Ankush Das

Applied Scientist, Amazon

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Research Interests

Programming Languages, Concurrency, Blockchain, Resource Analysis, Session Types, Type Systems, Formal Verification, Static Analysis, Model Checking

Education

2015 – 2021 **Ph.D. in Computer Science**, *Carnegie Mellon University (CMU)*, Pittsburgh, PA, USA, GPA – 4.0/4.0, Advisor: *Prof. Jan Hoffmann*

2010 – 2014 **B. Tech. in Computer Science and Engineering with Honors**, *Indian Institute of Technology*, Bombay, India, GPA – 8.92/10

Employment

2023 – Present **Tenure-Track Assistant Professor**, *Boston University*, Boston, MA

2021 – 2023 **Applied Scientist**, *Amazon*, Santa Clara, CA

Honors and Awards

2024 **Distinguished Paper Award**, POPL 2024

2021 **Invitation to TOPLAS special issue**, ESOP 2021

2020 **Best Junior System Description Paper Award**, FSCD 2020

2019 **Meta Fellowship**, Finalist

2009 **All India Rank 1** in **Indian National Mathematics Olympiad (INMO)**

2010 **All India Rank 45** in **IITJEE**

Publications and Patents

Journals

TOPLAS 2022 **Ankush Das**, *Henry DeYoung, Andreia Mordido, Frank Pfenning*. **Nested Session Types**, ACM Transactions on Programming Languages and Systems.

LMCS 2022 **Ankush Das**, *Frank Pfenning*. **Rast: A Language for Resource-Aware Session Types**, Logical Methods in Computer Science.

Peer-Reviewed Conferences

POPL 2024 *Henry DeYoung, Andreia Mordido, Frank Pfenning,* **Ankush Das**. **Parametric Subtyping for Structural Parametric Polymorphism**, 51st ACM SIGPLAN Symposium on Principles of Programming Languages.

CAV 2023 *Andrew Apicelli, Sam Bayless,* **Ankush Das**, *Andrew Gacek, Dhiva Jaganathan, Saswat Padhi, Vaibhav Sharma, Michael W. Whalen, Raveesh Yadav*. **Automated Analyses of IOT Event Monitoring Systems**, 35th International Conference on Computer Aided Verification.

POPL 2023 **Ankush Das**, *Di Wang, Jan Hoffmann*. **Probabilistic Resource-Aware Session Types**, 50th Symposium on Principles of Programming Languages.

ESOP 2022 *Zeeshan Lakhani,* **Ankush Das**, *Henry DeYoung, Andreia Mordido, Frank Pfenning*. **Polarized Subtyping**, 31st European Symposium on Programming.

ESOP 2021 **Ankush Das**, *Henry DeYoung, Andreia Mordido, Frank Pfenning*. **Nested Session Types**, 30th European Symposium on Programming.

CSF 2021 **Ankush Das**, *Stephanie Balzer, Jan Hoffmann, Frank Pfenning, Ishani Santurkar*. **Resource-Aware Session Types for Digital Contracts**, 34th IEEE Computer Security Foundations Symposium.

SAS 2020 **Ankush Das** *and Shaz Qadeer*. **Exact and Linear-Time Gas-Cost Analysis**, 27th International Static Analysis Symposium.

PPDP 2020 **Ankush Das** *and Frank Pfenning*. **Verified Linear Session-Typed Concurrent Programming**, 22nd International Symposium on Principles and Practice of Declarative Programming.

CONCUR 2020 **Ankush Das** *and Frank Pfenning*. **Session Types with Arithmetic Refinements**, 31st International Conference on Concurrency Theory.

FSCD 2020 **Ankush Das** *and Frank Pfenning*. **Rast: Resource-Aware Session Types with Arithmetic Refinements (System Description)**, 5th International Conference on Formal Structures for Computation and Deduction.

ICFP 2018 **Ankush Das**, *Jan Hoffmann, Frank Pfenning*. **Parallel Complexity Analysis with Temporal Session Types**, 23rd ACM SIGPLAN International Conference on Functional Programming.

LICS 2018 **Ankush Das**, *Jan Hoffmann, Frank Pfenning*. **Work Analysis with Resource Aware Session Types**, 33rd Annual Symposium on Logic in Computer Science.

TACAS 2017 **Ankush Das**, *Jan Hoffmann*. **ML for ML: Learning Cost Semantics by Experiment**, 23rd International Conference on Tools and Algorithms for the Construction and Analysis of Systems.

ATVA 2017 **Ankush Das**, *Akash Lal*. **Precise Null Pointer Analysis Through Global Value Numbering**, 15th International Symposium on Automated Technology for Verification and Analysis.

POPL 2017 *Jan Hoffmann*, **Ankush Das**, *Shu-Chun Weng*. **Towards Automatic Resource Bound Analysis for OCaml**, 44th Symposium on Principles of Programming Languages.

CONCUR 2017 *S. Akshay, Supratik Chakraborty*, **Ankush Das**, *Vishal Jagannath, Sai Sandeep*. **On Petri Nets with Hierarchical Special Arcs**, 28th International Conference on Concurrency Theory.

CAV 2015 **Ankush Das**, *Shuvendu K. Lahiri, Akash Lal, Yi Li*. **Angelic Verification: Precise Verification Modulo Unknowns**, 27th International Conference on Computer Aided Verification.

TAMC 2015 **Ankush Das**, *Shankara Narayanan Krishna, Lakshmi Manasa, Ashutosh Trivedi, Dominik Wojtczak*. **On Pure Nash Equilibria in Stochastic Games**, 12th Annual Conference on Theory and Applications of Models of Computation.

