

# Yepang Liu

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## Education

- **Ph.D.** in Computer Science and Engineering, The Hong Kong Univ. of Science and Technology, 2010-2015.
  - Advisor: Prof. Shing-Chi Cheung (HKUST)
  - Thesis Examination Committee: Prof. Mauro Pezzè (University of Lugano), Prof. Chi-Ying Tsui (HKUST), Prof. Charles Zhang (HKUST), Prof. Sunghun Kim (HKUST), Prof. Raymond Wong (HKUST), Prof. Joghesh Muppala (HKUST), and Prof. Li Qiu (HKUST)
- **B.Sc.** in Computer Science, Nanjing University, 2006-2010 (with the Outstanding Graduate honor).
- **Visiting Student**, Wilfrid Laurier University, Fall 2009.

## Research Interest

My main area of research is software engineering, with a focus on software testing and program analysis. I am also interested in cybersecurity, adaptive systems and mobile computing. I often conduct empirical studies to understand the root causes of various software defects and design techniques to help developers diagnose and fix those defects. My vision is to provide easy-to-use, scalable, and effective tools to help developers build trustworthy, energy-efficient, and high-performance software systems. My work has been published at top software engineering conferences and journals, and has been recognized by several awards and honors including two ACM SIGSOFT Distinguished Paper awards, one featured article of the IEEE Transactions on Software Engineering, and the Platinum-Level Research Artifacts honor at the ACM SIGSOFT International Symposium on the Foundations of Software Engineering. Over the years, I have developed and maintained the following tools and datasets, which have been used by researchers and practitioners from over 40 universities and organizations worldwide:

1. **AFChecker**: A model checker for detecting configuration errors in context-aware applications  
Website: <http://sccpu2.cse.ust.hk/afchecker/>
2. **GreenDroid**: A dynamic analysis tool for detecting energy bugs in Android applications  
Website: <http://sccpu2.cse.ust.hk/greendroid/>
3. **PerfChecker**: A static analysis tool for detecting performance bugs in Android applications  
Website: <http://sccpu2.cse.ust.hk/perfchecker/>
4. **Elite**: A static analysis tool for detecting wake lock misuses in Android applications  
Website: <http://sccpu2.cse.ust.hk/elite/>
5. **Custodes**: A spreadsheet cell clustering and smell detection tool  
Website: <http://sccpu2.cse.ust.hk/custodes/>

6. **DroidLeaks**: A benchmark of resource leak bugs in Android applications  
Website: <http://sccpu2.cse.ust.hk/droidleaks/>
7. **OASIS**: A tool for prioritizing static analyzer warnings for Android applications  
Website: <http://sccpu2.cse.ust.hk/oasis/>

