

# Curriculum Vitae

**An-I A. Wang**

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## General Information

University address: Computer Science  
College of Arts and Sciences  
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Florida State University  
Tallahassee, Florida 32306-4530  
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## Professional Preparation

2003 Ph.D., University Of California, Los Angeles. Major: Computer Science.  
Specialization: Operating Systems. Supervisor: Gerald Popek.

Wang, An-I A. (2003). *The Conquest File System: A Disk/Persistent-RAM Hybrid Design for Better Performance and Simpler Data Paths*. (Doctoral dissertation, University Of California, Los Angeles). Retrieved from ProQuest Dissertations and Theses, <http://search.proquest.com/docview/305353494?accountid=4840,3094262>.

1998 M.S., University of California, Los Angeles. Major: Computer Science.  
Specialization: Operating Systems. Supervisor: Gerald Popek.

Wang, An-I A. (1998). *Simulation Evaluation for Optimistically Replicated Filing Environments*. Unpublished master's thesis, University of California, Los Angeles.

1995 B.A., University of California, Berkeley. Major: Computer Science. summa cum laude.

## Professional Experience

2017–present Professor, Computer Science, Florida State University.

- 2009–present Associate Professor, Computer Science, Florida State University.  
Sabbatical and Parental Leave, 2011.
- 2003–2009 Assistant Professor, Computer Science, Florida State University.
- 2003 Lecturer, University of California, Los Angeles.
- 1995–2003 Research Assistant, University of California, Los Angeles.
- 2000 Teaching Assistant, University of California, Los Angeles.
- 1994 EECS Summer Intern, IBM Almaden Research Center.

### **Areas of Expertise**

file systems, storage systems, operating systems, distributed systems, optimistic replication, ad hoc network routing.

### **Honors, Awards, and Prizes**

Excellence in Teaching Award, The Alpha of Florida Chapter of Phi Beta Kappa (2019).  
Nominee, FSU Developing Scholar Award, Florida State University (2010).  
Nominee, University Undergraduate Teaching Award, Florida State University (2010).  
NSF Faculty Early Career Development Award, National Science Foundation (2009).  
Nominee, University Undergraduate Teaching Award, Florida State University (2006).

### **Current Membership in Professional Organizations**

Association for Computing Machinery, Inc. (ACM)  
USENIX: The Advanced Computing Systems Association

### **Teaching**

#### **Courses Taught**

Computer Systems Performance Evaluation (CIS5105)  
Storage Research (CIS5900)  
Systems Security Research (CIS6900)  
Computer Systems Performance Evaluation (CIS 5105)  
Internship in Computer Science (CIS5949)  
Object-Oriented Programming in C++ for Non-Majors (COP3330)  
Object-Oriented Programming in C++ for Non-Majors (CGS5409)

Storage Research (CIS4900)  
Advanced Operating Systems (COP5611)  
Operating Systems Principles (COP4610)  
Principles of Operating Systems (CGS5765)  
Honors Work (CIS4933)  
Special Topics in Computer Science (CIS4930)  
Computer Systems Performance Evaluation (CIS5930)  
Kernel and Device Driver Programming (COP5641)  
Doctoral Qualifying Examination (CIS8962)  
Advanced Seminar in Computer Science (CIS6935)  
LENS Seminar Series (CIS6935)  
Graduate Software Project (CIS5915)  
Operating Systems Reading Group (CIS6935)  
Data Structures, Algorithms, and Generic Programming (COP4530)  
Object-Oriented Programming with Data Structures (CGS5425)  
Undergraduate Operating Systems Principles (at UCLA) (CS111)

### **New Course Development**

Object-Oriented Programming in C++ for Non-Majors (2016)  
Computer Systems Performance Evaluation (2009)  
Kernel and Device Driver Programming (2007)  
Operating Systems Principles (2004)  
Advanced Operating Systems (2004)

### **Doctoral Committee Chair**

Wang, W., graduate. (2020). *Tags: A Unifying Primitive for the Storage Data Path*. [funded by NSF]  
Zhang, S., graduate. (2018). *Matching Physical File Representation to Logical Access Patterns for Better Performance*.  
Mitchell, M. J., graduate. (2015). *Cashtags: Protecting the Input and Display of Sensitive Data*. [funded by NSF]  
Diesburg, S. M., graduate. (2012). *Per-file Full-data-path Secure Deletion for Electronic Storage*. [funded by NSF, DoE, PEO, and FSU]  
Roy, B., doctoral candidate. [funded by NSF]  
Walsh, B., doctoral student.  
Liu, W., doctoral student.  
Nath, A., doctoral student.

### **Doctoral Committee Cochair**

Stanovich, M., graduate. (2015). *Plugging I/O Resource Leaks in General-purpose Real-time*

*Operating Systems.* [funded by NSF and FSU, co-directed with Ted Baker]

### **Doctoral Committee Member**

Hasan, M. A., graduate. (2019).

Tan, S., graduate. (2019). *Towards Ubiquitous Sensing using Commodity WiFi.*

Chen, Y., graduate. (2018). *Securing Systems by Vulnerability Mitigation and Adaptive Live Patching.*

Wang, T., graduate. (2017). *Exploring Novel Burst Buffer Management Solutions on Extreme-scale HPC Systems.*

Gavin, P., graduate. (2015). *A Presentation and Low-level Energy Usage Analysis of Two Low-power Architectural Techniques.*

West, P. E., graduate. (2010). *Next Generation Performance Monitoring.*

Hines, S. R., graduate. (2008). *Improving Processor Efficiency Through Enhance Instruction Fetch.*

Khan, M., doctoral candidate.

Chowdhury, M., doctoral student.

### **Doctoral Committee University Representative**

Annane, B., graduate. (2019). *HWRT Analysis and Forecast Impact of CYGNSS Observations Assimilated as Scalar Wind Speeds and as VAM Wind Vectors.*

### **Master's Committee Chair**

Ma, T., graduate. (2020).

Rumancik, L., graduate. (2020).

Williams, J., graduate. (2020).

Mustapick, E., graduate. (2019).

Trettin, R., graduate. (2019).

Li, K., graduate. (2018).

Chennaka, A., graduate. (2018).

Bach, J., graduate. (2017). [funded by NSF]

Stephens, B., graduate. (2017). *I/O Latency in the Linux Storage Stack.*

Roy, B., graduate. (2016). [funded by NSF]

Zhang, S., graduate. (2016).

Shyamala, S., graduate. (2015).

Dhabhai, H., graduate. (2015). *Identity Theft Data Analysis Based on the 2012 National Crime Victimization Survey.*

Kadali, P., graduate. (2015).

Kulkarni, N., graduate. (2015). *Analysis of TagFS Implementation in FUSE.*

Meyers, C., graduate. (2014). [funded by NSF]

Pillay, M., graduate. (2013).

Bobba, B., graduate. (2013).  
Buzbee, B., graduate. (2013).  
Gourineni, A., graduate. (2013).  
Sanders, J., graduate. (2011). [funded by DoE]  
Cobbs, B., graduate. (2011).  
Chauhan, S., graduate. (2009).  
Mohanty, S., graduate. (2009).  
Goyal, V., graduate. (2009).  
Vyas, R., graduate. (2009).  
Fishel, R., graduate. (2008). *Exploring RAID Configurations*.  
Diesburg, S., graduate. (2008). [funded by DoE]  
Fox, C., graduate. (2008). *Quantifying Temporal and Spatial Localities in Storage Workloads and Transformations by Data Path Components*. [funded by NSF]  
Lary, D., graduate. (2008). *PonyFS: File-system-level Encryption-based Secure Erasure*.  
Lojpur, D., graduate. (2008). [funded by NSF]  
Stanovich, M., graduate. (2008). *Throttling On-disk Schedulers to Meet Soft-real-time Requirements*. [funded by NSF, co-directed with Ted Baker]  
Qian, J., graduate. (2007). *A Behind-the-Scenes Story on Applying Cross-Layer Coordination to Disks and RAIDs*. [funded by NSF]  
Toh, S., graduate. (2005).  
Weddle, C., graduate. (2005). [funded by NSF]  
Hu, Z., graduate. (2004).  
Brown, A., student.  
Vuong, B., student.  
Miao, Y., student.

### **Master's Committee Cochair**

Mitchell, M. J., graduate. (2011). *Context and Bio-aware Mobile Applications*. [funded by FSU, co-directed with Gary Tyson]  
Mahajan, A., graduate. (2006). *Urban Mobility Models for Vehicular Ad Hoc Networks*. [funded by FSU, co-directed with Kartik Gopalan]  
Potnis, N., graduate. (2006). *Evaluating Urban Deployment Scenarios for Vehicular Wireless Networks*. [funded by FSU, co-directed with Kartik Gopalan]

### **Master's Committee Member**

Draper, C., graduate. (2020).  
Escobar-Avila, J., graduate. (2019).  
Kundnani, H., graduate. (2019).  
Connor, C., graduate. (2019).  
Pimienta, M., graduate. (2019).  
Yohn, D., graduate. (2019).  
Chowdhury, M., graduate. (2018).

Perez, D., graduate. (2017).  
Karthik Achalkar, graduate. (2017).  
Chetty, H., graduate. (2016).  
Darunam, V., graduate. (2016).  
Kishore Mattaparth, graduate. (2016).  
Sinha, G., graduate. (2016).  
Dwibhashyam, S., graduate. (2016).  
Haribaran, A., graduate. (2016).  
Pogaku, S. K., graduate. (2015).  
Setty, S., graduate. (2015).  
Chittipolu, K., graduate. (2015).  
Jangannagari, A., graduate. (2015).  
Parimala, B., graduate. (2015).  
Qureshi, F., graduate. (2015).  
Tangella, S., graduate. (2015).  
Varma, A., graduate. (2015).  
Veladi, P., graduate. (2015).  
Ambavarapu, C., graduate. (2015).  
Kamble, A., graduate. (2015).  
Cai, J., graduate. (2014).  
Montee, G. M., graduate. (2011).  
Sposaro, F., graduate. (2011).  
Hekimian-Williams, C. B., graduate. (2009).  
Achury, M., graduate. (2009).  
Boindala, A., graduate. (2008).  
West, P., graduate. (2008).  
Erande, M., graduate. (2007).  
Lakshminarayana, S., graduate. (2007).  
Reece, G., graduate. (2006).  
Rivera, C., graduate. (2005).  
Xu, M., graduate. (2004).  
Zhao, H., graduate. (2004).  
Busey, J., graduate. (2004).

### **Bachelor's Committee Chair**

Cassano, C., graduate. (2012). *A Comparison Study of Deduplication Methods with Small-Scale Workloads*. [funded by NSF]  
Carpenter, M., graduate. (2006). *File Clustering for Efficient Backup Systems*. [funded by Bess Ward Fellows and Thesis Grant]  
Oldham, M., graduate. (2005). *A Power and Performance Measurement Framework for Server-Class Storage*. [funded by NSF]

**Bachelor's Committee Member**

Yarboro, J., graduate. (2017). [funded by NSF]

Khlaaf, H., graduate. (2012).

**Supervision of Student Research Not Related to Thesis or Dissertation**

Jacob May (Aug 2020–May 2021).

Peter Karras (Jan 2020–May 2021).

Valery Arturo (Jan–May 2016).

funded by NSF.

