Xuan-Bach LE

Personal Data

Place and Date of Birth:	Vietnam | 07 October 1988
Address:	Research Lab for Intelligent Software Engineering (RISE),
	SMU Administration Building,
	81 Victoria Street, Singapore 188065
Phone:	+65 8372 2445
email:	lxbachcs@gmail.com
website:	https://lexuanbach.github.io/
Research Interests:	Formal Methods for Concurrent/Quantum/Probabilistic Reasoning,
	Decision Procedures, Separation Logic, Computational Complexity

Work Experience

Jan 2022 – Now | Research Scientist at Singapore Management University, Singapore
Formal methods for Verification

May 2019 – Dec 2021 | Research Fellow at Nanyang Technological University, Singapore
Formal methods for Verification

Formalized mathematical reasoning frameworks to verify the correctness of complex systems that feature concurrency, quantum computation, probabilities. Developed automatic verification tool ReGaSol and decision procedures from these frameworks.

Aug 2018 – Mar 2019 | Research Fellow at University of Oxford, UK
Algorithmic Verification of String-Manipulating Programs

Investigated the monadic decomposibility problem to decompose complex string constraints into simpler monadic constraints that are solvable. Proved the tight complexity bounds of the decomposibility problem for regular string constraints expressed by DFA and NFA.

Sep 2017 – Aug 2018 | Research Associate&Fellow at National University of Singapore, Singapore
Formal methods for Verification

Developed formal proof system and automatic tool ShareInfer to handle tree share constraints that are used to model permissions in concurrent programs. Investigated methods for symbolic execution to verify programs with loops.

Education

Jan 2013 – Aug 2017   PhD in Computer Science
National University of Singapore, Singapore
Thesis title: *Tree Share Structure in Verification:*
Applications, Systems, and Theory
Supervisor: Dr. Aquinas Hobor   Advisor: Dr. Anthony W. Lin

Aug 2007 – May 2012   Undergraduate Degree in Computer Science
Specialization: Algorithms and Computation
National University of Singapore, Singapore
First-class Honours

Undergraduate Degree in Pure Mathematics
National University of Singapore, Singapore
First-class Honours

Selected Publications

1. Xuan-Bach Le and Shang-Wei Lin and Sun Jun and David Sanán. *A Quantum Interpretation of Separating Conjunction for Local Reasoning of Quantum Programs Based on Separation Logic* . In POPL, 2022.

2. Xuan-Bach Le and David Sanán and Sun Jun and Shang-Wei Lin. *Automatic Verification of Multi-threaded Programs by Inference of Rely-Guarantee Specifications.* In ICECCS, 2020.

3. Pablo Barceló and Chih-Duo Hong and Xuan-Bach Le and Anthony W. Lin and Reino Niskanen (alphabetical order). *Monadic Decomposability of Regular Relations.* In ICALP, 2019.

4. Xuan-Bach Le and Aquinas Hobor. *Reasoning over disjoint permissions.* In ESOP, 2018.

5. Xuan-Bach Le and Aquinas Hobor and Anthony W. Lin. *Complexity analysis of tree share operations.* In APLAS, 2018.

6. Xuan-Bach Le and Thanh-Toan Nguyen and Wei Ngan Chin and Aquinas Hobor. *A certified decision procedure for tree shares.* In ICFEM, 2017

Teaching Experience

Jan 2017 – May 2017   Grader at Yale-NUS
1. YCC1212 (Introduction to CS, S2/16-17)
2. YCC2202 (Data Structures & Algorithm, S2/16-17)

2009 – 2015   Teaching Assistant and Lab Assistant at NUS
1. CS1231 (Discrete Maths, S1/11-12, S1/13-14)
2. CS1010 (Programming Methodology, S1/10-11)
3. CS1102/1020 (Data Structures I, S2/09-10, S2/10-11)
4. CS3234 (Logic & Formal Systems, S1/10-11, S2/12-13)

Technical Skills

Basic Knowledge:	Machine Learning (SVM, Probabilistic Prediction Network)
Intermediate Knowledge:	Web Programming (JavaScript, php, html, mysql), Integer Programming, Constraint Solving (Z3)
Expert Knowledge:	Coq, Java, C++, OCaml

Scholarships and Certificates

2013 – 2017	President Graduate Fellowship
2007 – 2012	A STAR Pre-graduate Scholarship
	NUS Donated Scholarship
	Dean List Award 2007, 2008, 2010
	Certificate of Special Program in Computing

Languages

Vietnamese:	Mothertongue
English:	Fluent
French:	Basic Knowledge