Xiaohong Chen

CONTACT

Email: xc3@illinois.edu
Homepage: https://xchen.page/
Department of Computer Science
University of Illinois Urbana-Champaign (UIUC)
201 N. Goodwin, Urbana, IL 61801, USA

RESEARCH INTERESTS

Logic and formal methods
Programming languages
Proof-carrying smart contracts and blockchain applications

REFERENCES CONTACT

Prof. Grigore Roşu
University of Illinois Urbana-Champaign
Contact: grosu@illinois.edu

Prof. José Meseguer
University of Illinois Urbana-Champaign
Contact: Salome Liebenberg salomel@illinois.edu

Dr. Margus Veanes
Microsoft Research
Contact: margus@microsoft.com

EDUCATION

Department of Computer Science, UIUC

Ph.D. Student in Computer Science (2016–present; expected May'23)

- Dissertation Topic: Matching Logic
- Thesis Advisor: Grigore Roşu

School of Mathematical Sciences, Peking University

Bachelor of Science, June 2014

- Highest distinction in general scholarship

PUBLICATIONS

B. Collie, T. Kasampalis, **X. Chen**, D. Guth, G. Roşu. *An efficient language-agnostic semantics-based interpreter*, **PLDI** (under review).

T. Trinh, **X. Chen**, N. Rodrigues, G. Roşu. *Automatic abstraction for fixpoint reasoning in matching logic*, **PLDI** (under review).

Z. Lin, **X. Chen**, T. Trinh, J. Wang, G. Roşu. *Generating proof certificates for a language-agnostic deductive program verifier*, **OOPSLA** (under review).

X. Chen, G. Roşu. *Defining binders in matching logic (featuring a case study of contexts in $\mathbb{K}$)*, Journal of Functional Programming (**JFP**) ICFP Special Issue (under review).

X. Chen, D. Lucanu, G. Roşu. *Capturing constrained constructor patterns in matching logic*, Journal of Logical and Algebraic Methods in Programming (**J'LAMP**), 2022.

X. Zhang, **X. Chen**, M. Sun. *Towards a unifying logical framework for neural networks*, International Colloquium on Theoretical Aspects of Computing (ICTAC), 2022.

P. Bereczky, **X. Chen**, D. Horpácsi, T. Mizsei, L. Peña, J. Tusil. *Mechanizing matching logic in Coq*, Working Formal Methods Symposium (FROM), 2022.

M. Saxena, **X. Chen**, S. Song, S. Meng, L. Sha, G. Roşu. *Rewriting-based computer-interpretable clinical practice guidelines*, Technical Report `https://hdl.handle.net/2142/116016`, 2022.

X. Chen, G. Roşu. *The $\mathbb{K}$ vision for the future of programming language design and analysis*, Formal Methods in Outer Space, 2021.

X. Chen, Z. Lin, T. Trinh, G. Roşu. *Towards a trustworthy semantics-based language framework via proof generation*, Computer-Aided Verification (**CAV**), 2021.

X. Chen, D. Lucanu, G. Roşu. *Matching logic explained*, Journal of Logical and Algebraic Methods in Programming (**J'LAMP**), 2021.

Z. Lin, **X. Chen**, G. Roşu. *An interactive theorem prover for matching logic with proof object generation*, Technical Report `https://hdl.handle.net/2142/111650`, 2021.

X. Chen, T. Trinh, N. Rodrigues, L. Pẽna, G. Roşu. *Towards a unified proof framework for automated fixpoint reasoning using matching logic*, **OOPSLA**, 2020.

X. Chen, G. Roşu. *A general approach to define binders using matching logic*, International Conference on Functional Programming (**ICFP**), 2020.

X. Chen, D. Lucanu, G. Roşu. *Connecting constrained constructor patterns and matching logic*, International Workshop on Rewriting Logic and Its Applications, 2020.

X. Chen, G. Roşu. *$\mathbb{K}$—A semantic framework for programming languages and formal analysis*, Book Chapter of the International School on Engineering Trustworthy Software Systems, 2020.

X. Chen, D. Lucanu, G. Roşu. *Initial algebra semantics in matching logic*, Technical Report `https://hdl.handle.net/2142/107781`, 2020.

M. Saxena, **X. Chen**, N. Rodrigues, G. Roşu. *Formal semantics*

of hybrid automata, Technical Report `https://hdl.handle.net/2142/106822`, 2020.

X. Chen, G. Roşu. *Matching μ-logic*, Logics in Computer Science (**LICS**), 2019.

X. Chen, G. Roşu. *A language-independent program verification framework*, Leveraging Applications of Formal Methods, Verification and Validation (ISoLA), 2018.

X. Chen, D. Park, G. Roşu. *A language-independent approach to smart contract verification*, Leveraging Applications of Formal Methods, Verification and Validation (ISoLA), 2018.