Brandon Stephens (Aug 2014–May 2015).

funded by NSF.

Catanese, H. (Jan–May 2014).

funded by NSF.

Debraban, J. (Sep 2009–May 2010).

Kaal, K. (Sep 2008–May 2009).

Rosenthal, D. (Sep 2008–May 2009).

funded by FSU, co-directed with Ted Baker.

Willage, J. (Sep 2008–May 2009).

funded by FSU.

Roy, B. (Sep 2007–Dec 2008).

Zatkovich, N. (Sep 2007–May 2008).

Garcia, B. J. (Sep 2006–Dec 2007).

Patel, J. (Sep 2006–Dec 2007).

Meyers, C. (Sep 2006–May 2007).

Zhu, F. (Sep 2005–May 2006).

Co-directed with Kartik Gopalan.

Iloff, B. (Sep 2004–Dec 2005).

Baylis, S. (Sep 2004–May 2005).

funded by Harris Scholarship, co-directed with Kartik Gopalan.

Fox, C. (Sep 2004–May 2005).

Gonzalez, J. (Sep 2004–May 2005).

Jones, K. (Sep 2004–May 2005).

Kulkarni, A. (Sep 2004–May 2005).

Owenby, C. (Sep 2004–May 2005).

Villmow, M. (Sep 2004–May 2005).

### **Research and Original Creative Work**

1552 Google Scholar Citations; sole/lead PI for 17/19 grants (\$4.4M total).

### **Publications**

#### **Invited Journal Articles**

Weddle, C., Oldham, M., Qian, J., Wang, A. A., Reiher, P., & Kuenning, G. (2007). PARAID: A Gear-Shifting Power-Aware RAID. *ACM Transactions on Storage (TOS)*, 3(3), 13:1-13:33. Retrieved from <http://dl.acm.org/citation.cfm?id=1289721>

This paper details the design, implementation, and measurements of one of the first energy-efficient storage systems, PARAID, which can save up to 34% of power. Andy Wang is the designer and the patent holder of PARAID. Charles Weddle and Jin Qian were Masters students at FSU, supervised by Andy Wang. Charles Weddle now works at Model N, and Jin Qian works at Google. Mathew Oldham was an Honors Thesis student at FSU, supervised by Andy Wang. Mathew now works at Facebook. Peter Reiher is an adjunct professor at UCLA. Geoff Kuenning is a professor at Harvey Mudd College. This paper was one of the top 7 papers (7%) from the USENIX FAST conference, with 273 citations (top 10 cited journal papers at ACM TOS).

#### **Refereed Journal Articles**

Wang, W., Christopher Meyers, Robert Roy, Sarah Diesburg, & Wang, An-I A. (2021). ADAPT: An Auxiliary Storage Data Path Toolkit. *Elsevier Journal of Systems Architecture*, 113, Article No. 101902.

This paper presents the design, implementation, evaluation, and applications of Tags, a unifying primitive used to construct various storage data path components. By doing so, we can facilitate data-path-wide coordination and enable new capabilities. Weisu Wang is a Ph.D. student at FSU, supervised by Andy Wang. Christopher Meyers was a Ph.D. student at FSU, who now works at Ansible. Bobby Roy is a



Ph.D. student at FSU. Sarah Diesburg is an assistant professor at the University of Northern Iowa.

Zhang, S., Roy, R., Rumancik, L., & Wang, An-I A. (2020). The Composite-file File System: Decoupling the One-to-one Mapping of Logical Files and Physical Metadata for Better Performance. *ACM Transactions on Storage (TOS)*, 16(1), Article No. 5.

Traditional file system optimizations typically retain the legacy one-to-one mapping of logical files to their physical metadata representations. This work explores many-to-one mappings of files to metadata to improve storage performance by up to 27%. Shuanglong Zhang was a Ph.D. student, supervised by Andy Wang. Shuanglong Zhang now works at Google. Robert Roy and Leah Rumancik are Ph.D. students, supervised by Andy Wang.

Diesburg, S., Meyers, C., Stanovich, M., Wang, A., & Kuenning, G. (2016). TrueErase: Leveraging an Auxiliary Data Path for Per-file Secure Deletion. *ACM Transactions on Storage (TOS)*, 12(4), Article No. 18. Retrieved from <http://dl.acm.org/citation.cfm?id=2854882>

The paper empirically examines the design space to implement secure deletion of data stored on flash and disk storage. Our solution is unique in (1) supporting per-file deletion, (2) purging metadata and data versions in the data path, (3) being backward compatible, and (4) handling system failures. Sarah Diesburg is an Assistant Professor at UNI. Christopher Meyers and Mark Stanovich were Ph.D. students at FSU, supervised by Andy Wang. Mark Stanovich is now a researcher at the FSU Center for Advanced Power Systems. Geoff Kuenning is a Professor at Harvey Mudd College.

Diesburg, S., & Wang, A. A. (2010). A Survey of Confidential Data Storage and Deletion Methods. *ACM Computing Surveys (CSUR)*, 43(1), 2:1-2:37. Retrieved from <http://dl.acm.org/citation.cfm?id=1824797>

This paper surveys how different systems achieve confidentiality and secure erasure of data from digital media. Sarah Diesburg was a Ph.D. student at FSU supervised by Andy Wang. Sarah is now an assistant professor at the University of Northern Iowa. This paper has 45 citations.

Wang, A. A., Kuenning, G., & Reiher, P. (2007). Using Permuted States and Validated Simulation to Analyze Conflict Rates in Optimistic Replication. *SCS Simulation: Transactions of the Society for Modeling and Simulation International*, 83(8), 551-569. Retrieved from <http://dl.acm.org/citation.cfm?id=1316483>

The paper presents a detailed analysis of a concept called permuted states, which can simplify the analysis of replicated storage systems, by removing 99.9999% of redundant and unreachable system states. Andy Wang invented the concept of permuted states and is the primary author of this paper. Geoff Kuenning is a professor at Harvey Mudd College. Peter Reiher is an adjunct professor at UCLA. This journal paper has a 25% acceptance rate, and the paper has one citation.

Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (2006). The Conquest File System: Better Performance Through a Disk/Persistent-RAM Hybrid Design. *ACM Transactions on Storage (TOS)*, 2(3), 309-348. Retrieved from <http://dl.acm.org/citation.cfm?id=1168914>

This paper details the design, implementation, and measurements of the Conquest File System, which combines the speed of memory and storage capability of disks to achieve 1.4x to 2.0x performance improvement over all other leading disk-based file systems. Andy Wang designed, implemented, and measured the Conquest file system. Geoff Kuenning is a professor at Harvey Mudd College. Peter Reiher is an adjunct professor at UCLA. Gerald Popek was an adjunct professor at UCLA and is now deceased. This journal paper is based on the original USENIX conference paper, which has a 24% acceptance rate. This

paper has 79 citations.

Nyugen, N. T., Wang, A. A., Kuenning, G. H., & Reiher, P. (2004). Electric-Field-Based Routing: A Reliable Framework for Routing in MANETs. *ACM SIGMOBILE Mobile Computing and Communications Review (MC2R)*, 8(2), 35-49. Retrieved from <http://dl.acm.org/citation.cfm?id=997129>

The paper demonstrates, in simulation, how electric-field equations can be applied to construct disjoint network routes to enhance reliability of network transmissions. Andy Wang is the inventor of electric-field-based routing. Nam Nyugen was a Master's student at UCLA, co-supervised by Peter Reiher and Andy Wang. Geoff Kuenning is a professor at Harvey Mudd College. Peter Reiher is an adjunct professor at UCLA. This paper has 33 citations.

### Invited Book Chapters

Wang, A. A., Reiher, P., & Kuenning, G. (2003). Multipath Routing for Ad Hoc Networks. In Kia Makki, Niki Pissinou, Kami (Sam) Makki, & E. K. Park (Eds.), *Mobile and Wireless Internet: Protocols, Algorithms, and Systems* (pp. 245-261). Kluwer Academic Press.

This chapter surveys ways to construct multiple routes for mobile ad hoc networks and introduces the concept of applying electric-field lines to construct multiple disjoint network routes. Andy Wang is the inventor of electric-field-based routing. Peter Reiher is an adjunct professor at UCLA. Geoff Kuenning is a professor at Harvey Mudd College.

### Refereed Proceedings

Wang, An-I A, Whalley, D., Zhang, Z., & Tyson, G. (2020). Experience Administering Our First NSF S-STEM (Scholarship) Grant. In *2020 ACM Special Interest Group on Computer Science Education Conference (SIGCSE), Oregon*. New York City, ACM.

This paper documents the findings of our analysis of the implementation of our six-year NSF S-STEM scholarship program. David Whalley, Zhenghao Zhang, and Gary Tyson are co-PIs on this NSF grant.

Roy, R., Dennis, E., Wang, An-I A, Reiher, P., & Diesburg, S. (2020). The Legend File System: Better Reliability through Implicit Replicas. In *the 35th ACM/SIGAPP Symposium on Applied Computing (SAC)*. New York City, ACM.

This work exploits the possibility of data regeneration to improve the availability of storage systems. The regenerable data can serve as implicit replicas to supplement physical data replicas. The use of implicit replicas can reduce the overhead for storage capacity and maintain data consistency. Robert Roy and Erika Dennis are Ph.D. students at FSU, supervised by Andy Wang. Peter Reiher (a Co-PI on our NSF grant) is an adjunct professor at UCLA. Sarah Diesburg is an assistant professor at the University of Northern Iowa.

Zhang, S., Catanese, H., & Wang, A. (2016). The Composite-file File System: Decoupling the One-to-one Mapping of Files and Metadata for Better Performance. In *Proceedings of the 14th USENIX Conference on File and Storage Technologies (FAST)* (pp. 15-22). USENIX.

Traditional file system optimizations typically retain the legacy one-to-one mapping of logical files to their

physical metadata representations. This work explores many-to-one mappings of files to metadata to improve storage performance by up to 27%. Shuanglong Zhang was a Ph.D. student, supervised by Andy Wang. Shuanglong Zhang now works at Google. Helen Catanese was an undergraduate research assistant, supervised by Andy Wang. This conference has a 20% acceptance rate.

Mitchell, M., Wang, A., & Reiher, P. (2015). Cashtags: Protecting the Input and Display of Sensitive Data. In *Proceedings of the 24th USENIX Security Symposium, Washington, D. C* (pp. 961-976). USENIX.

This paper presents Cashtags, a system that allows mobile users to access sensitive information in public without the fear of visual leaks. Cashtags is compatible with legacy features such as auto correct, and its deployment model requires no changes to applications and the underlying firmware, with a performance overhead of less than 3%. Michael Mitchell was a doctoral student at FSU, supervised by Andy Wang. Michael Mitchell is now at T-Mobile. Peter Reiher is an adjunct professor at UCLA. This conference has a 16% acceptance rate.

Mitchell, M., Patidar, R., Saini, M., Singh, P., Wang, A. A., & Reiher, P. (2015). Mobile Usage Patterns and Privacy Implications. In *Proceedings of the 2015 International Workshop on the Impact of Human Mobility in Pervasive Systems and Applications*. IEEE.

