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# Tzu-Han Hsu



## RESEARCH INTERESTS

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My research interests include applications of **formal methods** in program **verification**, **synthesis for hyperproperties**, and analysis of **information-flow security**.

## EDUCATION

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| <b>Ph.D. Student in Computer Science Engineering</b><br>Michigan State University, East Lansing, MI, USA<br><i>Advisor: Dr. Borzoo Bonakdarpour</i><br><i>GPA: 3.94/4.0</i> | 2020–present |
| <b>Bachelor of Science in Computer Science</b><br>Iowa State University, Ames, IA, USA<br><i>GPA: 3.86/4.0</i>  | 2016–2020    |
| <b>Bachelor of Music in Piano Performance</b><br>Iowa State University, Ames, IA, USA<br><i>GPA: 3.86/4.0, Outstanding Senior Nomination by the Department of Music</i>     | 2013–2017    |

## RESEARCH EXPERIENCE

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- **Graduate Research Assistant** *Michigan State University* 2020–Present  
Formal Methods, Synthesis of Hyperproperties, Information-flow Security, and Privacy
- **Applied Scientist Intern** *Amazon Automated Reasoning Group* Summer 2022  
Symbolic Model Checking for Distributed Protocol with Parallelization
- **Undergrad Research Assistant** *Iowa State University* 2019–2020  
Model checking and Hyperproperties

## CONFERENCE PAPERS

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1. Tzu-Han Hsu, 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. (To appear)*
2. Tzu-Han Hsu, 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. (To appear)*
3. Tzu-Han Hsu, 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.*
4. Tzu-Han Hsu, 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

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1. Tzu-Han Hsu, Borzoo Bonakdarpour, and César Sánchez, “**HyperQube: A QBF-Based Bounded Model Checker for Hyperproperties**” (2021)
2. Tzu-Han Hsu, Yu Wang, Borzoo Bonakdarpour, Miroslav Pajic, “**Multi-Agent Path Planning with Hyperproperties**” (2020)

## TEACHING EXPERIENCE

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

## PROFESSIONAL SERVICE

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- **Student Volunteer.** *International Conference on Computer Aided Verification (CAV’21).*
- **Conference Paper Subreviewer:**  
*International Conference ON Cyber-Physical Systems (ICCPS’23)*  
*Verified Software: Theories, Tools, Experiments (VSTTE’23)*  
*NASA Formal Methods (NFM’23)*  
*International Symposium on Distributed Computing (DISC’22)*  
*Computer Security Foundations Symposium (CSF’22)*  
*International Symposium on Automated Technology for Verification and Analysis (ATVA’21)*
- **Journal Reviewer.** *Acta Informatica (ACTA’22)*

## FELLOWSHIPS

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- University Graduate Research Fellowship, *Michigan State University*, April of 2020–2022

## HONORS, AWARDS, AND SCHOLARSHIPS

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- Nomination of Departmental Outstanding Senior of 2020 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

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- 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

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- 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

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### **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.