Chandrakana Nandi

Employment

Principal Researcher at Certora Inc., April 2023 - present
Affiliate Assistant Professor, UW, Seattle, January 2023 - present

Formal Verification Team Lead at Certora Inc., June 2022 - March 2023
Senior Researcher at Certora Inc., September 2021 - May 2022
Website: `https://cnandi.com/`

Education

PhD in Computer Science, Fall 2015 - Summer 2021
Paul G. Allen School of Computer Science & Engineering, UW
Thesis topic: Programming Language Techniques for Computational Fabrication
Advisors: Zachary Tatlock, Dan Grossman
Adobe Research Fellow, 2019

Master of Science, Computer Science, June 2018
Paul G. Allen School of Computer Science & Engineering, UW
Advisors: Zachary Tatlock, Dan Grossman

Master of Science, Computer Science, August 2014
École Polytechnique Fédérale de Lausanne(EPFL), Switzerland
Thesis: Contracts for Real-Time, Safety Critical Systems
Supervisors: Prof.Viktor Kuncak, Dr.Manuel Oriol
M.Sc Research Scholars Program and Swiss Government Fellow

Bachelor of Science, Statistics, Mathematics and Computer Science, June 2012
Banaras Hindu University (BHU), Varanasi, India
Concentration: Statistics
Thesis: Social Network-based Analysis of Behavior
Supervisor: Prof. R.D Singh
University Gold Medalist for graduating with highest GPA

Publications

Peer reviewed conference and workshop papers

1. Enzo Nicourt, Ylies Falcone, **Chandrakana Nandi**.
   Towards Mutation-guided Test Suites for Smart Contracts, , *Under submission.*
2. Anjali Pal, Brett Saiki, Cynthia Richey, Amy Zhu, Ryan Tjoa, Oliver Flatt, Max Willsey, Zachary Tatlock, **Chandrakana Nandi**.
   Equality Saturation Theory Exploration à la Carte, *Under submission.*
3. John Toman, Shelly Grossman, Alexander Bakst, Mooly Sagiv, **Chandrakana Nandi**.
   Pointer Analysis Guided Verification of Ethereum Bytecode, *Under submission.*
4. David Cao, Rose Kunkel, **Chandrakana Nandi**, Max Willsey, Zachary Tatlock, Nadia Polikarpova.

babble: Learning Better Abstractions with E-Graphs and Anti-Unification, POPL 2023.

5. Haisen Zhao, Max Willsey, Amy Zhu, **Chandrakana Nandi**, Zachary Tatlock, Justin Solomon, Adriana Schulz.
   Co-Optimization of Design and Fabrication Plans for Carpentry, SIGGRAPH 2022 (ACM TOG).
6. **Chandrakana Nandi**, Max Willsey, Amy zhu, Brett Saiki, Yisu Wang, Adam Anderson, Adriana Schulz, Dan Grossman, Zachary Tatlock. Rewrite Rule Inference Using Equality Saturation. OOPSLA 2021.
   Distinguished Paper Award
7. Jasper Tran O'Leary, **Chandrakana Nandi**, Khang Lee, Nadya Peek.
   Taxon: a Language for Formal Reasoning with Digital Fabrication Machines. UIST 2021.
8. Brett Saiki, Oliver Flatt, **Chandrakana Nandi**, Zachary Tatlock, Pavel Panchekha. Combining Precision Tuning and Rewriting. ARITH 2021.
9. Molly Carton, **Chandrakana Nandi**, Adam Anderson, Haisen Zhao, Eva Darulova, Dan Grossman, Jeff Lipton, Adriana Schulz, Zachary Tatlock.
   A Roadmap Towards Parallel Printing for Desktop 3D Printers. SFF 2021.
10. Max Willsey, **Chandrakana Nandi**, Remy Wang, Oliver Flatt, Pavel Panchekha, Zachary Tatlock.
    Fast and Extensible Equality Saturation. POPL 2021
    Distinguished Paper Award
11. **Chandrakana Nandi**, Max Willsey, Adam Anderson, James R. Wilcox, Eva Darulova, Dan Grossman, Zachary Tatlock.
    Synthesizing Structured CAD Models with Equality Saturation and Inverse Transformations. PLDI 2020.
12. Chenming Wu, Haisen Zhao, **Chandrakana Nandi**, Jeff Lipton, Zachary Tatlock, Adriana Schulz.
    Carpentry Compiler. SIGGRAPH ASIA 2019
13. **Chandrakana Nandi**, James R. Wilcox, Pavel Panchekha, Taylor Blau, Dan Grossman, Zachary Tatlock.
    Functional Programming for Compiling and Decompiling Computer-aided Design. ICFP 2018.
14. **Chandrakana Nandi**, Anat Caspi, Dan Grossman, Zachary Tatlock.
    Programming Language Tools and Techniques for 3D Printing. SNAPL 2017.
15. **Chandrakana Nandi**, Dan Grossman, Adrian Sampson, Todd Mytkowicz, Kathryn S. McKinley.
    Debugging Probabilistic Programs. MAPL 2017.
16. **Chandrakana Nandi**, Dan Grossman, Adrian Sampson, Todd Mytkowicz, Kathryn S. McKinley.
    Debugging Probabilistic Programs. PPS 2017.
17. **Chandrakana Nandi**, Michael D. Ernst.
    Automatic Trigger Generation for Rule-based Smart Homes. ACM SIGPLAN PLAS 2016.
18. **Chandrakana Nandi**. Automatic Trigger Generation for End User Written Rules for Home Automation. ACM FSE SRC 2016.
19. **Chandrakana Nandi**. Correctness and Security for Home Automation. POPL SRC 2016.