This paper presents a survey study based on a ~100-question questionnaire and provides a further step in obtaining a better picture of how today's users of mobile devices regard issues of privacy. Michael Mitchell was a doctoral student at FSU, supervised by Andy Wang. Michael Mitchell is now at T-Mobile. Ratnesh Patidar, Manik Saini, and Parteek Singh were students in Wang's advanced operating systems course. Peter Reiher is an adjunct professor at UCLA.

Wang, A. A., Tyson, G., Whalley, D., van Engelen, R., & Zhang, Z. (2014). A Journey toward Obtaining Our First NSF S-STEM (Scholarship) Grant. In *Proceedings of the 2014 ACM Special Interest Group on Computer Science Education (SIGCSE)* (pp. 427-432). ACM.

This paper documents our four proposal submissions prior to acquiring our first NSF S-STEM grant for the Department of Computer Science at Florida State University. This paper also highlights major issues to consider when writing such proposals. Gary Tyson, David Whalley, and Robert van Engelen are professors at FSU. Zhenghao is an associate professor at FSU. This conference has a 40% acceptance rate.

Diesburg, S., Meyers, C., Stanovich, M., Mitchell, M., Marshall, J., Gould, J., Wang, A. A., & Kuenning, G. (2012). TrueErase: Full-storage-data-path Per-file Secure Deletion. In *Proceedings of the 2012 Annual Computer Security Applications Conference (ACSAC)* (pp. 439-449). ACM.

The paper empirically examines the design space to implement secure deletion of data stored on flash and disk storage. Our solution is unique in (1) supporting per-file deletion, (2) purging metadata and data versions in the data path, (3) being backward compatible, and (4) handling system failures. Sarah Diesburg implemented most of the TrueErase framework for the flash medium. Christopher Meyers built the tools to debug kernel level code from the user space. Mark Stanovich worked on the secure deletion for disks. Michael Mitchell investigated the portability of the framework. Justin Marshall and Julia Gould investigated ways to optimize the performance for secure deletion. Andy Wang designed the framework. Geoff Kuenning helped with the verification of the framework. Sarah Diesburg was a Ph.D. student at FSU supervised by Andy Wang. Sarah is now an assistant professor at the University of Northern Iowa. Christopher Meyers and Mark Stanovich were Ph.D. students at FSU, supervised by Andy Wang. Mark is now at the FSU Center for Advanced Power Systems. Michael Mitchell was a Ph.D. student supervised by Andy Wang. Michael is now at T-Mobile. Justin Marshall was a Ph.D. student supervised by Gary Tyson. Julia Gould was a Masters student supervised by Gary Tyson and now works at Intel. Gary Tyson is a professor at FSU. Geoff Kuenning is a Professor at Harvey Mudd College. This conference has a 19%

acceptance rate, and this paper has 12 citations.

Mitchell, M., Sposaro, F., Wang, A. A., & Tyson, G. (2011). BEAT: Bio-Environmental Android Tracking. In *Proceedings of the IEEE Topical Meeting on Biomedical Radio and Wireless Technologies, Networks, and Sensing Systems (RWW)* (pp. 402-405). IEEE.

This paper introduces BEAT, a framework based on smartphones and off-the-shelf sensors for collecting, processing, and archiving one's daily vital and spatiotemporal statistics. Michael Mitchell and Frank Sposaro jointly developed the BEAT framework. Andy Wang supervised the evaluation aspect of the framework. Gary Tyson provided the development environment. Michael Mitchell was a Ph.D. student at FSU, supervised by Andy Wang. Michael is now at T-Mobile. Frank Sposaro was a Ph.D. student at FSU, supervised by Gary Tyson. Gary Tyson is a professor at FSU. This paper has 18 citations.

Mitchell, M., Meyers, C., Wang, A. A., & Tyson, G. (2011). ContextProvider: Context Awareness for Medical Monitoring Applications. In *Proceedings of the 33rd Annual International Conference on IEEE Engineering Medicine and Biology Society (EMBS)* (pp. 5244-5247). IEEE.

This paper introduces the ContextProvider framework, which allows smartphones to incorporate sensor inputs to improve the accuracy of predicting user behavior for biologically driven applications. Michael Mitchell and Christopher Meyers jointly developed the ContextProvider framework. Andy Wang supervised the evaluation aspect of the framework. Gary Tyson provided the development environment. Michael Mitchell was a Ph.D. student supervised by Andy Wang. Michael is now at T-Mobile. Christopher Meyers was a Ph.D. student supervised by Andy Wang. Gary Tyson is a professor at FSU. This paper has 23 citations.

Stanovich, M., Baker, T., & Wang, A. A. (2011). Experience with Sporadic Server Scheduling in Linux: Theory vs. Practice. In *Proceedings of the 13th Real-Time Linux Workshop (RTLWS)* (pp. 219-230). OSADL.

This paper examines the gap between theoretical and empirical performance of sporadic server and proposed a few solutions to close this gap: (1) taking the context switching overhead into account, (2) capping the number of context switches, and (3) dynamically switching between sporadic-server and polling modes. Mark Stanovich designed and implemented various mechanisms to improve the sporadic server. Ted Baker and Andy Wang supervised Mark Stanovich in resolving various performance anomalies. Mark Stanovich was a Ph.D. student jointly supervised by Theodore Baker and Andy Wang. Mark is now at the FSU Center for Advanced Power Systems. Theodore Baker was a professor at FSU. This paper has four citations.

Stanovich, M., Baker, T., Wang, A. A., & Harbour, M. G. (2010). Defects of the POSIX Sporadic Server and How to Correct Them. In *Proceedings of the 16th IEEE Real-time and Embedded Technology and Applications Symposium (RTAS)* (pp. 35-45). IEEE.

This paper shows that (1) the POSIX sporadic server scheduling specification forgives budget overruns and allows significant error accumulations. (2) The current specifications have missed scenarios where the sporadic server can be preempted by tasks with higher priorities, and the resulting accounting errors allow budget replenishments to occur prematurely. (3) The solutions involve accounting for overruns via borrowing from future budgets and accounting for the time when a sporadic server is preempted. Mark Stanovich was a Ph.D. student at FSU, jointly supervised by Theodore Baker and Andy Wang. Mark is now at the FSU Center for Advance Power Systems. Theodore Baker was a professor at FSU. Michael Gonzalez is a professor at Universidad de Cantabria, Spain. This conference has a 22% acceptance rate, and this paper has 31 citations.

Qian, J., Meyers, C., & Wang, A. A. (2008). A Linux Implementation Validation of Track-Aligned Extents and Track-Aligned RAIDs. In *Proceedings of the 2008 USENIX Annual Technical Conference (ATC)* (pp. 261-266). USENIX.

Through redesign and reimplementing of two existing disk optimizations, this paper demonstrates the importance of independent empirical validations in the field of computer science, which is given less emphasis when compared to other science disciplines. Jin Qian was a Master's student at FSU supervised by Andy Wang. Jin now works at Google. Christopher Meyers was a Ph.D. student at FSU, supervised by Andy Wang. The conference has a 15% acceptance rate. This paper has six citations.

Fox, C., Lojpur, D., & Wang, A. A. (2008). Quantifying Temporal and Spatial Localities in Storage Workloads and Transformations by Data Path Components. In *Proceedings of the 16th Annual Meeting of the IEEE International Symposium on Modeling, Analysis, and Simulation (MASCOTS)* (pp. 1-10). IEEE.

This paper proposes and evaluates new metrics to quantify temporal and spatial clustering of storage accesses. Cory Fox and Dragan Lojpur were Masters students at FSU, supervised by Andy Wang. Cory Fox now works at Echostar Satellite Services, and Dragan Lojpur works at Accenture. This conference has a 38% acceptance rate. This paper has two citations.

Stanovich, M., Baker, T. P., & Wang, A. A. (2008). Throttling On-Disk Schedulers to Meet Soft-Real-Time Requirements. In *Proceedings of the 14th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)* (pp. 331-341). IEEE.

This paper examines how operating systems can coordinate with on-disk scheduling optimizations to improve the performance of I/Os with timing constraints. Andy Wang developed a disk simulator to help explain various timing characteristics observed. Mark Stanovich was a Ph.D. student at FSU, co-supervised by Ted Baker and Andy Wang. Mark is now at the FSU Center for Advanced Power Systems. Ted Baker was a professor at FSU. This conference has a 24% acceptance rate. This paper has 15 citations.

Diesburg, S., Meyers, C., Lary, D., & Wang, A. A. (2008). When Cryptography Meets Storage. In *Proceedings of the 4th International Workshop on Storage Security and Survivability (StorageSS)* (pp. 11-20). ACM.

This paper empirically shows mismatching assumptions and vulnerabilities when cryptography methods used in the networking context are applied to the storage contexts. Andy identified various vulnerabilities and built a program to automate the exploits for various cryptographic schemes. Sarah Diesburg was a Ph.D. student at FSU supervised by Andy Wang. Sarah is now an assistant professor at the University of Northern Iowa. Christopher Meyers was a Ph.D. student at FSU, supervised by Andy Wang. David Lary was a Master's student at FSU supervised by Andy Wang. David now works at Cisco. This paper has 13 citations.

Potnis, N., Mahajan, A., Wang, A. A., & Gopalan, K. (2007). Evaluation of Mesh-Enhanced VANET Deployment Models. In *Proceedings of the 16th International Conference on Computer Communications and Networks, Workshop on Advanced Networking and Communications* (pp. 862-867). IEEE.

This paper evaluates the feasibility of combining a mobile network by using vehicles and the infrastructural network in a metropolitan area to achieve good service quality. Andy Wang initiated the project in 2004 and demonstrated the parameterization of obstacles and its mapping on radio models. Atulya Mahajan and Niranjan Potnis were Masters students at FSU, co-supervised by Kartik Gopalan and Andy Wang. Atulya now works at RBS Global Banking and Markets, and Niranjan works at Anaqua. Kartik Gopalan was an assistant professor at FSU, now at SUNY, Binghamton. This conference has a 45% acceptance rate. This paper has three citations.

Baker, T. P., Wang, A. A., & Stanovich, M. (2007). Fitting Linux Device Drivers into an Analyzable Scheduling Framework. In *Proceedings of the 3rd Workshop on Operating System Platforms for Embedded Real-Time Applications* (pp. 9-18). IEEE.

This paper, based on the original NSF proposal, identifies the gap between theories of scheduling I/Os with time constraints and operating system implementations. Ted Baker was a professor at FSU. Mark Stanovich was a Ph.D. student at FSU, co-supervised by Ted Baker and Andy Wang. Mark is now at the FSU Center for Advanced Power Systems. This paper has 14 citations.

Lewandowski, M., Stanovich, M., Baker, T., Gopalan, K., & Wang, A. A. (2007). Modeling Device Driver Effects in Real-Time Schedulability Analysis: Study of a Network Driver. In *Proceedings of the 13th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)* (pp. 57-68). IEEE.

This paper presents an empirical approach to bound the level of interference between the operating system component that schedules I/O and the component that schedules CPU. Andy Wang suggested the need to investigate the worst-case interference theoretically achievable, in addition to gathering empirical data points. Mark Lewandowski now works at Google. Mark Stanovich was a Ph.D. student at FSU, co-supervised by Ted Baker and Andy Wang. Mark is now at the FSU Center of Advanced Power Systems. Ted Baker was a professor at FSU. Kartik Gopalan was an assistant professor at FSU, now at SUNY, Binghamton. This conference has a 36% acceptance rate. This paper has 41 citations.