J. Wang, **X. Chen**, J. Sun, S. Qin. *Improving probability estimation through active probabilistic model learning*, International Conference on Formal Engineering Methods (ICFEM), 2017

E. Palomar, **X. Chen**, Z. Liu, S. Maharjan, J. Bowen. *Component-based modelling for scalable smart city systems interoperability: A case study on integrating energy demand response systems*, Sensors **16**(11):1810, 2016.

P. Kong, Y. Li, **X. Chen**, J. Sun, M. Sun, J. Wang. *Towards concolic testing for hybrid systems* Formal Methods (**FM**), 2016.

Z. Liu, **X. Chen**. *Model-Driven Design of Object and Component Systems*, Book Chapter of the International School on Engineering Trustworthy Software Systems, 2016.

(Best Paper) S. Li, **X. Chen**, Y. Wang, M. Sun. *A framework for off-line conformance testing of timed connectors*, Theoretical Aspects of Software Engineering (TASE), 2015.

X. Chen, J. Sun, M. Sun. *A hybrid model of connectors in cyber-physical systems*, International Conference on Formal Engineering Methods (ICFEM), 2014.

Awards

2022	Graduate College's Dissertation Completion Fellowship
2020	Mavis Future Faculty Fellowship
2018–2019	Yunni & Maxine Pao Memorial Fellowship
2012–2013	China National Scholarship

Grants

Assisted in proposal preparation for the following research grant:

2022–2023 *Trustworthy Formal Verification for Ethereum Smart Contracts via Machine-Checkable Proof Certificates*, Ethereum Foundation, Funded Amount: $30,000. News Article: `https://shorturl.at/djtuz`.

Talks

Verification in the RISC-Zero zkVM at the New England Systems Verifi-

cation Day, slides available online: `https://shorturl.at/ijzH0`, 2022

Towards a trustworthy semantics-based language framework via proof generation at CAV, 2021.

A general approach to define binders using matching logic at ICFP, available online: `https://www.youtube.com/watch?v=TNO_jGr33VM`, 2020.

Towards a unified proof framework for automated fixpoint reasoning using matching logic at OOPSLA, available online: `https://www.youtube.com/watch?v=2JlaJPPilB0`, 2020.

(Tutorial) *Using the* $\mathbb{K}$ *framework to formalize functional languages* at ICFP, available online: `https://www.youtube.com/watch?v=VlQMi_N42B8`, 2020.

A language-independent program verification framework at the 7th International Symposium on Leveraging Applications of Formal Methods, Verification and Validation, Limassol, Cyprus, 2018.

A language-independent approach to smart contract verification at the 7th International Symposium on Leveraging Applications of Formal Methods, Verification and Validation, Limassol, Cyprus, 2018.

Towards concolic testing for hybrid systems at the 21st International Symposium on Formal Methods, Limassol, Cyprus, 2016.

Teaching Experience

2022	Guest Lecturer, Programming Language Design
2019 & 2020	Teaching Assistant, Software Engineering (I)
2018	Guest Lecturer, Programming Language Semantics
2015	Assistant Lecturer, Data Analysis
2014	Assistant Lecturer, Software Engineering

Advising

I have served as a research advisor for the following students:

Nishant Rodrigues	(PhD student at UIUC)
Manasvi Saxena	(PhD student at UIUC)
Mircea Sebe	(PhD student at UIUC)
Adam Fiedler	(MSc student at Masaryk University; now at Runtime Verification Inc.)
Jan Tušil	(MSc student at Masaryk University; now at Runtime Verification Inc.)
Zhengyao Lin	(undergrad at UIUC; now PhD student at CMU)
John Wang	(undergrad at UIUC)

Work Experience

2022 — Verification Engineer, Runtime Verification Inc.

Helped establish RV Research—the new research institute at Runtime Verification Inc (`https://research.runtimeverification.com/`). Drafted open research problems for RV Research and recorded introduction videos. Organized weekly RV Research seminars.

2018–2019 — Verification Engineer, Runtime Verification Inc.

Designed the logical foundation of the $\mathbb{K}$ framework (`https://kframework.org`). Wrote the *Semantics of* $\mathbb{K}$ white paper. Helped design the symbolic execution engine of $\mathbb{K}$.

2015–2016 — Research Assistant, Singapore University of Technology and Design.

Created probabilistic models for cyber-physical systems. Designed efficient and effective sampling algorithms. Proved asymptotic properties of the algorithms.

Service

Local Organization Committee Member of SPIN'22. Helped organizing the conference and publishing the conference proceedings.

Student Volunteer of PLDI'21

(Sub)reviewer and/or artifact reviewers of CONCUR'22, OOPSLA-AEC'22, LICS'21, TACAS'21, JLAMP'20, LICS'19, CAV'19, CONCUR'19, FM'19, FoSSaCS'19, JLAMP'19, FSCD'18, AiML'18, FSCD'17, RV'17, CALCO'17, HSCC'17, NFM'17, FSCD'16, RV'16, CALCO'16, HSCC'16, NFM'16, FM'16, SEFM'16, TASE'16, APSEC'15, MEDI'15, WWV'15.