Simon Chu

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EDUCATION

Carnegie Mellon University, Pittsburgh, PA   May 2020 - May 2025 (expected)
Ph.D. in Software Engineering, advised by Eunsuk Kang and David Garlan
Software and Societal Systems Department, School of Computer Science

Wilkes University, Wilkes-Barre, PA   Aug. 2016 - May 2020
Bachelor of Science in Computer Science
Minor in Mathematics
GPA: 3.94/4.00

GRADUATE RESEARCH

Resilience Framework for Cyber-Physical Systems   May 2020 – Present
Carnegie Mellon University, Thesis Topic   *Pittsburgh, PA*

· Investigating CPS resilience problems, including graceful degradation, recovery, and feature interaction.
· Exploring applying formal methods in designing safety-critical software systems.
· Implemented MILP-based optimization in requirement-driven runtime adaptation architecture.
· Developed constraint encoder for Signal Temporal Logic (STL) specifications.

Manage Large-Legacy Systems using Domain-Specific Language   May 2022 – Present
DARPA-funded project, in collaboration with Vanderbilt University   *Pittsburgh, PA*

· Modeling ArduPilot-based drone controller software in state-machine-based modeling languages P.
· Facilitating tool integration with existing legacy code by investigating DSL code generation capabilities.
· Present live demos, and propose DARPA engagement challenge to project stakeholders in PI meetings.

Model Extraction and Validation using Large Language Model (LLM) May 2023 – Present
Carnegie Mellon University   *Pittsburgh, PA*

· Designed intermediate language (IR) to capture state machine semantics which boosts model quality.
· Developed techniques and tools for model validation using model-based testing.
· Implemented framework to extract formal models from drone controllers using GPT 3.5/4 API.

UNDERGRADUATE RESEARCH

Safe and Modular Programming Language (The Wyvern Project)   May 2019 – Aug. 2019
REUSE Program, Carnegie Mellon University   *Pittsburgh, PA*

· Designed typing rules for safe recursive initialization construct and dynamic composition mechanism.
· Implemented option-type syntactic sugar, enhanced the language expressiveness.
· Improved code reliability and efficiency by refactoring the parser, lexical analyzer rules, and CI process.

Wilkes University   May 2017 – May 2019
Undergraduate Researcher, Math and CS Dept.   *Wilkes-Barre, PA*

· Developed the scikit-learn models using SVM for classifying animal images with over 80% accuracy.
· Implemented scripts that facilitate distributed model training, evaluation, and statistical analysis.
· Trained and improved face-cropping Haar Cascades, with over 85% face detection accuracy.
· Presented at Eastern College Science Conference (ECSC) 2018 at Ithaca College.

LEADERSHIP EXPERIENCE

Carnegie Mellon University — Aug. 2021 - Dec. 2021
Teaching Assistant, 17-614 & 17-624 Formal Methods Course — Pittsburgh, PA
· Designed course materials including lectures on the TLA+ model checking tool and exams.
· Responsible for grading homework/exams for 70 students while coordinating with 3 other TAs.
· Assisted students with proofs and PRISM/Alloy/TLA+ model debugging via weekly office hours.

Wilkes University — May 2017 – May 2019
System Manager, Math and CS Dept. — Wilkes-Barre, PA
· Maintained Computer Science departmental networks, LDAP server, and lab computers.
· Implemented scripts to automate routine updates, software installation, system accounts, and backups.
· Assisted with large-scale Ubuntu system migration, hardware replacement, and programming contests.

LSEO, LLC — Jan. 2018 – May 2018
Software Engineering Intern — Wilkes-Barre, PA
· Assisted the content marketing team with the development of 5+ clients' web-based projects.
· Analyzed the traffic data, conducted keyword/ranking algorithm research using SEMrush.
· Monitored web traffic, detected malicious network requests and vulnerabilities in clients' projects.

PUBLICATION

Integrating Graceful Degradation and Recovery through Requirement-driven Adaptation
Simon Chu, Justin Koe, David Garlan, and Eunsuk Kang — ***SEAMS 2024***

Runtime Resolution of Feature Interactions through Adaptive Requirement Weakening
Simon Chu, Emma Shedden, Changjian Zhang, Romulo Meira-Goes, Gabriel Moreno, David Garlan, and Eunsuk Kang — ***SEAMS 2023***

"Do it my way!": Impact of Customizations on Trust Perceptions in Human-Robot Collaboration
Simon Chu, Angela Chen, Parv Kapoor — ***Technical Report, ArXiv***

TEACHING AND MENTORING

Guest Lecturer/Instructor on TLA+, 17-624 Advanced Formal Methods, CMU Fall 2021 & 2022
Research Mentor, REUSE Program, Carnegie Mellon University — Summer 2021 & 2022
Math/Computer Science Mentor, STEM Discovery Day, Wilkes University — Nov. 2019
Robotics/Programming Mentor, Women Empowered by Science, Wilkes University — July 2017
First-year Student Mentor, Wilkes University Student Development — 2017-2019

SERVICE

Admissions Committee Member, REUSE Program, CMU — Spring 2021, 2022 & 2023
Student Volunteer, ICSE '22 — May 2022
Sub-Reviewer, SEAMS '23, ACSOS '23, ASE '22, ICSA '22 — 2022-2023
President of Math/CS Club, Wilkes University Math/CS Dept. — 2019-2020

SKILLS

Programming	Python, Java, C/C++, HTML/CSS/JavaScript, Swift, Go, OCaml
Specialty	System Modeling (P, TLA+), Compiler/PL Design, Deep Learning, Web Development
Languages	English (native proficiency), Mandarin (native proficiency)