Mahajan, A., Potnis, N., Gopalan, K., & Wang, A. A. (2007). Modeling VANET Deployment in URBAN Settings. In *Proceedings of the 10th ACM/IEEE International Symposium on Modeling, Analysis, and Simulation of Wireless and Mobile Systems (MSWiM)* (pp. 151-158). ACM/IEEE.

This paper studies how the service quality of a mobile network interacts with the moving patterns of vehicles in a metropolitan area. Andy Wang initiated the project in 2004 and demonstrated the parameterization of obstacles and its mapping on radio models. Atulya Mahajan and Niranjana Potnis were Masters students at FSU, co-supervised by Kartik Gopalan and Andy Wang. Atulya now works at RBS Global Banking and Markets, and Niranjana works at Anaqua. Kartik Gopalan was an assistant professor at FSU, now at SUNY, Binghamton. This conference has a 25% acceptance rate. This paper has 62 citations.

Weddle, C., Oldham, M., Qian, J., Wang, A. A., Reiher, P., & Kuenning, G. (2007). PARAID: A Gear-Shifting Power-Aware RAID. In *Proceedings of the 5th USENIX Conference on File and Storage Technologies (FAST)* (pp. 245-260). USENIX.

This paper presents the design, implementation, measurements of one of the first energy-efficient storage systems, PARAID, which can save up to 34% of power. Andy Wang is the designer and the patent holder of PARAID. Charles Weddle and Jin Qian were Masters students at FSU, supervised by Andy Wang. Charles Weddle now works at Model N, and Jin Qian works at Google. Mathew Oldham was an Honors Thesis student at FSU, supervised by Andy Wang. Mathew now works at Google. Peter Reiher is an adjunct professor at UCLA. Geoff Kuenning is a professor at Harvey Mudd College. This conference has a 19% acceptance rate. This paper has 273 citations.

Mahajan, A., Potnis, N., Gopalan, K., & Wang, A. (2006). Evaluation of Mobility Models for Vehicular Ad-hoc Network Simulations. In *IEEE International Workshop on Next Generation Wireless Networks* (pp. 13 pages). IEEE.

This paper presents one of the first models of how vehicles move in metropolitan areas and studies how the service quality of mobile ad hoc network interacts with this mobility model. Typical mobility models

assume an open space, with no obstacles. Our models account for streets and traffic rules extracted from real-world maps. Andy initiated this project in 2004. Atulya Mahajan and Niranjan Potnis were Masters students at FSU, co-supervised by Kartik Gopalan and Andy Wang. Atulya now works at RBS Global Banking and Markets, and Niranjan works at Anaqua. Kartik Gopalan was an assistant professor at FSU, now at SUNY, Binghamton. This paper has 44 citations.

Mahajan, A., Potnis, N., Gopalan, K., & Wang, A. A. (2006). Urban Mobility Models for VANETs. In *Proceedings of the 2nd IEEE International Workshop on Next Generation Wireless Networks*. IEEE.

This paper presents various ways to enhance the modeling realism of vehicle movements in urban settings and their effects on the quality of service in mobile networks. Andy Wang initiated the project in 2004 and demonstrated the parameterization of obstacles and its mapping on radio models. Atulya Mahajan and Niranjan Potnis were Masters students at FSU, co-supervised by Kartik Gopalan and Andy Wang. Atulya now works at RBS Global Banking and Markets, and Niranjan works at Anaqua. Kartik Gopalan was an assistant professor at FSU, now at SUNY, Binghamton. This paper has 105 citations.

Wang, A. A., Kuenning, G., & Reiher, P. (2005). Introducing Permuted States to Analyze Conflict Rates in Optimistic Replication. In *Proceedings of the ACM International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS)* (pp. 376-377). ACM.

The paper introduces a concept called permuted states, which can simplify the analysis of replicated storage systems, by removing 99.9999% of redundant and unreachable system states. Andy Wang invented the concept of permuted states and is the primary author of this paper. Geoff Kuenning is a professor at Harvey Mudd College. Peter Reiher is an adjunct professor at UCLA. This conference has a 20% acceptance rate. This paper has three citations.

Wang, A. A., Kuenning, G., & Reiher, P. (2005). Using Permuted States and Validated Simulation to Analyze Conflict Rates in Optimistic Replication. In *Proceedings of the 2005 International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS)* (pp. 929-939). SCS.

The paper demonstrates how a concept called permuted states can be used to validate simulations for replicated storage systems, with a 99.9999% reduction in the number of system states. Andy Wang invented the concept of permuted states and is the primary author of this paper. Geoff Kuenning is a professor at Harvey Mudd College. Peter Reiher is an adjunct professor at UCLA. This conference has a 50% acceptance rate. This paper has one citation.

Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (2003). The Effects of Memory-Rich Environments on File System Microbenchmarks. In *Proceedings of the 2003 International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS)* (pp. 745-754). SCS.

This paper demonstrates how modern disk benchmarks fail to reflect the abundance of memory and yield misleading results. Andy Wang performed the entire evaluation study as a Ph.D. student at UCLA, supervised by Gerald Popek. Geoff Kuenning is a professor at Harvey Mudd College. Peter Reiher is an adjunct professor at UCLA. Gerald Popek was an adjunct professor at UCLA and is now deceased. This conference has a 50% acceptance rate. This paper has five citations.

- Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (2002). Conquest: Better Performance Through a Disk/Persistent-RAM Hybrid File System. In *Proceedings of the 2002 USENIX Annual Technical Conference (ATC)* (pp. 15-28). USENIX.

This paper presents the design, implementation, and evaluation of the Conquest File System, which combines the speed of memory and storage capability of disks to achieve 1.4x to 2.0x performance improvement over all leading disk-based file systems. Andy Wang designed, implemented, and measured the Conquest file system as a Ph.D. student at UCLA, supervised by Gerald Popek. Geoff Kuenning is a professor at Harvey Mudd College. Peter Reiher is an adjunct professor at UCLA. Gerald Popek was an adjunct professor at UCLA and is now deceased. The conference has a 24% acceptance rate. This paper has 112 citations.

- Wang, A. A., Reiher, P., Bagrodia, R., & Kuenning, G. (2002). Understanding the Behavior of Conflict-Rate Metric in Optimistic Peer Replication. In *Proceedings of the 5th IEEE International Workshop on Mobility in Databases and Distributed Systems (MDDS)* (pp. 757-761). IEEE.

This paper presents the first analytical model that caps the probability of conflicting updates, occurring when data replicas are updated concurrently. As a Ph.D. student at UCLA, supervised by Gerald Popek, Andy Wang derived the analytical bound and compared the results with his prior simulation studies. Peter Reiher is an adjunct professor at UCLA. Rajive Bagrodia is a professor at UCLA. Geoff Kuenning is a professor at Harvey Mudd College. This paper has 11 citations.

- Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (2001). Position Summary: The Conquest File System—Life after Disks. In *Proceedings of the 8th IEEE Workshop on Hot Topics in Operating Systems (HotOS)* (pp. 186). IEEE.

This paper presents the design of the Conquest File System, which combines the speed of memory and storage capability of disks. Geoff Kuenning is a professor at Harvey Mudd College. Peter Reiher is an adjunct professor at UCLA. Gerald Popek was an adjunct professor at UCLA and is now deceased. This paper has one citation.

- Wang, A. A., Reiher, P., & Bagrodia, R. (1999). A Simulation Evaluation of Optimistically Replicated Filing in Mobile Environments. In *Proceedings of the 18th IEEE International Performance, Computing, and Communication Conference (IPCCC)* (pp. 43-51). IEEE.

This paper examines the performance behaviors of relaxed consistency model when updating replicated files in mobile environments. Andy Wang conducted the simulation experiments as a Master's student at UCLA, co-supervised by Rajive Bagrodia and Gerald Popek. Peter Reiher is an adjunct professor at UCLA. Rajive Bagrodia is a professor at UCLA. This paper has 22 citations.

- Kuenning, G., Guy, R., Popek, G., Reiher, P., & Wang, A. A. (1998). Measuring the Quality of Service of Optimistic Replication. In *Proceedings of the 12th European Conference on Object-Oriented Programming (ECOOP) Workshop on Mobility and Replication* (pp. 319-320). Springer.

This paper demonstrates how the commonly used conflict-rate metric is flawed when comparing file systems with a relaxed consistency model. As a Master's student supervised by Gerald Popek, Andy Wang designed and implemented a simulation framework that led to this finding. Geoff Kuenning is a professor at Harvey Mudd College. Richard Guy was a lecturer at UCLA, now at the California Institute of Technology. Peter Reiher is an adjunct professor at UCLA. Gerald Popek was an adjunct professor at UCLA and is now deceased. This paper has 14 citations.



## Nonrefereed Reports

Zhang, S., & Wang, A. (2017). *FJS: Fine-grained Journal Store* (Technical Report TR-171030). Florida State University.

Legacy file system journaling tends to introduce duplicate, random, and unnecessary writes of metadata. This work reduces such writes by up to 5.8x and improves the system performance by up to 15x. Shuanglong Zhang was a Ph.D. student, supervised by Andy Wang. Shuanglong Zhang now works at Google.

Wang, W., Meyers, C., Wang, An-I Andy, & Diesburg, S. (2017). *Tags: A Unifying Primitive for the Storage Data Path* (Technical Report TR-170929). Florida State University.

This paper presents the design, implementation, evaluation, and applications of Tags, a unifying primitive used to construct various storage data path components. By doing so, we can facilitate data-path-wide coordination and enable new capabilities. Weisu Wang is a Ph.D. student at FSU, supervised by Andy Wang. Christopher Meyers was a Ph.D. student at FSU, who now works at Ansible. Sarah Diesburg is an assistant professor at the University of Northern Iowa.

Zhang, S., Catanese, H., & Wang, A. (2016). *The Composite-file File System: Decoupling the One-to-one Mapping of Logical Files and Physical Metadata for Better Performance* (Poster). Proceedings of the 14th USENIX Conference on File and Storage Technologies.

Traditional file system optimizations typically retain the legacy one-to-one mapping of logical files to their physical metadata representations. This work explores many-to-one mappings of files to metadata to improve storage performance by up to 27%. Shuanglong Zhang was a Ph.D. student, supervised by Andy Wang. Shuanglong Zhang now works at Google. Helen Catanese was an undergraduate research assistant, supervised by Andy Wang.

Roy, R., Dennis, B., Wang, A., & Reiher, P. (2016). *The Legend File System: Better Reliability through Implicit Replicas* (Technical Report TR-160201). Department of Computer Science, Florida State University.

This work exploits the possibility of data regeneration to improve the availability of storage systems. The regenerable data can serve as implicit replicas to supplement physical data replicas. The use of implicit replicas can reduce the overhead for storage capacity and maintain data consistency. Robert Roy and Britton Dennis are Ph.D. students at FSU, supervised by Andy Wang. Peter Reiher is an adjunct professor at UCLA.

Zhang, S., Catanese, H., & Wang, A. (2015). *The Composite-file File System: Decoupling the One-to-one Mapping of Files and Metadata for Better Performance* (Technical Report TR-150921). Department of Computer Science, Florida State University.