Patents

2015 *Ram Bhushan Agrawal, Akhilesh Godi*, **Ankush Das**. **Robust Method to Find Layout Similarity between Two Documents**, US Patent 9,235,758 B1.

Research Internships

Summer 2019 **Meta**, *Seattle, WA*, Research Intern, Mentor: *Shaz Qadeer*

Summer 2017 **Microsoft Research**, *Redmond, WA*, Research Intern, Mentor: *Patrice Godefroid*

2014 – 2015 **Microsoft Research**, *Bangalore, India*, Research Fellow, Mentor: *Akash Lal*

Summer 2013 **Adobe Research**, *Noida, India*, Research Intern, Mentor: Ram B. Agrawal

Summer 2012 **Institute of Science and Technology**, *Austria*, Research Intern, Mentor: *Prof. Krishnendu Chatterjee*

Interns and Mentored Students

Summer 2023 **Gan Shen**, *Building user-friendly abstractions for expressing concurrent protocols in Rust*

Summer 2022 **Joomy Korkut**, *Expressing communication protocols in distributed systems as a transition system that is verified by the Rust compiler*

Summer 2022 **Michalis Kokologiannakis (co-mentor)**, *Optimal stateless dynamic partial-order reduction algorithm for message-passing systems*

Summer 2022 **Gan Shen (co-mentor)**, *Automated test generation for distributed systems*

Summer 2022 **Darion Cassel (co-mentor)**, *Information flow type system for design-level security analysis of AWS services*

2018 – 2020 **Ishani Santurkar**, *Integration of session types with functional programming*

2019 – 2020 **Stephen McIntosh**, *Design of blockchain simulation within the Nomos language*

Talks

Conference Presentations

Jan 2023 **Probabilistic Resource-Aware Session Types**, *POPL 2023*

Jun 2021 **Resource-Aware Session Types for Digital Contracts**, *CSF 2021*

Nov 2020 **Exact and Linear-Time Gas-Cost Analysis**, *SAS 2020*

Sep 2020 **Verified Linear Session-Typed Concurrent Programming**, *PPDP 2020*

Sep 2020 **Session Types with Arithmetic Refinements**, *CONCUR 2020*

Jul 2020 **Rast: Resource-Aware Session Types with Arithmetic Refinements (System Description)**, *FSCD 2020*

Sep 2018 **Parallel Complexity Analysis with Temporal Session Types**, *ICFP 2018*

Jul 2018 **Work Analysis with Resource-Aware Session Types**, *LICS 2018*

Apr 2017 **ML for ML: Learning Cost Semantics by Experiment**, *TACAS 2017*

May 2015 **On Pure Nash Equilibria in Stochastic Games**, *TAMC 2015*

Invited Talks

Oct 2021 **Resource-Aware Session Types for Digital Contracts**, *Dagstuhl Seminar*, Germany

Apr 2021 **Resource-Aware Session Types for Digital Contracts**, *Meta; Amazon*, USA

Jul 2017 **Work Analysis of Session-Typed Programs**, *Dagstuhl Seminar*, Germany

May 2014 **Termination of Initialized Integer Linear Programs**, *Microsoft Research*, Bangalore, India, Invited talk for the position of research fellow

Seminar Presentations

2019 – 2020 **Resource-Aware Session Types for Digital Contracts**, Stanford University; University of Pennsylvania; Harvard University; Imperial College, London; University of Edinburgh; Massachusetts Institute of Technology; New York University; Princeton Univeristy; University of California, San Diego; University of Texas, Austin; University of Wisconsin, Madison; Cornell University; Yale University; University of Illinois, Urbana-Champaign; University of Washington.

Schools and Seminars

Oct 2021 **Rigorous Methods for Smart Contracts**, *Schloss Dagstuhl*, Germany

Jul 2017 **Resource Bound Analysis**, *Dagstuhl Seminar*, Germany

Jun 2016 **Oregon Programming Languages Summer School**, *University of Oregon*

2009 – 2010 **International Mathematical Olympiad Training Camp**, *HBCSE*, Mumbai

May 2011 **Nurture Programme**, *TIFR*, Mumbai

Academic Service and Organizer Work

2019 – 2024 **Program Committee**, *Member*, POPL 2024, ESOP 2023, FoSSaCS 2022, DICE-FOPARA 2019

2021 – 2022 **Day 1 Science Mentorship Program**, *Mentor*, Amazon

2020 – 2022 **ACM SIGPLAN Long-Term Mentorship Program**, *Mentor*

2020 **Programming Language Mentoring Workshop (PLMW)**, *Mentor*, SPLASH

2020 **Committee on Diversity, Equity, and Inclusion**, *Member*, Computer Science Department, CMU

2020 **Equity, Diversity, and Inclusion Committee**, *Member*, Graduate Student Assembly, CMU

2020 **Graduate Application Support Mentor**, *Computer Science Department*, CMU

2019 **Artifact Evaluation Committee**, *Member*, PLDI 2019, POPL 2019

2017 – 2022 **External Reviewer**, PLDI 2023, LICS 2022, CONCUR 2021, CSL 2021, ESOP 2020, COORDINATION 2020, JLAMP 2018, FLOPS 2018, CSL 2018, ICALP 2018, FSCD 2018, FSCD 2017

2017 – 2021 **Speakers Club**, *Member*, CMU

Fall 2018 **15-317 Constructive Logic**, *Teaching Assistant*, CMU

Fall 2017 **MS in Computer Science Admissions Committee**, *Member*, CMU

Spring 2017 **Programming Languages Group Lunch**, *Organizer*, CMU

Fall 2016 **15-814 Types and Programming Languages**, *Teaching Assistant*, CMU

2016 **Logic in Computer Science (LICS)**, *Student Volunteer*, Columbia University