20. **Chandrakana Nandi**, Aurelien Monot, Manuel Oriol: Stochastic Contracts for Runtime Checking of Component-based Real-time Systems. CBSE'15: 18th International ACM SIGSOFT Symposium on Component-Based Software Engineering.

Theses

1. C. Nandi: Programming Language Tools and Techniques for Computational Fabrication. PhD Thesis, UW, August 2021
2. C. Nandi: Functional Programming for Compiling and Decompiling Computer-aided Design, MS Thesis, UW, March 2018
3. C. Nandi: Contracts for Real-Time, Safety Critical Systems, Masters Thesis, EPFL, August 2014
4. C. Nandi: Social Network based Analysis of Behavior, Bachelors Thesis, BHU, April 2012

Professional services

Review committees

1. ASPLOS 2024 program committee (PC)
2. TFP 2024 program committee (PC)
3. ISSTA 2023 program committee (PC)
4. APLAS 2023 program committee (PC)
5. ACM-SR 2023 Grand Finale judge
6. OOPSLA 2023 external review committee (ERC)
7. EGRAPHS 2023 review committee (PC)
8. PLDI 2022 review committee (PC)
9. OOPSLA 2022 external review committee (ERC)
10. EGRAPHS 2022 review committee (PC)
11. PLDI-SRC 2022 review committee (PC)
12. SFF 2021 review committee
13. Subreviewer, ACM Symposium on Computational Fabrication (SCF), 2020
14. Artifact Evaluation Committee, ASPLOS 2020
15. External Reviewer, ICFP SRC 2019
16. External Reviewer, UBICOMP 2018
17. Reviewer for Elsevier journal, Future Generation Computer Systems 2016

Organizing

1. PLDI-SRC 2024 co-chair
2. ISSTA-SRC 2023 inaugural co-chair
3. PLDI-SRC 2023 co-chair
4. DeFi Security Summit (DSS) Steering committee (current)
5. National Conference on HPCA, BHU, 2010

Other service

1. Panelist, Formal Verification and Security panel, ETH Denver 2023
2. SIGPLAN-M mentor, 2022 - current
3. Session Chair at PLDI 2022 and SIGPLAN tracks
4. Session Chair at EGRAPHS 2022
5. Session Chair at OOPSLA 2021
6. PLMW Panelist, PLDI 2020
7. PSC Chair, Visit Days 2017, UW CSE
8. Student volunteer at POPL 2016
9. ACM-W mentorship program 2015, UW CSE
10. Session Chair at ACM CBSE 2015, session: Component and Composition

Awards

1. Rising Stars in EECS Award, 2021
2. OOPSLA 2021 **Distinguished Paper Award**
3. POPL 2021 **Distinguished Paper Award**
4. Adobe Research Fellowship 2019
5. CRA-W Grad Cohort Workshop 2016 invitee
6. Scholarship and travel grant to attend SIGPLAN PLMW and POPL 2016
7. Student Travel Grants from ACM CCS and PLAS 2016
8. Swiss Government Fellow from September 2012-2014
9. M.Sc Research Scholars Program under Prof. Joseph Sifakis, 2012
10. University Gold Medal for having the highest GPA at the Institute of Science, BHU, 2012
11. Department Gold Medal for having the highest GPA in the Department of Statistics, BHU, 2012
12. Gargi Devi Deodhar Silver Medal, Institute of Science, BHU, 2012
13. Manorama Gold Medal for having the highest GPA among all Female students at the Institute of Science, BHU, 2012
14. Dr. Basudeo Sahni Medal for highest GPA at the Institute of Science, BHU, 2012
15. University scholarship holder for academic excellence at the Institute of Science, BHU, for 3 consecutive years.
16. Secured All India Rank 14 in the IIT-Joint Admission Test for Mathematical Statistics in 2012

Talks

- *Formal Verification Using the Certora Prover*, Invited Speaker, CMU Secure Blockchain summit, May 2023
- *Using Mutation Testing to Write Better Formal Specs*, ETH Denver, March 2023
- *Formally verifying what you execute* DeFi FV in Practice, Denver, March 2023
- *Formal Verification Using the Certora Prover*, Invited Lecture, UPenn, Nov 2022
- *Future of Smart Contract Security*, Panelist, Devcon, Bogota, Oct 2022
- *Formal Verification Using the Certora Prover*, Invited Lecture, (link) Stanford, Aug 2022
- *Formal Verification Using the Certora Prover*, Invited Lecture, (link) Secureum Bootcamp, Feb 2022