Traditional file system optimizations typically retain the legacy one-to-one mapping of logical files to their physical metadata representations. This work explores many-to-one mappings of files to metadata to improve storage performance by up to 27%. Shuanglong Zhang was a Ph.D. student, supervised by Andy Wang. Shuanglong Zhang now works at Google. Helen Catanese was an undergraduate research assistant, supervised by Andy Wang.

Mitchell, M., Reiher, P., & Wang, A. (2014). *Cashtags: Prevent Leaking Sensitive Information through Screen Display* (Technical Report TR-141209). Department of Computer Science, Florida State University.

This paper presents Cashtags, a system that allows mobile users to access sensitive information in public without the fear of visual leaks. Cashtags is compatible with legacy features such as auto correct, and its deployment model requires no changes to applications and the underlying firmware, with a performance overhead of less than 3%. Michael Mitchell was a doctoral student at FSU, supervised by Andy Wang. Michael is now at T-Mobile. Peter Reiher is an adjunct professor at UCLA.

Mitchell, M., Wang, A. A., & Reiher, P. (2013). *Mobile Usage Patterns and Privacy Implications* (Technical Report TR-131104). Florida State University.

This paper presents a survey study based on a ~100-question questionnaire and provides a further step in obtaining a better picture of how today's users of mobile devices regard issues of privacy. Michael Mitchell was a doctoral student at FSU, supervised by Andy Wang. Michael is now at T-Mobile. Peter Reiher is an adjunct professor at UCLA.

Buzbee, B., Wang, W., & Wang, A. A. (2013). *Power-Saving Approaches and Tradeoffs for Storage Systems* (Technical Report TR-130627). Department of Computer Science: Florida State University.

This survey illustrates the tradeoffs between energy savings and storage performance, capacity, reliability, total cost of ownership, etc. Benjamin Buzbee was a Masters student at FSU, supervised by Andy Wang. He now works at Microsoft. Weisu Wang is a doctoral student at FSU, supervised by Andy Wang.

Mitchell, M., Sposaro, F., Wang, A. A., & Tyson, G. (2011). *BEAT: Bio-Environmental Android Tracking* (Poster). Proceedings of the IEEE Topical Meeting on Biomedical Radio and Wireless Technologies, Networks, and Sensing Systems.

This paper introduces BEAT, a framework based on smartphones and off-the-shelf sensors for collecting, processing, and archiving one's daily vital and spatiotemporal statistics. Michael Mitchell and Frank Sposaro jointly developed the BEAT framework. Andy Wang supervised the evaluation aspect of the framework. Gary Tyson provided the development environment. Michael Mitchell was a Ph.D. student at FSU, supervised by Andy Wang. Michael is now at T-Mobile. Frank Sposaro was a Ph.D. student at FSU, supervised by Gary Tyson. Gary Tyson is a professor at FSU.

Mitchell, M., Meyers, C., Wang, A. A., & Tyson, G. (2011). *ContextProvider: Context Awareness for Medical Monitoring Applications* (Poster). Proceedings of the 33rd Annual International Conference on IEEE Engineering Medicine and Biology Society (EMBS).

This paper introduces the ContextProvider framework, which allows smartphones to incorporate sensor inputs to improve the accuracy of predicting user behavior for biologically driven applications. Michael Mitchell and Christopher Meyers jointly developed the ContextProvider framework. Andy Wang supervised the evaluation aspect of the framework. Gary Tyson provided the development environment. Michael Mitchell was a Ph.D. student supervised by Andy Wang. Michael is now at T-Mobile. Christopher Meyers was a Ph.D. student supervised by Andy Wang. Gary Tyson is a professor at FSU.

Diesburg, S., Meyers, C., Stanovich, M., Mitchell, M., Marshall, J., Gould, J., Wang, A. A., & Kuenning, G. (2011). *TrueErase: Full-storage-data-path Per-file Secure Deletion* (Technical Report TR-111020). Department of Computer Science: Florida State University.

The paper empirically examines the design space to implement secure deletion of data stored on flash and disk storage. Our solution is unique in (1) supporting per-file deletion, (2) purging metadata and data versions in the data path, (3) being backward compatible, and (4) handling system failures. Sarah Diesburg implemented most of the TrueErase framework for the flash medium. Christopher Meyers built the tools to debug kernel level code from the user space. Mark Stanovich worked on the secure deletion for disks. Michael Mitchell investigated the portability of the framework. Justin Marshall and Julia Gould investigated ways to optimize the performance for secure deletion. Andy Wang designed the framework. Geoff Kuenning helped with the verification of the framework. Sarah Diesburg was a Ph.D. student at FSU supervised by Andy Wang. Sarah is now an assistant professor at the University of Northern Iowa. Christopher Meyers and Mark Stanovich were Ph.D. students at FSU, supervised by Andy Wang. Mark is now at the FSU Center for Advanced Power Systems. Michael Mitchell was a Ph.D. student supervised by Andy Wang. Michael is now at T-Mobile. Justin Marshall was a Ph.D. student supervised by Gary Tyson. Julia Gould was a Masters student supervised by Gary Tyson and now works at Intel. Gary Tyson is a professor at FSU. Geoff Kuenning is a Professor at Harvey Mudd College.

Diesburg, S., Meyers, C., & Wang, A. A. (2010). *Full-datapath Secure Deletion* (Poster). Grace Hopper Conference, Celebration of Women in Computing.

The poster presents the design space to implement secure deletion of data stored on flash and disk storage. Sarah Diesburg was a Ph.D. student at FSU supervised by Andy Wang. Sarah is now an assistant professor at the University of Northern Iowa. Christopher Meyers was a Ph.D. student at FSU, supervised by Andy Wang.

Stanovich, M., Baker, T., Wang, A. A., & Harbour, M. G. (2009). *Defects of the POSIX Sporadic Server and How to Correct Them* (Technical Report TR-091026). Department of Computer Science: Florida State University.

This paper shows that (1) the POSIX sporadic server scheduling specification forgives budget overruns and allows significant error accumulations. (2) The current specifications have missed scenarios where the sporadic server can be preempted by tasks with higher priorities, and the resulting accounting errors allow budget replenishments to occur prematurely. (3) The solutions involve accounting for overruns via borrowing from future budgets and accounting for the time when a sporadic server is preempted. Mark Stanovich was a Ph.D. student at FSU, jointly supervised by Theodore Baker and Andy Wang. Mark is now at the FSU Center for Advance Power Systems. Theodore Baker was a professor at FSU. Michael Gonzalez is a professor at Universidad de Cantabria, Spain.

Diesburg, S., Meyers, C., & Wang, A. A. (2009). *Full-datapath Secure Deletion* (Work-in-progress Report). On-line Proceedings of the 18th USENIX Security Symposium.

The work-in-progress report presents the design space to implement secure deletion of data stored on flash and disk storage. Sarah Diesburg was a Ph.D. student at FSU supervised by Andy Wang. Sarah is now an assistant professor at the University of Northern Iowa. Christopher Meyers was a Ph.D. student at FSU, supervised by Andy Wang.

Datta, S., van Engelen, R., & Wang, A. A. (2009). *Predictux: A Framework for Predicting Incremental Release Times* (Technical Report TR-090120). Department of Computer Science: Florida State University.

This paper explores the use of a decision tree to predict the release times of Linux kernel versions. Subhajt Datta was a Ph.D. student, supervised by Robert van Engelen, and now works at IBM. This paper has one citation.

Diesburg, S., & Wang, A. A. (2008). *A Survey of Confidential Data Storage and Deletion Methods* (Technical Report TR-080508). Department of Computer Science: Florida State University.

This paper surveys how different systems achieve confidentiality and secure erasure of data from digital media. Sarah Diesburg was a Ph.D. student at FSU supervised by Andy Wang. Sarah is now an assistant professor at the University of Northern Iowa.

Fox, C., Lojpur, D., & Wang, A. A. (2008). *Quantifying Temporal and Spatial Localities in Storage Workloads and Transformations by Data Path Components* (Technical Report TR-080406). Department of Computer Science: Florida State University.

This paper proposes and evaluates new metrics to quantify temporal and spatial clustering of storage accesses. Cory Fox and Dragan Lojpur were Masters students at FSU, supervised by Andy Wang. Cory Fox now works at Echostar Satellite Services, and Dragan Lojpur works at Accenture.

Fox, C., Lojpur, D., & Wang, A. A. (2008). *Work-in-Progress Report: Quantifying Temporal and Spatial Localities due to File System Caching* (Work-in-progress Report). On-line Proceedings of the Sixth USENIX Conference on File and Storage Technologies (FAST).

This work-in-progress report summarizes our proposed metrics to quantify temporal and spatial clustering of storage accesses. Cory Fox and Dragan Lojpur were Masters students at FSU, supervised by Andy Wang. Cory Fox now works at Echostar Satellite Services, and Dragan Lojpur works at Accenture.

Qian, J., & Wang, A. A. (2007). *A Behind-the-Scenes Story on Applying Cross-Layer Coordination to Disks and RAIDs* (Technical Report TR-071015). Department of Computer Science: Florida State University.

Through redesign and reimplementing of two existing disk optimizations, this paper demonstrates the importance of independent empirical validations in the field of computer science, which is given less emphasis when compared to other science disciplines. Jin Qian was a Master's student at FSU supervised by Andy Wang. Jin now works at Google. This paper has three citations.

Stanovich, M. J., Baker, T. P., & Wang, A. A. (2007). *Throttling Disk Schedulers to Meet Soft-Real-Time Requirements* (Technical Report TR-071025). Department of Computer Science: Florida State University.

This paper examines how operating systems can coordinate with on-disk scheduling optimizations to improve the performance of I/Os with timing constraints. Andy Wang developed a disk simulator to help explain various timing characteristics observed. Mark Stanovich was a Ph.D. student at FSU, co-supervised by Ted Baker and Andy Wang. Mark is now at the FSU Center for Advanced Power Systems. Ted Baker was a professor at FSU.

Weddle, C., Oldham, M., Qian, J., Wang, A. A., Reiher, P., & Kuenning, G. (2006). *PARAID: Gear-Shifting Power-Aware RAID* (Technical Report TR-060323). Department of Computer Science: Florida State University.

This paper presents the design, implementation, measurements of one of the first energy-efficient storage systems, PARAID, which can save up to 34% of power. Andy Wang is the designer and the patent holder of PARAID. Charles Weddle and Jin Qian were Masters students at FSU, supervised by Andy Wang. Charles Weddle now works at Model N, and Jin Qian works at Google. Mathew Oldham was an Honors Thesis student at FSU, supervised by Andy Wang. Mathew now works at Google. Peter Reiher is an adjunct professor at UCLA. Geoff Kuenning is a professor at Harvey Mudd College.

Mahajan, A., Potnis, N., Gopalan, K., & Wang, A. A. (2005). *Evaluation of Mobility Models for Vehicular Ad-hoc Network Simulations* (FSU Technical Report TR-051220). Department of Computer Science: Florida State University.

This paper presents various ways to enhance the modeling realism of vehicle movements in urban settings and their effects on the quality of service in mobile networks. Andy Wang initiated the project in 2004 and demonstrated the parameterization of obstacles and its mapping on radio models. Atulya Mahajan and Niranjana Potnis were Masters students at FSU, co-supervised by Kartik Gopalan and Andy Wang. Atulya now works at RBS Global Banking and Markets, and Niranjana works at Anaqua. Kartik Gopalan was an assistant professor at FSU, now at SUNY, Binghamton. This paper has 30 citations.

