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GoogleScholar: 31 citations

Tzu-Han Hsu

Research Interests

My research is on applications of **formal methods** in program **verification** and **synthesis** for **hyperproperties** including requirements of **information-flow security** and **privacy** analysis.

Education

Ph.D. Student in Computer Science Engineering 2020–present
Michigan State University, East Lansing, MI, USA
Advisor: Dr. Borzoo Bonakdarpour
GPA: 3.94/4.0

Bachelor of Science in Computer Science 2016–2020
Iowa State University, Ames, IA, USA
GPA: 3.86/4.0

Bachelor of Music in Piano Performance 2013–2017
Iowa State University, Ames, IA, USA
GPA: 3.86/4.0, Outstanding Senior Nomination by the Department of Music

Research Experience

- **Research Intern** *Microsoft Research (MSR)* Summer 2023
  Theorem-Carrying-Transaction: Provable Security for Smart Contracts
  Mentors: *Shuo Chen, Nikolaj Bjørner*
- **Applied Science Intern** *Amazon Web Services Automated Reasoning Group (AWS-ARG)* Summer 2022
  Symbolic Model Checking for Distributed Protocol with Parallelization
  Mentors: *Aman Goel, Michael Whalen*
- **Graduate Research Assistant** *Michigan State University (MSU)* 2020–Present
  Formal Methods, Verification and Synthesis of Hyperproperties, Information-flow, Security and Privacy
- **Undergrad Research Assistant** *Iowa State University* 2019–2020
  Model checking with Hyperproperties

Conference Papers

1. Raven Beutner, <u>Tzu-Han Hsu</u>, Borzoo Bonakdarpour, and Bernd Finkbeiner, **"Syntax-Guided Automated Program Repair For Hyperproperties"** *In International Conference on Computer Aided Verification (CAV'24), To Appear*

2. <u>Tzu-Han Hsu</u>, Borzoo Bonakdarpour, Bernd Finkbeiner, and César Sánchez, **"Bounded Model Checking for Asynchronous Hyperproperties"** *In International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS'23), Paris, France.*

3. <u>Tzu-Han Hsu</u>, César Sánchez, Sarai Sheinvald, and Borzoo Bonakdarpour, **"Efficient Loop Conditions for Bounded Model Checking Hyperproperties"** *In International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS'23), Paris, France.*

4. <u>Tzu-Han Hsu</u>, Borzoo Bonakdarpour, Eunsuk Kang, and Stavros Tripakis, **"Mapping Synthesis for Hyperproperties"** *In IEEE International Symposium on Computer Security Foundations (CSF'22/FLoC'22), Haifa, Israel.*

5. <u>Tzu-Han Hsu</u>, César Sánchez, and Borzoo Bonakdarpour, **"Bounded Model Checking for Hyperproperties"** *In International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS'21), Luxembourg, Luxembourg.*

Preprints

1. <u>Tzu-Han Hsu</u>, Borzoo Bonakdarpour, and César Sánchez, **"HyperQB: A QBF-Based Bounded Model Checker for Hyperproperties"** (2021)

2. <u>Tzu-Han Hsu</u>, Yu Wang, Borzoo Bonakdarpour, Miroslav Pajic,**"Multi-Agent Path Planning with Hyperproperties"** (2020)

Professional Services

- **Peer-evaluated Conference Paper Reviews/Sub-reviews**:

(CAV'24)	*Computer Aided Verification*
(RV'23)	*International Conference on Runtime Verification*
(TACAS'23)	*International Conference on Tools and Algorithms for the Construction and Analysis of Systems*
(FM'23)	*International Symposium on Formal Methods*
(ICCPS'23)	*International Conference on Cyber-Physical Systems*
(ICCPS'23)	*International Conference on Cyber-Physical Systems*
(VSTTE'23)	*Verified Software: Theories, Tools, Experiments*
(NFM'23)	*NASA Formal Methods*
(DISC'22)	*International Symposium on Distributed Computing*
(CSF'22)	*Computer Security Foundations Symposium*
(ATVA'21)	*International Symposium on Automated Technology for Verification and Analysis*

- **Conference Artifact and Code Submission Reviews:**

(CAV'24)	*International Conference on Computer Aided Verification*
(CAV'23)	*International Conference on Computer Aided Verification*

- **Journal Reviews::**

(ACTA'22)	*Acta Informatica*

- **Student Volunteer:**

(CAV'21)	*International Conference on Computer Aided Verification*

Fellowships

- **Michigan State University Graduate Research Fellowship**   April 2021 and 2022
  Summer Support for Outstanding Students

- **Google Research Fellowship**   September 2021
  One of the only four nominees selected by Michigan State University Engineering Department

Teaching Experience

- **Graduate Teaching Assistant** at Michigan State University — Spring 2020
  Discrete Structures in Computer Science (CSE 260)
- **Undergrad Teaching Assistant** at Iowa State University — Spring and Fall 2018
  Object-Oriented Programming (COM S 227)

Honors, Awards, and Scholarships

- Nomination of Departmental Outstanding Senior — 2020
- Iowa State University College of Liberal Arts and Sciences Dean's List — 2013–2020
- Future Leader Award, Issued by U.S. Ambassador to China Terry Branstad — 2018
- Iowa State University International Student Ambassador Gold Level Scholarship Recipient — 2013–2018
- Iowa State University Music Department Outstanding Student Scholarship Recipient — 2013–2018

Leadership and Volunteer Experiences

- The Society for Collegiate Leadership & Achievement — 2016–2020
- Iowa State University Student Council, Department Representative — 2017–2018
- Iowa Education without Borders (non-profit) Volunteer/Event Coordinator — 2017–2018
- Iowa Youth Leadership Summer Camp Student Volunteer — 2017–2018
- Iowa State University Annual K-12 Computational Thinking Competition — 2020

Music Awards

- Soloist Winner, Fort Dodge Orchestra Young Artists Concerto Competition — 2015
- 1st Prize Winner, Iowa State University Symphony Orchestra Concerto Competition — 2014
- State Winner, Music Teacher National Association (MTNA) Piano Competition — 2014

Industrial Experience

Software Engineer Intern — 2019–2020
Worrell Medical Design Inc., Minneapolis, MN

- Developed a Virtual Reality Environment on Oculus Quest for Human Factor Engineering usability testing.
- Programed well-functioning C# scripts in Unity3D engine with desired behaviors and outcomes.
- Analyzed user feedback and debug/adjust/improve the existing versions of the program with HF engineers.