- *Rewrite Rule Inference Using Equality Saturation*, Invited Talk, NVIDIA Research, Feb 2022
- *Rewrite Rule Inference Using Equality Saturation*, Invited Talk, NUS, Singapore, Nov 2021
- *Rewrite Rule Inference Using Equality Saturation*, Conference Talk, OOPSLA, October 2021
- *Programming Languages Tools and Techniques for 3D Printing*, Invited Talk, MIT, October 2021
- *Efficient Term Rewriting and Rewrite Rule Inference with Equality Saturation*, Invited Talk, Intel, May 2021
- *Synthesizing Structured CAD Models with Equality Saturation and Inverse Transformations*, Invited Talk, UCSD PL Seminar, Nov 2020
- *Synthesizing Structured CAD Models with Equality Saturation and Inverse Transformations*, Conference Talk, PLDI, June 2020
- *Programming Languages for Computational Geometry and Fabrication*, Expert Speaker, IEEE RAS, UP Section Chapter, Allahabad, India, January 2020
- *Programming Languages for Computational Fabrication*, Adobe Headquarters, San Jose, August 2019
- *Functional Programming for Compiling and Decompiling CAD*, Invited Talk, MPI-SWS, Germany, October 2018
- *Functional Programming for Compiling and Decompiling CAD*, Invited Talk, SUNY Buffalo, October 2018
- *Functional Programming for Compiling and Decompiling CAD*, Conference Talk, ICFP, September 2018
- *Automatic Trigger Generation for Rule-based Smart Homes*, Conference Talk, PLAS, October 2016
- *Debugging Probabilistic Programs*, Internship Talk, Microsoft Research, Redmond, September 2016
- *Use of Contracts for Run-time Verification of Real-time Software*, Invited talk, IEEE RAS, UP Section Chapter, Allahabad, India, August 2015
- *Stochastic Contracts for Runtime Checking of Component-based Real-time Systems*, Conference talk, ACM Sigsoft Symposium on CBSE, Montreal, May 2015
- *Contracts for Real-time and Safety Critical Systems*, LARA, EPFL, August 2014
- *Contracts for Real-time and Safety Critical Systems*, ABB Corporate Research, August 2014
- *A Bi-directional Model Transformation Tool between BIP and FASA*, ABB Corporate Research, November 2013

Media Coverage

- Featured in the ICFP 2021 trailer
- Invited SIGPLAN Article on Fast and Extensible Equality Saturation, April 2021
- Co-author of a SIGPLAN blog on Conferences after COVID: An Early-Career Perspective, March 2021
- Media coverage for Carpentry Compiler published in 2019:
  1. UW News Article, 2019
  2. Tech Crunch Article, 2019

3. The Daily of UW Article, 2020

- "I Am CSE" video for Reincarnate, UW CSE 2020

Research Mentorship

1. Ben Kushigian, intern at Certora (March - June 2023)
2. Thia Richey, intern at Certora (June - Sept 2023)
3. Oliver Flatt, intern at Certora (Jan - Aug 2022)
4. Vishal Canumalla, intern at Certora (March - June 2022)
5. Ben Phipathananunth, intern at Certora (June - Dec 2022) → Yale PhD student
   - 2^{nd} place, ACM-SPLASH SRC (undergraduate category), 2022
6. Amy Zhu, UW PhD Student
7. Anjali Pal, UW PhD Student
8. Brett Saiki, UW BS/MS
9. Anagha G, BIT Hyderabad BS, SIGPLAN-M, Jan 2023 - current
10. Alperen Keles, UMD PhD student, SIGPLAN-M, May 2022 - Jan 2023
11. Adam Anderson, UW BS (March 2018 - Nov 2020)
12. Grace Oh, High School → Princeton BS
13. Taylor Blau, UW BS → Github
14. Seth Pendergrass, UW BS → Microsoft
15. Melissa Hovik, UW BS/MS → Caltech, Teaching Faculty

TA Experience

1. Winter 2018. CSE 341: Programming Languages, UW, Seattle
2. Spring, Fall 2016. CSE 331: Software Design and Implementation, UW, Seattle
3. Spring 2015: Concepts of Concurrent Computation, graduate level, ETH Zurich
4. Fall 2014: Introduction to Programming, undergraduate level, ETH Zurich

Prior Work Experience

Research Intern — June 2016 - August 2016
RiSE group, Microsoft Research, Redmond

Research Assistant — September 2014 - June 2015
Chair of Software Engineering, ETH Zurich

Research Intern — August 2013 - August 2014
ABB Corporate Research Center, Switzerland

Research Intern — June 2010 - July 2010
Bio-robotics Lab, EPFL, Switzerland

Language Proficiency

English: Fluent
French: Basic
German: Basic
Bengali: Mother Tongue
Hindi: Fluent