Xu, R., Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (2003). *Work in Progress: Conquest—Combining Battery-backed RAM and Threshold-based Storage Scheme to Conserve Power* (Work-in-progress Report). On-line Proceedings of the 19th ACM Symposium on Operating Systems Principles (SOSP).

This work-in-progress report presents the preliminary numbers that show the promise of applying persistent RAM to conserve power. Rugang Xu was a student at UCLA, who now works at Susquehanna International Group. Geoff Kuenning is a professor at Harvey Mudd College. Peter Reiher is an adjunct professor at UCLA. Gerald Popek was an adjunct professor at UCLA and is now deceased.

Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (2002). *Work-in-Progress Report: Conquest: Better Performance Through a Disk/RAM Hybrid File System* (Work-in-progress Report). On-Line Proceedings of the First USENIX Conference on File and Storage Technologies (FAST).

This abstract presents the design of Conquest File System, which combines the speed of memory and storage capability of disks. Geoff Kuenning is a professor at Harvey Mudd College. Peter Reiher is an adjunct professor at UCLA. Gerald Popek was an adjunct professor at UCLA and is now deceased.

Wang, A. A., Reiher, P., & Bagrodia, R. (2001). *A Simulation Framework and Evaluation for Optimistically Replicated Filing Environments* (Technical report CSD-010046). Computer Science Department: University of California, Los Angeles.

Through a simulation framework, this paper investigates the performance behaviors of file replication with relaxed consistency semantics. Andy Wang designed and implemented the simulation framework as a Master's student, co-advised by Rajive Bagrodia and Gerald Popek. Peter Reiher is an adjunct professor at UCLA. Rajive Bagrodia is a professor at UCLA. This paper has four citations.

Yarvis, M., Wang, A. A., Rudenko, A., Reiher, P., & Popek, G. (1999). *Conductor: Distributed Adaptation for Complex Networks* (Technical report CSD-990042). Computer Science Department: University of California, Los Angeles.

This paper presents a Conductor framework, which distributes the responsibility of optimizations out of the applications into the network. Andy Wang designed and implemented the archeological network application to showcase the Conductor framework. Mark Yarvis is a researcher at Intel. Alexey Rudenko was a Ph.D. student at UCLA. Peter Reiher is an adjunct professor at UCLA. Gerald Popek was an adjunct professor at UCLA and is now deceased. This paper has 30 citations.

Wang, A. A., Reiher, P., & Bagrodia, R. (1997). *A Simulation Framework for Evaluating Optimistically Replicated Filing Environments* (Technical report CSD-970018). Computer Science Department: University of California, Los Angeles.

This paper details the design and implementation of a simulation framework to evaluate file replications with relaxed consistency semantics. Andy Wang built the framework as a Master's student, co-supervised by Gerald Popek and Rajive Bagrodia. This paper has seven citations.

## Presentations

### Refereed Papers at Conferences

Wang, A. A., Kuenning, G., & Reiher, P. (presented 2005, June). *Using Permuted States to Analyze Conflict Rates in Optimistic Peer-to-Peer Replication*. Paper presented at International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS), ACM. (International)

Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (presented 2002, June). *Conquest: Better Performance Through a Disk/Persistent-RAM Hybrid File System*. Paper presented at 2002 Annual Technical Conference (ATC), USENIX. (International)

Wang, A. A., Reiher, P., & Bagrodia, R. (presented 1999, February). *A Simulation Evaluation of Optimistically Replicated Filing in Mobile Environments*. Paper presented at 18th International Performance, Computing, and Communication Conference (IPCCC), IEEE. (International)

### Refereed Papers at Symposia

Wang, An-I A, Whalley, D., Zhang, Z., & Tyson, G. (accepted). *Experience of Administering Our First S-STEM Program to Broaden Participation in Computer Science*. In Jian Zhang and Mark Sherriff (Chair), *the 2020 ACM Special Interest Group on Computer Science Education (SIGCSE) Technical Symposium*. Symposium to be conducted at the meeting of ACM, Portland, Oregon, USA. (International)

This paper documents the findings of our analysis of the implementation of our six-year NSF S-STEM scholarship program. David Whalley, Zhenghao Zhang, and Gary Tyson are co-PIs on this NSF grant.

- Fox, C., Lojpur, D., & Wang, A. A. (presented 2008, May). Quantifying Temporal and Spatial Localities in Storage Workloads and Transformations by Data Path Components. In *16th Annual International Symposium on Modeling, Analysis, and Simulation (MASCOTS)*. Symposium conducted at the meeting of IEEE. (International)
- Wang, A. A., Kuenning, G., & Reiher, P. (presented 2005, July). Using Permuted States and Validated Simulation to Analyze Conflict Rates in Optimistic Replication. In *2005 International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS)*. Symposium conducted at the meeting of The Society for Modeling and Simulation International. (International)
- Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (presented 2003, July). The Effects of Memory-Rich Environments on File System Microbenchmarks. In *2003 International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS)*. Symposium conducted at the meeting of The Society for Modeling and Simulation International. (International)

### **Refereed Workshops**

- Wang, A. A., Reiher, P., Bagrodia, R., & Kuenning, G. (2002, September). *Understanding the Behavior of Conflict-Rate Metric in Optimistic Peer Replication*. Workshop delivered at 5th IEEE International Workshop on Mobility in Databases and Distributed Systems (MDDS), Aix-en-Provence, France. (International)
- Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (2001, May). *Position Summary: The Conquest File System—Life after Disks*. Workshop delivered at 8th IEEE Workshop on Hot Topics in Operating Systems (HotOS). (International)

### **Invited Lectures and Readings of Original Work**

- Wang, A. (2018, November). *Tags: A Unifying Primitive for the Storage Data Path*. Delivered at Florida State University, Tallahassee. (Local)
- Wang, A. (2017, November). *Tags: A Unifying Primitive for the Storage Data Path*. Delivered at Florida State University, Tallahassee. (Local)
- Wang, An-I. (2017, January). *The Composite-file File System: Decoupling One-to-one Mapping of Files and Metadata for Better Performance*. Delivered at Florida State University, Tallahassee, FL, Tallahassee. (Local)
- Wang, An-I. (2016, December). *The Composite-file File System: Decoupling One-to-one Mapping of Files and Metadata for Better Performance*. Delivered at Florida State University, Tallahassee, FL, Tallahassee. (Local)

- Wang, A. (2015, December). *TrueErase: Full-storage-data-path Per-file Secure Deletion*. Delivered at Florida State University, Tallahassee, FL. (Local)
- Wang, A. (2014, November). *Applying for Graduate Schools*. Delivered at Florida State University, Tallahassee, FL. (Local)
- Wang, A. (2014, November). *TrueErase: Full-storage-data-path Per-file Secure Deletion*. Delivered at Florida State University, Tallahassee, FL. (Local)
- Wang, A. A. (2013, December). *TrueErase: Full-storage-data-path Per-file Secure Deletion*. Delivered at Florida State University, Tallahassee, FL. (Local)
- Wang, A. A. (2012, December). *Full-storage-data-path Per-file Secure Deletion*. Delivered at Florida State University, Tallahassee, FL. (Local)
- Wang, A. A. (2012, May). *A Survey of Power-Saving Techniques for Storage Systems*. Delivered at Chalmers University of Technology, Gothenburg, Sweden. (International)
- Wang, A. A. (2012, May). *PARAID: A Gear-Shifting Power-Aware RAID*. Delivered at Chalmers University of Technology, Gothenburg, Sweden. (International)
- Wang, A. A. (2012, May). *TrueErase: Full-storage-data-path Per-file Secure Deletion*. Delivered at Computer Science Research Seminar, Chalmers University of Technology, Gothenburg, Sweden. (International)
- Wang, A. A. (2011, November). *TrueErase: Full-storage-data-path Per-file Secure Deletion*. Delivered at 8th International Workshop Operating System Technologies for Large Scale NVRAM (NVRAMOS), Jeju Island, South Korea. (International)
- Wang, A. A. (2011, October). *TrueErase: Full-storage-data-path Per-file Secure Deletion*. Delivered at Computer Science Colloquium, Florida State University, Tallahassee, FL. (Local)
- Wang, A. A. (2010, November). *Some Ongoing Storage Research Projects*. Delivered at Computer Science Colloquium, Florida State University, Tallahassee, FL. (Local)
- Wang, A. A. (2009, October). *When Cryptography Meets Storage*. Delivered at Computer Science Colloquium, Florida State University, Tallahassee, FL. (Local)
- Wang, A. A. (2008, November). *My Passion for Digital Plumbing*. Delivered at Computer Science Colloquium, Florida State University, Tallahassee, FL. (Local)



- Wang, A. A. (2008, May). *Quantifying Temporal and Spatial Localities in Storage Workloads and Transformations by Data Path Components*. Delivered at 16th Annual Meeting of the IEEE International Symposium on Modeling, Analysis, and Simulation (MASCOTS). (International)
- Wang, A. A. (2008, April). *PARAID: A Gear-Shifting Power-Aware RAID*. Delivered at Computer Science Research Seminar, University of Wisconsin, Madison, Madison, WI. (State)
- Wang, A. A. (2008, March). *PARAID: A Gear-Shifting Power-Aware RAID*. Delivered at Computer Science Research Seminar, University of California, Santa Cruz, Santa Cruz, CA. (State)
- Wang, A. A. (2007, November). *PARAID: A Gear-Shifting Power-Aware RAID*. Delivered at Computer Science Colloquium, Harvey Mudd College, Claremont, CA. (State)
- Wang, A. A. (2007, November). *Some Research Frontiers in Storage Systems*. Delivered at Computer Science Colloquium, Florida State University, Tallahassee, FL. (Local)
- Wang, A. A. (2006, November). *Some Research Frontiers in Storage Systems*. Delivered at Computer Science Colloquium, Florida State University, Tallahassee, FL. (Local)
- Wang, A. A. (2006, May). *Conquest-2: Improving Energy Efficiency and Performance Through a Disk/RAM Hybrid File System*. Delivered at Computer Science Colloquium, University of California, Los Angeles, Los Angeles, CA. (State)
- Wang, A. A. (2005, December). *Conquest-2: Improving Energy Efficiency and Performance Through a Disk/RAM Hybrid File System*. Delivered at Computer Science Colloquium, Florida State University, Tallahassee, FL. (Local)
- Wang, A. A. (2005, November). *Conquest-2: Improving Energy Efficiency and Performance Through a Disk/RAM Hybrid File System*. Delivered at Computer Science Colloquium, University of Delaware, Newark, DE. (State)
- Wang, A. A. (2005, May). *Conquest-2: Improving Energy Efficiency and Performance Through a Disk/RAM Hybrid File System*. Delivered at Computer Science Colloquium, University of California, Riverside, Riverside, CA. (State)
- Wang, A. A. (2004, October). *Some Research Frontiers in Storage Systems*. Delivered at Computer Science Colloquium, Florida State University, Tallahassee, FL. (Local)
- Wang, A. A. (2004, February). *Electric-Field-Based Routing: Secure Spatially Disjoint Routes in MANETs*. Delivered at DARPA's Proposer's Day for Defense against Cyber Attacks on Mobile Ad Hoc Networks, Virginia. (National)

- Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (2003, October). *Conquest: Preparing for Life After Disks*. Delivered at Computer Science Colloquium, Florida State University, Tallahassee, FL. (Local)
- Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (2002, November). *Conquest: Preparing for Life After Disk*. Delivered at UCLA Advanced Operating Systems Lecture, Los Angeles, CA. (Local)
- Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (2002, January). *Conquest: Better Performance Through a Disk/Persistent-RAM Hybrid File System*. Delivered at 1st USENIX Conference on File and Storage Technologies (FAST), Monterey, CA. (International)
- Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (2001, November). *Conquest: RAM as Storage; Disks as Tapes*. Delivered at UCLA Advanced Operating Systems Lecture, Los Angeles, CA. (Local)
- Wang, A. A., Kuenning, G., Reiher, P., & Popek, G. (1999, October). *Integration of Memory and File System Services via Persistent RAM*. Delivered at Computer Science Colloquium, Harvey Mudd College, Claremont, CA. (State)

### **Patented Inventions**

- Mitchell, M., Wang, A., & Reiher, P. (2018). *Obfuscation of Sensitive Mobile Display*. 10,025,952, Florida State University. Tallahassee, FL.
- Wang, A. A. (2006). *Power-Aware Redundant Array of Independent Disks (PARAID) and Related Methods*. U.S. Patent No. 11/424,656.