### Referred Research Publications (Journals, Magazines, and Book Chapters)

1. Lili Wei, **Yepang Liu**, Shing-Chi Cheung, Huaxun Huang, Xuan Lu, and Xuanzhe Liu. Understanding and Detecting Fragmentation-Induced Compatibility Issues for Android Apps. In *IEEE Transactions on Software Engineering (TSE)*, 2018, to appear.
2. **Yepang Liu**, Chang Xu, S.C. Cheung, and Jian Lu. GreenDroid: Automated Diagnosis of Energy Inefficiency for Smartphone Applications. In *Internetware: A New Software Paradigm for Internet Computing*, Hong Mei and Jian Lu, Eds.: Springer, 2016, ch. 18, forthcoming (**Book Chapter**).
3. Qiwei Li, Chang Xu, **Yepang Liu**, Chun Cao, Xiaoxing Ma, and Jian Lu. CyanDroid: Stable and Effective Energy Inefficiency Diagnosis for Android Apps. In *Science China Information Sciences (SCIS)*, 2016, forthcoming.
4. Wenhua Yang, **Yepang Liu**, Chang Xu, and S.C. Cheung. A Survey on Dependability Improvement Techniques for Pervasive Computing Systems. In *Science China Information Sciences (SCIS)*, Vol. 58, No. 5, Article 052102, pp. 1–14, May 2015.
5. **Yepang Liu**, Chang Xu, and S.C. Cheung. Diagnosing Energy Efficiency and Performance for Mobile Internetware Applications. In *IEEE Software*, Vol. 32, No. 1, pp. 67–75, January 2015.
6. **Yepang Liu**, Chang Xu, and S.C. Cheung. Detecting Energy and Performance Bugs for Smartphone Applications. In *Communications of the CCF* (a magazine in Chinese), Vol. 10, No. 12, pp. 40–42, December 2014 (**Invited Article**).
7. **Yepang Liu**, Chang Xu, S.C. Cheung, and Jian Lu. GreenDroid: Automated Diagnosis of Energy Inefficiency for Smartphone Applications. In *IEEE Transactions on Software Engineering (TSE)*, Vol. 40, Iss. 9, pp. 911–940, September 2014. **This work was selected as the featured article of the issue.**
8. Yueqi Li, S.C. Cheung, Xiangyu Zhang, and **Yepang Liu**. Scaling Up Symbolic Analysis by Removing Z-Equivalent States. In *ACM Transactions on Software Engineering and Methodology (TOSEM)*, Vol. 23, Iss. 4, Article 34, pp. 1–32, August 2014.
9. **Yepang Liu**, Chang Xu, S.C. Cheung, and Wenhua Yang. CHECKERDROID: Automated Quality Assurance for Smartphone Applications. In *International Journal of Software and Informatics (IJSI)*, Vol. 8, Iss. 1, pp. 21–41, August 2014 (**Invited Article**).
10. Chang Xu, **Yepang Liu**, S.C. Cheung, Chun Cao, and Jian Lu. Towards Context Consistency by Concurrent Checking for Internetware Applications. In *Science China Information Sciences (SCIS)*, Vol. 56, Iss. 8, Article 082105, pp. 1–20, August 2013.
11. **Yepang Liu**, Chang Xu, and S.C. Cheung. AFChecker: Effective Model Checking for Context-Aware Adaptive Applications. In *Journal of Systems and Software (JSS)*, Vol. 86, Iss. 3, pp. 854–867, March 2013.

