# Oyendrila **Dobe**

Graduate Student Researcher

oyendrila.dobe@gmail.com | oyendrila-dobe | oyendrila-dobe-400430103/ | Papers & citations

## Summary

I'm a 4th year PhD student researching on **formal verification of hyperproperties on probabilistic systems**. I am interested in designing and implementing algorithms that ensure security and correctness guarantees of systems by automatically reasoning about them.

## Education

### Michigan State University (Transferred from Iowa State University in 2020)

*East Lansing, Michigan, US*

Pursuing PhD in Computer Science GPA: 3.66/5 *2018 - Present*

- Taken courses in **Formal methods**, ML, Graph Theory, **Program analysis**, Theory of computation, Algorithms, Computer security.
- **Volunteer in Spartan Girls Who Code** - introducing coding to 6th grade students.
- Have been a **Grace Hopper Scholar** in 2019, 2021.
- Hold position as **graduate student representative** in department and play in Michigan State Badminton team.

### MAKAUT

*Kolkata, India*

BTech in Computer Science and Engineering GPA: 8.9/10 *2013 - 2017*

- Have pursued **research in classification and detection of brain tumors** from MRI scans under Dr. Amiya Halder.
- Have published the theory and results in ICACCI'16, ICACCI'17, IICCS'19.

## Research

### Statistical model checking of Probabilistic hyperproperties on Non-deterministic systems

*August 2020 - Current*

Joint work with Inria, Duke University, TU-Wien

- Statistical model checking provides a near-accurate result but in less time as compared to exhaustive model checking.
- The challenges in this problem is to **resolve non-determinism**, and to **minimize the number of traces** needed for verification.
- We are currently working on **implememting a solution** to solve this problem by extanding existing tool Plasma.

### Verifying Probabilistic Hyperproperties on Non-Deterministic & Probabilistic systems

*April 2020 - Current*

Joint work with RWTH-Aachen, TU-Wien

- The main challenge here is that it becomes undecidable when trying to resolve non-determinism.
- I have been involved in **creating the algorithm** for the solution and have solely **implemented** it using Python and Z3.
- Our **tool** *HyperProb* is the only one that can handle alternation of quantifiers and verify probabilistic hyperproperties.
- The tool paper appeared in the proceedings of **FM 2021**.
- We have published the theory for the work in **ATVA 2020** and special issue of **Information and Computing'21** (under review).

### Parameter Synthesis of Probabilistic Hyperproperties on Probabilistic systems

*November 2019 - March 2020*

Joint work with RWTH-Aachen, TU-Wien

- We tried to **synthesize values for unknown parameters** given a DTMC and a probabilistic hyperproperty it statisfies.
- The challenge lies in the generation of complicated constraints that capture all aspects of the system and the specification.
- I have been involved in **brainstorming the algorithm** for the solution and have solely **implemented** the solution using Python and Z3.
- We have published our theory and results in **LPAR'21**.

## Work Experience

### Teaching Assistant

Courses Taught: Object-Oriented Programming, Data Structures, Discrete Math. *Fall'18, Spring'19, Fall'20*

Conducted **recitations, and office hours** to help students improve their understanding.

### Research Assistant

Program analysis research laboratory (Iowa State University) *Summer'19*

- **Explored case studies** to prove the applicability of demand- driven algorithm to generate minimum size executable of c++/c codes.
- Wrote python scripts to **automate testing** across docker containers and VM.

### Infosys Limited

*Mysore, India*

Systems Engineer *October 2017 - May 2018*

- Underwent training of object-oriented programming in python, and SAP ABAP.
- Solely handled **implementation of leave system** for new subsidiary of the company using ABAP, directly under team leader.