### **Contracts and Grants**

#### **Contracts and Grants Funded**

- Wang, An-I A, Whalley, D., Haiduc, S., Perez-Felkner, L., & Liu, X. (Oct 2020–Sep 2025). *Broadening Participation in Computer Science*. Funded by National Science Foundation. (DUE-2003070). Total award \$999,848.
- Wang, An-I A. (2019–2020). *Decoupling Logical and Physical Representations of Files for Better Performance*. Funded by Florida State University. Total award \$13,000.
- Wang, A. (2018–2019). *Semantic Reliability Mechanisms for Computer Storage*. Funded by FSU Committee on Faculty Research Support. Total award \$14,000.

- Wang, A. (2017–2018). *Performance Analysis of SSDs*. Funded by Xilinx. Total award \$1,099.
- Wang, A. (2016–2017). *Modernize Storage-related Projects with Solid-State Disk Project Boards*. Funded by FSU. (TFCSCS1606). Total award \$28,080.
- Wang, A. (2015–2016). *Planning Grant: Better Computer Storage Reliability through Implicit Replicas*. Funded by Council on Research and Creativity, Florida State University. Total award \$13,000.
- Wang, A. (2014–2016). *Facets: Exploring Semantic Equivalence of Files to Improve Storage Systems*. Funded by NSF. (CNS-144387). Total award \$16,000.
- Whalley, D., Tyson, G., & Wang, A. (2014–2018). *IRES: U.S.-Sweden Research Experience in Efficient and Secure Mobile Systems for Students*. Funded by NSF. (IIA-1358147). Total award \$250,000.
- Wang, A. A., Whalley, D., Tyson, G., van Engelen, R., & Zhang, Z. (2013–2019). *Broadening Participation in Computer Science*. Funded by National Science Foundation. (DUE-1259462). Total award \$602,569.
- Wang, An-I A (PI). (2011–2015). *CAREER: Tags: A Unifying Primitive to Build Storage Data Paths for Swiftly Evolving Workloads and Storage Media*. Funded by National Science Foundation Experiences for Undergraduates Grant. (CNS-1125275). Total award \$16,000.
- Wang, An-I A (PI). (2011–2016). *CSR:Medium:Collaborative Research. Facets: Exploring Semantic Equivalence of Files to Improve Storage Systems*. Funded by National Science Foundation. (CNS-1065127). Total award \$850,000.  
(\$850,000 total; \$499,997 to FSU).
- Wang, A. A. (PI). (2010–2011). *Planning Grant: Studying the Effects of Multicore Environment on Storage Performance*. Funded by Council on Research and Creativity, Florida State University. Total award \$12,000.
- Wang, A. A. (2009–2015). *CAREER: Tags: A Unifying Primitive to Build Storage Data Path for Swiftly Evolving Workloads and Storage Media*. Funded by National Science Foundation Faculty Early Career Development Grant. (CNS-0845672). Total award \$400,000.
- Wang, A. A. (2008–2008). *Faculty Travel Grant*. Funded by Office of the Provost, Florida State University. Total award \$450.

To present paper at the 16th Annual Meeting of the IEEE International Symposium on Modeling, Analysis, and Simulation (MASCOTS), Baltimore, Maryland.

- Wang, A. A. (2008–2009). *Florida State University Research Foundation GAP Grant: In-memory File System*. Funded by Council on Research and Creativity, Florida State University. Total award \$100,000.
- Wang, A. A. (2007–2008). *Planning Grant: Exploring Opportunities between RAIDs and Storage Components*. Funded by Council on Research and Creativity, Florida State University. Total award \$11,999.
- Baker, Theodore P (PI), Wang, An-I A, & Gopalan, K. (2005–2008). *Next-Generation Real-Time Device Architecture*. Funded by National Science Foundation. (CNS-0509131). Total award \$600,000.
- Wang, A. A. (2005–2006). *Extracting and Exploiting Dependency Information amidst Non-deterministic Program Execution*. Funded by Bess Ward Fellows and Thesis Grant (for Mark Carpenter). Total award \$1,000.
- Wang, An-I A (PI). (Jul 2004–Jun 2007). *Collaborative Research: Conquest-2: Improving Energy Efficiency and Performance Through a Disk/RAM Hybrid File System*. Funded by National Science Foundation. (CNS-0410896). Total award \$450,000.  
(\$450,000 total; \$267,338 to FSU).
- Wang, A. A. (2004–2005). *First Year Assistant Professor Award: Conquest-2—Combining Battery-Backed RAM and Threshold-Based Storage Scheme to Conserve Power*. Funded by Council on Research and Creativity, Florida State University. Total award \$13,000.
- Reiher, P. (PI), & Wang, A. A. (2001–2002). *Improving Operating Systems by Replacing Hard Disks with Persistent Solid State Memory*. Funded by National Science Foundation. (CCR-0098363). Total award \$100,000.

### **Contracts and Grants Denied**

- Burmester, M., Liu, X., Whalley, D., Wang, An-I A, & Hay, C. (2019). *Renewal: CyberCorps: Scholarship for Service for FSU MS CC and CNSA Students*. Submitted to NSF.
- Wang, A. (2018). *ClumpFS: Better Per-file Access Latency for Commodity Computing Devices*. Submitted to Florida State University.
- Whalley, D., Wang, A., & Tyson, G. (2018). *IRES: Track I: Supporting FSU Student Research with NTNU Faculty on Improving the Efficiency of Traditional and Mobile Systems*. Submitted to National Science Foundation.

- Dennis, L., Jones, F., Randeree, E., Wang, A., Yuan, X., van Engelen, R., & Hu, S. (2017). *STEM: Collaborative Proposal: Florida Information Technology Career Scholars (FITC-S): Recruiting, Retaining, and Employing Academically-talented Transfer Students*. Submitted to NSF.
- Dennis, L., Jones, F., Randeree, E., Wang, A., Yuan, X., van Engelen, R., & Hu, S. (2016). *STEM: Collaborative Proposal: Florida Information Technology Career Scholars (FITC-S): Recruiting, Retaining, and Employing Academically-talented Transfer Students*. Submitted to NSF.
- Wang, A. (2015). *REU: Broadening Participation in Computer Science*. Submitted to NSF.
- Wang, A. (2015). *CSR::Small:Collaborative Research: Organic File System*. Submitted to NSF.
- Wang, An-I. (2015). *Organic File System*. Submitted to Florida State University, COFRS.
- Wang, A. (2013). *Self-adaptive File-System Bookkeeping Records*. Submitted to FSU CRC.
- Wang, A., Kumar, P., van Engelen, R., Tyson, G., & Whalley, D. (2011). *Broadening Participation in Computer Science and Computational Biology*. Submitted to NSF.
- Wang, A. (2010). *CSR:Small: Sifon: Storage-datapath-wide, Informed, and Coordinated Scheduling*. Submitted to NSF.
- Wang, A., Kumar, P., van Engelen, R., Tyson, G., & Whalley, D. (2010). *Broadening Participation in Computer Science and Computational Biology*. Submitted to NSF.
- Tyson, G., Zhang, Z., Kumar, P., Wang, A., & Yuan, X. (2010). *II-NEW: Cloud Computing for Mobile Devices*. Submitted to NSF.
- Tyson, G., Kumar, P., Wang, A., van Engelen, R., & Whalley, D. (2009). *Broadening Participation in Computer Science and Computational Biology*. Submitted to NSF.
- Tyson, G., Li, F., Zhang, Z., Wang, A., & Whalley, D. (2009). *CPS:MEDIUM: Designing a Battery Aware Paradigm for Mobile Cyber Physical Systems*. Submitted to NSF.
- Wang, A. (2008). *CSR:Small:icFlash: Information-rich and Control-rich Storage Data Path for Flash*. Submitted to NSF.
- Yuan, X., Wang, A., Liu, X., Aggarwal, S., & Baker, T. (2007). *CRI: Developing a Storage System Infrastructure*. Submitted to NSF.
- Wang, A. (2007). *CAREER: Nimble Storage Infrastructure for Swiftly Evolving Demands*. Submitted to NSF.

- Wang, A. (2007). *CSR--PDOS: Collaborative Research--E2ERAID: An End-to-End Approach for RAID Data Path Design and Implementation*. Submitted to NSF.
- Wang, A. (2007). *CT-T: Collaborative Research: Using Context To Improve System Security*. Submitted to NSF.
- Yuan, X., Wang, A., Liu, X., Aggarwal, S., & Baker, T. (2006). *CRI: Developing a Storage System Infrastructure*. Submitted to NSF.
- Wang, A. (2006). *HECERA: Collaborative Research. Orchestra: A Traffic-Class-Aware Parallel File System*. Submitted to NSF.
- Wang, A., & Whaley, D. (2006). *CSR--PDOS: Ancestry: Dependency-Centric Reliability Mechanisms for Better Data Survivabilit*. Submitted to NSF.
- Gopalan, K., & Wang, A. (2005). *NeTS-NBD: Tackling Real-World Obstacles and Mobility in Ad Hoc Networks: New Strategies for Modeling, Simulation, and Empirical Validation*. Submitted to NSF.
- Wang, A. (2004). *CSR--PDOS: Virtual Content: Exploiting Data-Process Dependencies for Performance, Storage Capacity, Network Bandwidth, and Energy Savings*. Submitted to NSF.
- Wang, A. (2004). *CAREER: Modernizing Operating Systems Storage Infrastructure and I/O Benchmarks toward Memory-Rich Environments*. Submitted to NSF.
- Wang, A. (2004). *NeTS-NR: Physics-Inspired and Stateless Routes for Reliable Coordination in Mobile Ad Hoc Networks*. Submitted to NSF.
- Burmester, M., Wang, A., & Yasinsac, A. (2004). *Cyber Trust: Secure Scalable Routing in MANETs*. Submitted to NSF.