## Referred Research Publications (Conferences and Symposiums)

1. Lili Wei, **Yepang Liu**, and Shing-Chi Cheung. PIVOT: Learning API-Device Correlations to Facilitate Android Compatibility Issue Detection. In *Proceedings of the 41st ACM/IEEE International Conference on Software Engineering (ICSE 2019)*, Montreal, Canada, May 2019, to appear.
2. Ming Wen, **Yepang Liu**, Rongxin Wu, Xuan Xie, Shing-Chi Cheung, and Zhendong Su. Exposing API Misuses via Mutation Analysis. In *Proceedings of the 41st ACM/IEEE International Conference on Software Engineering (ICSE 2019)*, Montreal, Canada, May 2019, to appear.
3. Wenjie Li, Yanyan Jiang, Chang Xu, **Yepang Liu**, Xiaoxing Ma, and Jian Lu. Characterizing and Detecting Inefficient Image Displaying Issues in Android Apps. In *Proceedings of the 26th IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER 2019)*, Hangzhou, China, Feb 2019, to appear.
4. Huaxun Huang, Lili Wei, **Yepang Liu**, and Shing-Chi Cheung. Understanding and Detecting Callback Compatibility Issues for Android Applications. In *Proceedings of the 33rd International Conference on Automated Software Engineering (ASE 2018)*, Montpellier, France, September 2018, pp. 532-542.
5. Jiajun Hu, Lili Wei, **Yepang Liu**, Shing-Chi Cheung, and Huaxun Huang. A Tale of Two Cities: How WebView Induces Bugs to Android Applications. In *Proceedings of the 33rd International Conference on Automated Software Engineering (ASE 2018)*, Montpellier, France, September 2018, pp. 702-713.
6. Lili Wei, **Yepang Liu**, and S.C. Cheung. OASIS: Prioritizing Static Analysis Warnings for Android Apps Based on App User Reviews. In *Proceedings of the 11th Joint Meeting of The European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE 2017)*, Paderborn, Germany, September 2017, pp. 672-682.
7. **Yepang Liu**, Chang Xu, S.C. Cheung, and Valerio Terragni. Understanding and Detecting Wake Lock Misuses for Android Applications. In *Proceedings of the 24th ACM SIGSOFT International Symposium on Foundations of Software Engineering (FSE 2016)*, Seattle, WA, USA, November 2016, pp. 396-409. **This work received the Platinum-Level Research Artifacts honor.**
8. Lili Wei, **Yepang Liu**, and S.C. Cheung. Taming Android Fragmentation: Characterizing and Detecting Compatibility Issues for Android Apps. In *Proceedings of the 31st IEEE/ACM International Conference on Automated Software Engineering (ASE 2016)*, Singapore, September 2016, pp. 226-237. **This work received the ACM SIGSOFT Distinguished Paper Award.**
9. Jue Wang, **Yepang Liu**, Chang Xu, Xiaoxing Ma, and Jian Lu. E-GreenDroid: Effective Energy Inefficiency Analysis for Android Applications. In *Proceedings of the Eighth Asia-Pacific Symposium on Internetware (INTERNETWARE 2016)*, Beijing, China, September 2016, pp. 71-80.
10. Valerio Terragni, **Yepang Liu**, and S.C. Cheung. CSNIPPPEX: Automated Synthesis of Compilable Code Snippets from Q&A Sites. In *Proceedings of the 25th International Symposium on Software Testing and Analysis (ISSTA 2016)*, Saarbrücken, Germany, July 2016, pp. 118-129.
11. S.C. Cheung, Wanjun Chen, **Yepang Liu**, and Chang Xu. CUSTODES: Automatic Spreadsheet Cell Clustering and Smell Detection Using Strong and Weak Features. In *Proceedings of the 38th International Conference on Software Engineering (ICSE 2016)*, Austin, TX, USA, May 2016, pp. 464-475.

12. Xiujiang Li, Yanyan Jiang, **Yepang Liu**, Chang Xu, Xiaoxing Ma, and Jian Lu. User Guided Automation for Testing Mobile Apps. In *Proceedings of the 21st Asia-Pacific Software Engineering Conference (APSEC 2014)*, Jeju, Korea, December 2014, pp. 27–34.
13. Wenhua Yang, Chang Xu, **Yepang Liu**, Chun Cao, Xiaoxing Ma, and Jian Lu. Verifying Self-adaptive Applications with Uncertainty. In *Proceedings of IEEE/ACM International Conference on Automated Software Engineering (ASE 2014)*, Vasteras, Sweden, September 2014, pp. 199–209.
14. **Yepang Liu**, Chang Xu, and S.C. Cheung. Characterizing and Detecting Performance Bugs for Smartphone Applications. In *Proceedings of the 36th International Conference on Software Engineering (ICSE 2014)*, Hyderabad, India, June 2014, pp. 1013–1024. **This work received the ACM SIGSOFT Distinguished Paper Award.**
15. **Yepang Liu** and Chang Xu. VeriDroid: Automating Android Application Verification. In *Proceedings of the ACM/IFIP/USENIX International Middleware Conference (Middleware 2013 Doctoral Symposium)*, Beijing, China, December 2013, Article 5, pp. 1–6.
16. **Yepang Liu**, Chang Xu, and S.C. Cheung. Where Has My Battery Gone? Finding Sensor Related Energy Black Holes in Smartphone Applications. In *Proceedings of the 11th IEEE International Conference on Pervasive Computing and Communications (PerCom 2013)*, San Diego, CA, USA, March 2013, pp. 2–10.

