Kenneth (Kira) H. Chan

Phone: 1 (734) 635-4028 Email: chanken1@msu.edu Website: https://cse.msu.edu/~chanken1 City: East Lansing, MI

Education:

Ph.D. - Computer Science and Eng., Michigan State University, East Lansing **Exp. May 2026 - GPA: 4.0/4.0**
Research Focus: Addressing the assurance of machine learning components for software engineering.
M.S. - Computer Science and Eng., Michigan State University, East Lansing **May 2021 - GPA: 4.0/4.0**
B.S. - Computer Science and Eng., Michigan State University (Honors), East Lansing **May 2019 - GPA: 3.76/4.0**

Publications:

Kenneth H Chan and B.H.C. Cheng. EvoAttack: Suppressive adversarial attacks against object detection models using evolutionary search. Automated Software Engineering, 2024. *Accepted* to Special Issue on Advances in Search-based Software Engineering

Sol Zilberman, **Kenneth H Chan**, and B.H.C. Cheng. SavviDriver: A model-based framework for using multi-agent games to explore human-based uncertainty for autonomous vehicles. 2024. *In press* Sep. 2024 to ICSE

Kenneth H Chan, Sol Zilberman, Nick Polanco, Joshua E Siegel, and B.H.C. Cheng. SafeDriveRL: Combining non-cooperative game theory with reinforcement learning to explore and mitigate human-based uncertainty for autonomous vehicles. In Proceedings of the 19th International Symposium on Software Engineering for Adaptive and Self-Managing Systems, pages 214–220, 2024

Kenneth H Chan and B.H.C. Cheng. Expound: A black-box approach for generating diversity-driven adversarial examples. In International Sym. on Search Based Software Engineering, pages 19–34. Springer, 2023

Michael Austin Langford, **Kenneth H Chan**, Jonathon Emil Fleck, Philip K McKinley, and B.H.C. Cheng. MoDALAS: addressing assurance for learning-enabled autonomous systems in the face of uncertainty. Software and Systems Modeling, pages 1–21, 2023

Kenneth H Chan and B.H.C. Cheng. EvoAttack: An evolutionary search-based adversarial attack for object detection models. In Proceedings of the 14th IEEE Symposium on Search-Based Software Engineering, Singapore, 2022

Michael Austin Langford, **Kenneth H Chan**, Jonathon Emil Fleck, Philip K McKinley, and B.H.C. Cheng. MoDALAS: Model-driven assurance for learning-enabled autonomous systems. In Proceedings of MODELS 2021: ACM/IEEE 24th International Conference on Model Driven Engineering Languages and Systems (MODELS), pages 207–216, Fukuoka, JP, 2021.

Kenneth H Chan, Matthew Pasco, and B.H.C. Cheng. Towards a blockchain framework for autonomous vehicle system integrity. SAE International Journal of Transportation Cybersecurity and Privacy Special Issue on System Safety and Cybersecurity, 4(11-04-01-0002), 2021

Work Experience:

Graduate Researcher, 2021 - Current **Michigan State University - East Lansing, MI**

- Developed techniques to address / improve the assurance and robustness of DNNs to ensure their correctness in the face of adverse perturbations or uncertainties (human-induced, environmental, etc.).
- Applied technologies from a number of distinct disciplines (e.g., reinforcement learning, evolutionary computing, game theory, etc.) to assess and improve the robustness of DNNs and software.

Software Engineer (Capstone project), 2018 **Volkswagen - Auburn Hills, MI**

- Designed and developed a demo application which introduces potential customers to VW's connected interactive phone car services and familiarized existing customers with new system features.
- Developed applications for the Android platform (Kotlin), using Firebase, Eventbus, and OAuth.
- Worked in a team of 4 teammates, corresponding with our customer via weekly meetings.

Software Engineer (Intern), Summer 2015 **GeoNexus Technologies - Ann Arbor, MI**

- Designed and developed a prototype application to extend GeoNexus' geographic information system to visualize work order services on a map for handheld devices for customers with 2 other interns.
- Technologies used include Android Studio (Java), pair programming, unit testing, threads, Git, and SQL.