### **Postdoctoral Supervision**

- Wang, W. (May–Dec 2020).
- Stanovich, M. (May–Aug 2015).
- Diesburg, S. (Jan–Aug 2013).

## Reviews of My Research and Original Creative Work by Other Authors

### Reviews Appearing in Magazines or Newsletters

Kathleen Haughney. (2015, May). NSF grant allows computer science students to work on energy efficient devices in Sweden. *Florida State* 24/7, 1.

Mueller, K. (2014, November). Neuroscience Student Wins Timed Thesis Competition. *Florida State* 24/7, 1.

Nicole Brooks. (2013, October). Scholarships to Help Computer Science Fill Gaps in U.S. Job Market. *State*, 48(5), 12.

Nicole Brooks. (2013, September). Computer Science Department Awarded More Than \$3.2 Million for Student Scholarships. *Florida State* 24/7, 1.

Levine, K. (2009, October). Florida State Standouts: Sarah Diesburg. *Florida State Headlines*, 1.

Blackhum, D. (2009, October). FSU Student Tackles 'Flash' Issues. *Tallahassee Democrat*, 1.

Blackhum, D. (2009, October). FSU Student Develops Software Prototype to Erase Electronic Files. *Tallahassee Democrat*, 1.

Hellstrom, S. (2009, May). Florida State doctoral students win top research scholarships. *FSU News*, 1.

Hellstrom, S. (2009, March). Computer Science Professor Wins NSF 'Career' Award. *STATE: The Faculty-Staff Bulletin of the Florida State University*, 43(12), 1.

Unknown. (2009, February). Wang Wins Award. *Tallahassee Democrat*, A.6.

Hellstrom, S. (2009, February). FSU Computer Science Professor Wins NSF Early CAREER Award. *FSU News*, 1.

Copps, E. (2009). Gone in a Flash. *Research in Review*, 61.

Unknown. (2003, April). Conquest FS: The Disk is Dead. *Slashdot*, 1.

Baltazar, H. (2002, June). DAFS, Conquest May Pave Way for Future File Systems. *eWeek*, 1.

Heffron, M. (1990, April). Perpetuating a Love of Learning—and the Scientists of Tomorrow. *Los Angeles Times*, 1.

## **Service**

### **Florida State University**

#### **FSU University Service**

Member, Student Technology Fee Advisory Committee (2013–present).

I reviewed and provided feedback to 498 grant proposals (53 for 2013, 48 for 2014, 70 for 2015, 72 for 2016, 79 for 2017, 93 for 2018, 83 for 2019, and 139 for 2020).

Alternate, Faculty Senate (2019–2020).

Reviewer, FSU COFRS Grant Review Panel (2019).

I reviewed 6 proposals.

Member, GPC Subcommittee (2019).

I reviewed the Electrical and Computer Engineering graduate degree program.

Panel member, NSF CAREER Workshop (2015).

Member, Graduate Policy Committee (2011–2012).

I attended weekly meetings to review graduate programs from various departments.

Panel member, NSF CAREER Workshop (2009–2011).

#### **FSU Department Service**

Member, Broadening Participation Committee (2020–present).

Chair, COP 4610 Course Committee (2015–present).

Member, Ph.D. Portfolio Committee (2005–present).

Chair, NSF S-STEM Scholarship Committee (2013–2025).

I am responsible for administering this NSF S-STEM Scholarship program, which involves (1) coordinating with committee members to execute logistics on awardee selection, mentoring, evaluation, (2) interacting with institutional research, financial aid, various academic support units, advising scholarship awardees, and (3) reporting to NSF.

Member, Departmental Awards Committee (2020–2021).

Associate Chair, Graduate Studies (2020–2021).

The duties include conducting orientation of new students to the department, checking prerequisite courses



for incoming students, making initial student advisor assignments, handling student course transfers, renewing bachelor and master pathway programs, making changes to major/degree programs (changed MSCC degree to MSCC major), gathering data for SACS compliance, reporting to IEP portals, writing annual student evaluation letters, monitoring student progress, helping low-performing students, reporting to the board of directors, and scheduling graduate-level courses.

Chair, Promotion and Tenure Committee (2020–2021).

Member, Chair Selection Committee (2019–2020).

Member, Executive Committee (2019–2020).

Director, Graduate Curriculum Committee (2018–2020).

Director, Graduate Studies (2018–2020).

The duties include conducting orientation of new students to the department, checking prerequisite courses for incoming students, making initial student advisor assignments, handling student course transfers, renewing bachelor and master pathway programs, making changes to major/degree programs (changed MSCC degree to MSCC major), gathering data for SACS compliance, reporting to IEP portals, writing annual student evaluation letters, monitoring student progress, helping low-performing students, reporting to the board of directors, and scheduling graduate-level courses.

Member, Undergraduate Curriculum Committee (2018–2020).

Departmental Representative, Academic Honor Policy Hearings (2018–2019).

Member, Faculty Evaluation Committee (2017–2018).

Assistant Director, Graduate Studies (2016–2018).

Member, Graduate Curriculum Committee (2013–2018).

Director, Undergraduate Recruiting (2009–2018).

I obtained the first NSF S-STEM grant for FSU.

Judge, CS Expo (2015–2016).

Member, Departmental Website Development Committee (2015–2016).

Organizer, CS Honors Day (2014–2015).

Member, COP 4610 Course Committee (2006–2015).

Coordinator, FITC Career Fair (2014).

Member, Admission and Aid Committee (2011–2014).

Member, Course Scheduling Committee (2012–2013).

Member, Faculty Evaluation Committee (2011–2012).

Faculty Advisor, Student Groups ACM and ACM-W (2011–2012).

Member, Department Chair Search Committee (2010–2011).

Judge, FSU ACM Programming Contest (2005–2010).

Member, Undergraduate Curriculum Committee (2008–2009).

Member, Equipment and Network Committee (2007–2008).

Member, Faculty Evaluation Committee (2006–2007).

Judge, Second FSU Computer Science Graduate Research Conference (2005–2006).

Member, Equipment and Network Committee (2004–2005).

Member, Faculty Recruiting Committee (2004–2005).

Head Judge, FSU ACM Programming Contest (2004–2005).

Judge, FSU Computer Science Graduate Research Conference (2004–2005).

Member, Admission and Aid Committee (2003–2004).

Judge, FSU ACM Programming Contest (2003–2004).

Member, Graduate Curriculum Committee (2003–2004).

## **The Profession**

### **Editorial Board Membership(s)**

*ACM Transactions on Storage* (2016–2019).

### **Guest Reviewer for Refereed Journals**

*ACM Transactions on Storage (TOS)* (2021).

*IEEE Transactions on Computers (TC)* (2021).

*IEEE Transactions on Parallel and Distributed Systems (TPDS)* (2019).

*Communications of the ACM (CACM)* (2018–19).

*Elsevier Sustainable Computing, Informatics, and Systems (SUSCOM)* (2018–19).

*ACM Transactions on Architecture and Code Optimizations (TACO)* (2017).

*Elsevier Ad Hoc Networks* (2013–16).

*Elsevier Performance Evaluation Journal (PEVA)* (2014).

*IEEE Communication Letters (CL)* (2014).

*CIC China Communication* (2013).

*IEEE Transactions on Intelligent Transportation Systems (T-ITS)* (2011–12).

*IEEE Transactions on Computers (TC)* (2008–12).

*Elsevier Sustainable Computing Informatics and Systems (SUSCOM)* (2011).

*IEEE Communication Letters (CL)* (2011).

*ACM Computing Surveys (CSUR)* (2010).

*IEEE Transactions on Vehicular Technology (TVT)* (2010).

*IEEE Wireless Communications (WC)* (2009).

*ACM Transactions on Computers (TOCS)* (2008).

*IEEE Transactions on Mobile Computing (TMC)* (2006–07).

### **Reviewer for Textbooks**

*Linux, the Textbook, 2nd Edition, Taylor and Francis Group* (2017).

*System Administration, McGraw-Hill Higher Education* (2009).

*The Handbook of Computer Networks, John Wiley and Sons* (2006).

Publisher: John Wiley & Sons.

**Reviewer or Panelist for Grant Applications**

National Science Foundation (2021).

National Science Foundation (2012–2013).

Department of Energy (DoE) (2010).

Natural Sciences and Engineering Research Council of Canada (NSERC) (2010).

**Service to Professional Associations**

Reviewer, ACM Special Interest Group on Computer Science Education (SIGCSE) (2019–2020).

Program Committee Member, USENIX Conference on File and Storage Technologies (FAST) (2017).

Reviewer, Annual IFIP WG 11.9 International Conference on Digital Forensics (2015–2016).

Reviewer, IEEE Real-Time Systems Symposium (RTSS) (2014).

Reviewer, ACM International Conference on Supercomputing (ICS) (2013).

Program Committee Member, ACM Annual International Systems and Storage Conference (SYSTOR) (2012).

Reviewer, IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) (2012).

Program Committee Member, IEEE Symposium on Massive Storage Systems and Technologies (MSST) (2012).

Program Committee Member, IEEE International Conference on Networking, Architecture, and Storage (NAS) (2011).

Program Committee Member, International Workshop on Operating System Support for Next Generation Large Scale NVRAM (NVRAMOS) (2011).

Program Committee Member, ACM Annual International Systems and Storage Conference (SYSTOR) (2010).

Reviewer, ACM/SigArch International Conference on Supercomputing (ICS) (2010).

Track Program Committee Member, IEEE Vehicular Networks and Applications Workshop, IEEE International Conference on Communications (ICC) (2010).

Shadow Program Committee Member, ACM Symposium on Operating Systems Principles (SOSP) (2009).

Reviewer, IEEE International Conference on Communications 2009 (ICC) (2009).

Reviewer, IEEE International Conference on Networked Digital Technologies (NDT) (2009).

Program Committee Member, IEEE International Conference on Networking, Architecture, and Storage (NAS) (2009).

Track Program Committee Member, International Conference on Parallel Processing (ICPP) (2009).

Reviewer, USENIX Conference on File and Storage Technologies (FAST) (2009).

Reviewer, IEEE Real-Time Systems Symposium (RTSS) (2008–2009).

Reviewer, ACM Annual Symposium on Applied Computing 2008 (SAC) (2008).

Reviewer, Euromicro Conference on Real-Time Systems (ECRTS) (2008).

Reviewer, IEEE Annual International Conference on High Performance Computing (HiPC) (2008).

Program Committee Member, IFIP International Conference on Embedded and Ubiquitous Computing (EUC), 2008 (2008).

Reviewer, International Conference on Principles of Distributed Systems (OPODIS) (2008).

Reviewer, International Conference on Supercomputing (ICS) (2007–2008).

Reviewer, IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) (2006–2007).

Reviewer, IEEE International Conference on Network Protocols (ICNP) (2006).

Reviewer, International Symposium on High-Performance Computer Architecture (HPCA) (2006).

Reviewer, International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS) (2005).

Reviewer, USENIX Conference on File and Storage Technologies (FAST) (2005).

Reviewer, International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (2004).

Program Committee Member, International Workshop on Network Design and Architecture 2004 (2004).

Reviewer, Annual ACM Symposium on Applied Computing 2004 (SAC) (2003).

### **The Community**

Technical Support, The School of Arts and Sciences (2016–2017).

Presenter, Science Night, The School of Arts and Sciences (2017).