## Invited Talks

1. **Yepang Liu**. Green Mobile Software Engineering: Datasets, Techniques, and Impacts. Invited talk at *Nanjing University*, May 15, 2017, Nanjing, China.
2. **Yepang Liu**. Towards Engineering Green, Fast, and Reliable Mobile Applications. Invited talk at *Institute of Software, Chinese Academy of Sciences*, September 14, 2016, Beijing, China.
3. **Yepang Liu**. Automated Analysis of Energy Efficiency and Execution Performance for Android Applications. Invited talk at *WeChat*, December 10, 2015, Guangzhou, China.
4. **Yepang Liu**. Automated Analysis of Energy Efficiency and Execution Performance for Android Applications. Invited talk at the *NII Shonan Meeting on Mobile App Store Analytics*, Oct. 20, 2015, Tokyo, Japan.
5. **Yepang Liu**. Automating Performance Analysis for Smartphone Applications. Invited talk at *Huawei*, August 11, 2014, Shenzhen, China.

## Honors and Awards

1. Excellent Coach Award (awarded by IEEE Reliability Society at the 2018 National Student Contest of Software Testing)
2. Overseas High-Caliber Personnel (Level C), Shenzhen, 2018
3. ACM SIGSOFT Distinguished Paper Award (ASE 2016)
4. Platinum-Level Research Artifacts (FSE 2016)
5. ACM SIGSOFT Service Recognition Award (FSE 2014)
6. ACM SIGSOFT Service Award (FSE 2014)

7. Featured Article in IEEE Transactions on Software Engineering (TSE 2014)
8. ACM SIGSOFT Distinguished Paper Award (ICSE 2014)
9. UGC Research Travel Grant Award (HKUST 2014)
10. Postgraduate Scholarship (HKUST 2010-2014)
11. Outstanding Graduate of Nanjing University (NJU 2010)
12. People's Scholarship Second Class (NJU 2009)
13. China Ping An Insurance Inc. Scholarship Third Class (NJU 2008)
14. People's Scholarship Second Class (NJU 2008)
15. Social Service Scholarship First Class (NJU 2008)
16. People's Scholarship Third Class (NJU 2007)
17. Social Service Scholarship First Class (NJU 2007)
18. Outstanding Student Leader of Nanjing University (NJU 2007)

### **Academic Employments**

- Tenure-Track Assistant Professor, CSE Department, SUSTech (February 2018 – Present)
- Post-doctoral Fellow, CSE Department, HKUST (September 2015 – February 2018 )
- Research Assistant, CSE Department, HKUST (September 2014 – August 2015)

### **Participated Research Projects**

1. Automated Software Quality Assurance Techniques for Taming Application Issues Induced by the Evolution of Mobile Computing Platforms (NSFC 61802164, Principle Investigator)
2. Enabling Developers and Manufacturers to Tame Android Compatibility Issues (GRF 16202917, Co-Investigator)
3. Diagnosing Energy Inefficiencies in Mobile Applications based on Observable Sensory Data Utilization (GRF 611813)
4. Fault Detection of Event-Driven Mobile Applications Using Static Analysis (GRF 611912)
5. Effective Model Checking for Context-aware Adaptive Applications (NJU KFKT2012A08)
6. Effective Regression Fault Detection for the Reuse of Spreadsheets (GRF 611811)
7. Detecting Adaptation Faults in Context-aware Pervasive Applications (GRF 612210)

### **Teaching Experience**

At SUSTech, I have been teaching the following courses:

- CSE5008: Advanced Software Engineering (Fall 2018)
- CS102B: Introduction to Computer Programming (Fall 2018)

- CS102A: Introduction to Computer Programming (Spring 2018)

At HKUST, I have been the teaching assistant of the following undergraduate and postgraduate courses:

- COMP5111: Fundamentals of Software Analysis (Fall 2014)
- CSIT5100: Object-Oriented Software Development of Enterprise Systems (Spring 2014)
- COMP1022p: Introduction to Computing with Java (Fall 2013)
- CSIT5100: Object-Oriented Software Development of Enterprise Systems (Spring 2013)
- COMP1022p: Introduction to Computing with Java (Fall 2012)
- CSIT5100: Object-Oriented Software Development of Enterprise Systems (Spring 2012)
- COMP1022p: Introduction to Computing with Java (Fall 2011)
- COMP211: Introduction to Software Engineering (Spring 2011)
- COMP102: Computer and Programming Fundamentals I (Fall 2010)

