

RESEARCH INTERESTS

Distributed Systems, High Performance Computing, Dependable Systems and Fault Tolerance Techniques, GPGPU computing, Quantum Computing

EDUCATION

PhD, Electrical and Computer Engineering <i>University of British Columbia, Canada</i> Advisors: Professor Karthik Pattabiraman and Professor Matei Ripeanu Thesis Title: Approaches for Building Error Resilient Applications	2020
MASc, Electrical and Computer Engineering <i>University of British Columbia, Canada</i>	2014
Master in Software Systems <i>University of British Columbia, Canada</i>	2011
BE, Information Security <i>Wuhan University, China</i>	2006

AWARDS, HONORS AND COMPETITIONS

Major Awards

Honorable Mention for the 2020 ACM SIGHPC Dissertation Award 2020 July
awarded by ACMs Special Interest Group on High Performance Computing for “making significant progress on protecting large-scale HPC applications against soft errors”. This award is given to the best doctoral dissertation completed in high performance computing (HPC) in the previous year. I am the only one who received the honorable mention designation worldwide.

William C. Carter PhD Dissertation Award in Dependability 2020 May
awarded jointly by IEEE TC on Dependable Computing and Fault Tolerance (TCFT) and IFIP Working Group 10.4 on Dependable Computing and Fault Tolerance for “addressing the problem of transient hardware faults in high performance computing (HPC) systems”. The William C. Carter PhD Dissertation Award is presented since 1997 “to recognize an individual who has made a significant contribution to the field of dependable and secure computing throughout his or her PhD dissertation”. One award is given each year worldwide.

Canada NSERC Postdoctoral Fellowship 2020 Jan
\$90,000 for two years, awarded by Natural Sciences and Engineering Research Council of Canada. I am ranked 2nd in computer science division across Canada.

University-level Awards

Nominated for the ACM doctoral dissertation award 1 of 2 nominees, University of British Columbia	2020 Oct
British Columbia Student Scholarship \$15,000, University of British Columbia	2019 Sep
Walter C Koerner Fellowship \$5,300, University of British Columbia	2018 Aug
J K Zee Memorial Fellowship \$8,800, University of British Columbia	2018 May
Graduate Support Initiative \$12,000, University of British Columbia	2017 Nov
Graduate Support Initiative \$5,000, University of British Columbia	2016 Nov
Graduate Support Initiative \$6,000, University of British Columbia	2014 Nov
First Place in Coding Competition of UBC Division Microsoft	2014 Oct
Second Place in Outstanding Annual Undergraduate Wuhan University	2005 May

SELECTED PUBLICATIONS

Journal

1. *Improving the Accuracy of IR-level Fault Injection*, Lucas Palazzi, Guanpeng Li, **Bo Fang**, and Karthik Pattabiraman, IEEE Transactions on Dependable and Secure Computing (TDSC). doi: 10.1109/TDSC.2020.2980273.
2. *A Systematic Methodology for Evaluating the Error Resilience of GPGPU Applications*, **Bo Fang**, Karthik Pattabiraman, Matei Ripeanu, and Sudhanva Gurusurth, in the IEEE Transactions on Parallel and Distributed Systems (TPDS). vol. 27, no. 12, pp. 3397-3411, 1 Dec. 2016, doi: 10.1109/TPDS.2016.2517633.

