CURRICULUM VITAE

PERSONAL INFORMATION

Rui Wang Øvregaten 21, 5003, Bergen, Norway +4792250400 wruiwr86@gmail.com
Personal Website Github Profile Linkedin Profile Google Scholar

WORK EXPERIENCE

03/2016-04/2020 *Ph.D. Research Fellow in Computer Science - Software Engineering Group*
Western Norway University of Applied Sciences, Bergen, Norway

Skills acquired: Project management (design, implementation and development, testing and evaluation phases), time management, international cooperation, scientific and technical documentation, conference presentation, publishing, travel availability, pro-activeness, adaptability.

Techniques & tools used: Google gRPC and protocol buffers, TCP & UDP sockets, CPNs and CPN Tools, Modbat Model-based API Tester, modeling, code and test case generation, Golang, Go toolchain, Scala, Java, shell scripting, Sed & AWK, Latex, the DOT language, GraphViz, Goland, IntelliJ, Neovim, Unix (macOS), Linux (Ubuntu cluster), Windows, Git, Travis CI.

Model-Based Software Testing (MBT) for Quorum-based Fault-Tolerant Distributed Systems and Protocols (Research Cooperation with the University of Stavanger, Norway)

DESIGN: Designed an MBT approach and a QuoMBT framework to validate the correctness of quorum-based fault-tolerant distributed systems and consensus protocols.

IMPLEMENTATION & DEVELOPMENT OF SOFTWARE TOOLS:

- Successfully implemented distributed systems and consensus protocols using the Gorums framework (relying on gRPC and protocol buffers) in the Go programing language.
- Developed CPN testing Models of implemented distributed systems and consensus protocols using Coloured Petri Nets (CPNs) and CPN Tools.
- Developed an MBT/CPN testing tool as an extension of CPN Tools for automated test case generation from CPN models.
- Developed a test case execution engine in Go to use Go templates to automatically generate a test adapter that performs automated test case execution.

TESTING & EVALUATION: Successfully tested concurrency and fault tolerance, obtained good coverage, and detected errors in the implementations of distributed systems protocols.

NOTABLE OUTCOME: Two journal publications, one international conference publication, and two workshop publications.

Test Adequacy Criteria Measurement and Visualization Technique for Model-based Software Testing (Visiting Ph.D. Researcher work at the KTH Royal Institute of Technology, Stockholm, Sweden, 08/2018-12/2018)

DESIGN: Designed an approach to capture execution paths and a technique to measure and visualize the execution path coverage criterion of test cases.

IMPLEMENTATION & DEVELOPMENT OF SOFTWARE TOOLS: Developed a path coverage visualizer tool in Scala, which was included as a new feature for the Modbat Tester 3.4 release, to record execution paths of test cases and visualize execution path coverage.

TESTING & EVALUATION:

- Applied the visualizer to measure and visualize execution path coverage of test cases of a collection of examples, including the ZooKeeper distributed coordination service.
- The visual feedbacks successfully gave us confidence about how well the testing models were explored by the generated test cases and what kinds of tests succeeded or failed.

NOTABLE OUTCOME: One international conference publication.

Effective Test Case Generation using Reinforcement Learning and Multi-objective Optimization for Model-based Software Testing (Research Cooperation with the KTH)

DESIGN: Designed the search-based test case generation approach based on multi-objective reinforcement learning and optimization technique to generate optimal test cases.

IMPLEMENTATION & DEVELOPMENT OF SOFTWARE TOOLS:

- Implemented a bandit heuristic search algorithm in Scala as a search-based test case generation tool extension included as a new feature for the Modbat Tester 3.4 release.

- Developed a plot generator tool in Go to generate box plots for result data analysis.

TESTING & EVALUATION:

- Defined multi-objective bandit optimization problem in Java using an objective function.
- Applied the bandit heuristic search algorithm and multi-objective optimization with the NSGA-II genetic algorithm on a collection of Modbat models including the ZooKeeper distributed coordination service and the PostgreSQL database system.
- The optimal test cases generated using bandit heuristic search algorithm provided more predictable and improved state- and transition coverage, found failures earlier, and provided increased path coverage.

NOTABLE OUTCOME: One international conference paper.

08/2016-11/2019 *Teaching*
Western Norway University of Applied Sciences, Bergen, Norway

BACHELOR COURSES: Basic Programming in Java; Mobile and Distributed Applications.

09/2015-02/2016 *IBM i Software Developer - IBM System & Technology Laboratory*
IBM Investment Company LTD

The Common Information Model (CIM) project for IBM i System

IBM I SOFTWARE DEVELOPER: Independently set up a new and complicated development environment of the Common Information Model (CIM) of different releases of the IBM i System for the efficient development of CIM and documented a detailed technical article to explain how to set up the IBM Universal Manageability Enablement environment for the development of CIM of different releases.

TESTER: Achieved product vulnerability analysis by fixing a new critical security vulnerability and bugs in CIM which potentially impacted CIM; successfully built and tested fixed CIM products of different releases by using the new development environment and testing tools. Accomplished the production build and released the product temporary fixes for CIM of different releases.

CPS DEVELOPER: solved issues and fixed bugs for CIM reported by customers.

06/2014-09/2014 *Research Assistant - Cyber-physical Systems Research Group*
Halmstad university, Halmstad, Sweden

Development of 3D animations and visualizations for the Acumen simulation tool

Independently achieved the development of the demos based on different Java-based libraries and game engines in Java and Scala. The promising Java-based library for 3D animations and visualization I proposed was successfully accepted by the research group.

EDUCATION

2017-present *Ph.D. in Computer Science - Software Engineering*
Western Norway University of Applied Sciences, Bergen, Norway

2017-2017 *Ph.D. Project in Computer Science - Advanced Distributed Systems*
University of Stavanger, Stavanger, Norway

2011-2014 *M.Sc in Computer Science and Engineering - Embedded and Intelligent Systems*
Halmstad University, Halmstad, Sweden

PERSONAL SKILLS

Technical Skills:
Software skills: Golang, Scala, Java, Python, shell scripting, Sed & AWK.
IDEs and Editors: Goland, IntelliJ, PyCharm, Eclipse, Vim/Neovim, Atom, Sublime.
Documentation: Latex, Markdown.
OS: Unix (macOS), Linux.
Version control and team cooperation: Git, Travis CI, Slack, Trello.
Design, modeling and testing tools and techniques: CPNs, Modbat, JUnit, table-driven testing.

Languages: Mandarin Chinese (Native), English (Advanced), Norwegain (A2)

REFERENCE

Lars M. Kristensen Professor, Western Norway University of Applied Sciences, Bergen, Norway.
Tel: +4755587164, Email: lmkr@hvl.no, Web: https://home.hvl.no/ansatte/lmkr/