEEE Real-Time Systems at Work, RTSS, 2011, 2012

PANELS AND REVIEWS

- **DoE, Office of Science:** Panel on Distributed Resilient Systems.
- **National Science Foundation:** 2 panels.
- **External Grant Reviewer:** Portuguese Foundation for Science and Technology (2012); Danish National Research Foundation (2013); Hong Kong Research Grants Council (2022)
- **Journal Reviewer:** Springer International Journal of Time-Critical Computing Systems; ACM Transactions on Embedded Computing Systems; IEEE Transactions on Industrial Informatics; Springer International Journal of Formal Methods and System Design; IEEE Embedded Systems Letters; European Association for Signal Processing Journal on Embedded Systems; EUROMICRO Journal of Systems Architecture; Springer Design Automation for Embedded Systems; ACM Transactions on Design Automation of Electronic Systems; IEEE Transactions on Computers; IEEE Transactions on Software Engineering.