Conference

3. *QuGAN: A generative adversarial network through quantum states*, Samuel A Stein, Betis Baheri, Ray Marie Tischio, Ying Mao, Qiang Guan, Ang Li, **Bo Fang**, Shuai Xu, IEEE International Conference on Quantum Computing and Engineering 2021.
 4. *Characterizing Impacts of Storage Faults on HPC Applications: A Methodology and Insights*, **Bo Fang**, Daoce Wang, Sian Jin, Quincey Koziol, Zhao Zhang, Qiang Guan, Suren Byna, Sriram Krishnamoorthy, Dingwen Tao, IEEE Cluster 2021
 5. *A Hybrid System for Learning Classical Data in Quantum States*, Samuel A. Stein, Betis Baheri, Ray Marie Tischio, Yiwen Chen, Ying Mao, Qiang Guan, Ang Li, **Bo Fang**, arXiv preprint arXiv:2012.00256, 2020
 6. *TensorFlowFI: A Flexible Fault Injection Framework for TensorFlow Applications*, Zitao Chen, Niranjana Narayanan, **Bo Fang**, Guanpeng Li, Karthik Pattabiraman, Nathan DeBardeleben, IEEE International Symposium on Software Reliability Engineering (ISSRE), 2020 (acceptance rate: 25.6%).
 7. *Chaser: A Enhanced Fault Injection Tool for Tracing Soft Errors in MPI Applications*, Qiang Guan, Xunchao Hu, Terence Grove, **Bo Fang**, Hailong Jiang, Heng Yin, Nathan DeBardeleben, 50th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2020) (acceptance rate: 16.5%).
 8. *A Tale of Two Injectors: End-to-End Comparison of IR-level and Assembly-Level Fault Injection*, Lucas Palazzi, Guanpeng Li, **Bo Fang**, and Karthik Pattabiraman, IEEE International Symposium on Software Reliability Engineering (ISSRE), 2019 (acceptance rate: 31.4%).
 9. *BonVoision: Leveraging Spatial Data Smoothness for Recovery from Memory Soft Errors*, **Bo Fang**, Karthik Pattabiraman, Matei Ripeanu, Sriram Krishnamoorthy, ACM International Conference on Supercomputing (ICS), June 2019.
 10. *LetGo: A Lightweight Continuous Framework for HPC Applications upon Failures*, **Bo Fang**, Qiang Guan, Nathan DeBardeleben, Karthik Pattabiraman, Matei Ripeanu, The ACM International Symposium on High-Performance Parallel and Distributed Computing (HPDC) June 2017, (acceptance rate 18%).
 11. *ePVF: An Enhanced Program Vulnerability Factor Methodology for Cross-Layer Resilience Analysis*, **Bo Fang**, Qining Lu, Karthik Pattabiraman, Matei Ripeanu and Sudhanva Gurumurthi, Proceedings of the IEEE/IFIP International Conference on Dependable Systems and Networks (DSN), 2016, (acceptance rate 21%).
 12. *GPU-Qin: A Methodology for Evaluating the Error Resilience of GPGPU Applications*, **Bo Fang**, Karthik Pattabiraman, Matei Ripeanu and Sudhanva Gurumurthi, Proceedings of the IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), 2014, (acceptance rate 31%),
 13. *GPUS: Combining high-performance with high-reliability*, L. Bautista Gomez, F. Cappello, L. Carro, N. DeBardeleben, **B. Fang**, S. Gurumurthi, K. Pattabiraman, P. Rech, M. Sonza Reorda, Embedded tutorial paper (invited), Proceedings of the International Symposium on Design Automation and Test in Europe (DATE), 2014.
- Workshop, poster and abstract**
14. *Towards Predicting the Impact of Roll-Forward Failure Recovery for HPC Applications*, **Bo Fang**, Jieyang Chen, Karthik Pattabiraman, Matei Ripeanu, Sriram Krishnamoorthy, the 49th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2019), Fast abstract.
 15. *SDC is in the Eye of the Beholder: A Survey and Preliminary Study*, **Bo Fang**, Panruo Wu, Qiang Guan, Nathan DeBardeleben, Laura Monroe, Sean Blanchard, Zhizong Chen, Karthik Pattabiraman, Matei Ripeanu, 3rd IEEE International Workshop on Reliability and Security Data Analysis (co-located with DSN 2016), June 2016.
 16. *Evaluating the Error Resilience of Parallel Programs*, **Bo Fang**, Karthik Pattabiraman, Matei Ripeanu and Sudhanva Gurumurthi, Workshop on Fault Tolerance for High-Performance at Extreme Scale (FTXS), 2014 (6 pages). In conjunction with DSN 2014.
 17. *Towards Building Error Resilient GPGPU Applications*, **Bo Fang**, Jiesheng Wei, Karthik Pattabiraman, Matei Ripeanu, 3rd IEEE Workshop on Resilient Architecture (WRA) in conjunction with MICRO 2012, Vancouver Canada.
 18. *Evaluating Error Resiliency of GPGPU Applications*, **Bo Fang**, Jiesheng Wei, Karthik Pattabiraman, Matei Ripeanu, High Performance Computing, Networking, Storage and Analysis (SC), 2012 poster

EXPERIENCE

Research Associate

2020 April - Now

Pacific Northwest National Laboratory

Manager: Dr. Kevin Barker, Dr. Sriram Krishnamoorthy & Dr. Ang Li

Research Scholar

2018 June - 2018 Nov

Pacific Northwest National Laboratory

Mentor: Dr. Sriram Krishnamoorthy

Research Intern

2016 Jan - 2016 Apr

Los Alamos National Lab

Mentor: Dr. Nathan DeBardeleben

Mitacs-Accelerate Intern

2011 Nov - 2012 May

Singular Software Inc.

Mentor: Dr. Matei Ripeanu

Software Engineering Intern

2010 Sep - 2010 Dec

Arcatel-Lucent S.A.

ACADEMIC ACTIVITIES

- Program committee member:
 - IEEE/IFIP International Conference on Dependable Systems and Networks(DSN) 2022,2021
 - IEEE international conference on High Performance Computing and Communications (HPCC) 2021, 2020, The IEEE Workshop on Silicon Errors in Logic System Effects (SELSE) 2020, 2021.
- Invited reviewers for IEEE Transactions on Parallel and Distributed Systems (TPDS) and Journal of Parallel and Distributed Computing (JPDC).
- External reviewers for conferences such as The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC) 2021, 2020, The ACM International Symposium on High-Performance Parallel and Distributed Computing (HPDC) 2020-2014, IEEE/IFIP International Conference on Dependable Systems and Networks (DSN) 2020-2015, IEEE International Symposium on Software Reliability Engineering (ISSRE) 2016, etc.
- Student volunteer for IEEE Pacific Rim International Symposium on Dependable Computing (PRDC) 2012 and IEEE International Conference on Software Quality, Reliability, and Security (QRS) 2015.
- Mentor for Sudeep Sureshan for Mitacs intern program in 2015 summer