Teaching Experience:

Graduate Assistant, 2019 - Current (16 semesters) **Michigan State University - East Lansing, MI**

Selected Courses: CSE435 Software Engineering (8 semesters), CSE812 Distributed Systems, CSE477 Web Dev., CSE476 Mobile App Dev., CSE335 Object-Oriented Software Development, CSE260 Discrete Mathematics.

- Created 35+ assignments, projects, and exams designed to transform concepts into practical application.
- Presented 6 guest lectures on machine learning, DNNs, software engineering, and computer security.
- Organized, led, and trained 35+ teaching assistants and undergraduate assistants.
- Assisted, managed, and taught classes with up to 200 students per semester (2,000+ students total).
- Courses taught include introductory-level undergraduate courses, senior-level undergraduate courses, and graduate-level courses.

Invited Talks and Lectures:

"Introduction to Statistical Machine Learning and Deep Learning Fall 2024", Guest Lecture (2 Sessions), Michigan State University 2024

"Introduction to Deep Learning Fall 2023", Guest Lecture, Michigan State University 2023

"EvoAttack: an Evolutionary Search-based Adversarial Attack for Object Detection Models", Graduate Seminar, Michigan State University 2022

"Computer Security for Software Engineering", Guest Lecture, Michigan State University 2021

"Introduction to Programming", MSU Leaders In IT Club, Michigan State University 2018

Selected Project Experience:

SavviDriver - *K. Chan*, S. Zilberman, and B.H.C. Cheng **(In press, ICSE2024)**

- Proposed a novel framework to leverage model-based engineering to systematically construct reward functions for agents in a multi-agent reinforcement learning systems using two distinct modelling language (KAOS and i*) to achieve rapid reconfiguration, leading to improved design, deployment, and testing.

SafeDriveRL - *K. Chan*, S. Zilberman, N. Polanco, and B.H.C. Cheng (SEAMS 2024) **Lisbon, Portugal**

- Synthesized reinforcement learning and non-cooperative game theory to discover human-induced misbehaviors for autonomous vehicles trained with machine learning, discovering up to 25% failures.

Expound - *K. Chan* and B.H.C. Cheng (Sym. on Search-based Software Eng. 2023) **San Francisco, U.S.**

- Proposed a novelty search approach to discover *diverse* adversarial examples, leading to more than 300% increased *types* of unique failures in image classifier DNNs using the exploration/exploitation paradigm.

EvoAttack - *K. Chan* and B.H.C. Cheng (Sym. on Search-based Software Eng. 2022) **Singapore**

- Demonstrated that black-box evolutionary search-based adversarial examples apply to state-of-the-art object detection algorithms, preventing the correct detection of *all* objects for existing models.

Honors and Awards:

Summer Research Fellowship 2023 (Michigan State University, College of Engineering) $7,600

Dr. Delia Koo Global Student Scholarship and Chinese Student Endowment - 2023 $5,000

GOF Research Fellowship 2020 (Michigan State University) $7,000

Auto-Owners Exposition Award - 2018

Blue Oval STEM Scholarship (Ford Motor Company) - 2015-2019 $2,500 - Renewable for 4 Years

Synergistic Activities:

SME Education Foundation Scholarship Application Reviewer 2023/2024

ACM Special Interest Group on Software Engineering (SIGSOFT) Student Member 2023-Present

Skills:

Languages: Python, Java, C/C++, HTML/CSS, JavaScript, Shell/Bash, PHP, SQL

Tools: PyTorch, pandas, TensorFlow, Latex, SVMs, Statistical Machine Learning, A/B Testing, Sklearn, Big Data, DNNs (RetinaNet, YoloV5, Faster-RCNN, ResNet, etc.)

Interdisciplinary Techniques: Reinforcement Learning, Cooperative and Non-cooperative Game Theory, Evolutionary Search/Computing, Requirements Engineering, Model-driven Engineering

Systems: Linux/Unix, Windows