## Professional Activities

- *PC member*, The 43rd Annual International Computers, Software and Applications Conference (COMPSAC 2019)
- *PC member*, The 13th International Symposium on Theoretical Aspects of Software Engineering (TASE 2019)
- *PC member*, The 1st IEEE International Workshop on Artificial Intelligence for Mobile (AI4Mobile 2019, co-located with SANER 2019)
- *PC member*, The 1st International Workshop on Intelligent Bug Fixing (IBF 2019, co-located with SANER 2019)
- *Co-reviewer*, The 40th ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI 2019)
- *Reviewer*, Journal of Software: Evolution and Process (JSME 2018)
- *Reviewer*, IEEE Transactions on Software Engineering (TSE 2018)
- *Reviewer*, Journal of Computer Science and Technology (JCST 2018)
- *PC member*, The 9th International Workshop on Empirical Software Engineering in Practice (IWESEP 2018)
- *PC member*, The Annual Conference on Software Analysis, Testing and Evolution (SATE 2018)
- *PC member*, The 2018 International Workshop on Advances in Mobile App Analysis (A-Mobile 2018)
- *PC member*, The 42nd Annual International Computers, Software and Applications Conference (COMPSAC 2018)
- *Co-reviewer*, The 19th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2018)
- *Reviewer*, Empirical Software Engineering Journal (2017)
- *Reviewer*, IEEE Transactions on Software Engineering (2017)
- *Reviewer*, IEEE Access (2017)

- *Reviewer*, Science of Computer Programming (2017)
- *Reviewer*, Journal of Computer Science and Technology (2017)
- *Reviewer*, Journal of Systems and Software (2017)
- *Guest Editor*, Journal of Mobile Information Systems (Special Issue on Mobile Applications Testing and Quality Evaluation, 2017)
- *Reviewer*, Software Quality Journal (2017)
- *PC member*, The 41st Annual International Computers, Software and Applications Conference (COMPSAC 2017)
- *PC member*, The 8th International Workshop on Empirical Software Engineering in Practice (IWESEP 2017)
- *Co-reviewer*, The 39th International Conference on Software Engineering (ICSE 2017)
- *Reviewer*, IEEE Transactions on Software Engineering (2016)
- *Reviewer*, Journal of Systems and Software (2016)
- *Reviewer*, Journal of Computer Science and Technology (2016)
- *Reviewer*, IEEE Communications Magazine (2016)
- *Reviewer*, Journal of Mobile Information Systems (2016)
- *PC member*, The 15th National Software Application Conference (NASAC 2016 English Track)
- *Co-reviewer*, The 32nd IEEE International Conference on Software Maintenance and Evolution (ICSME 2016 Early Research Achievements Track)
- *Co-reviewer*, The 38th International Conference on Software Engineering (ICSE 2016)
- *Co-reviewer*, The 24th ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE 2016 Visions and Reflections Track)
- *Reviewer*, IEEE Transactions on Services Computing (2015)
- *Reviewer*, IEEE Transactions on Software Engineering (2015)
- *Reviewer*, Journal of Systems and Software (2015)
- *Reviewer*, IEEE Communications Magazine (2015)
- *PC member*, The 9th Asia-Pacific Services Computing Conference (APSCC 2015)
- *OC member*, The 22nd ACM SIGSOFT International Symposium on the Foundations of Software Engineering (FSE 2014)
- *PC member*, The 8th Asia-Pacific Services Computing Conference (APSCC 2014)
- *Co-reviewer*, The 16th International Conf. on Fundamental Approaches to Software Engineering (FASE 2013)
- *Co-reviewer*, The 15th International Conf. on Fundamental Approaches to Software Engineering (FASE 2012)
- *Student volunteer*, The 19th Asia-Pacific Software Engineering Conference (APSEC 2012)
- *Student volunteer*, The 41st International Conference on Dependable Systems and Networks (DSN 2011)

Last updated: January 3, 2019

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