

# Ankush Das

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## Research Interests

Programming Languages, Concurrency, Resource Analysis, Type Theory and Type Systems, Formal Verification, Static Analysis, Game Theory

## Education

2015–Present **Ph.D. in Computer Science**, *Carnegie Mellon University*, 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.

## Research Positions

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*.

## Publications and Patents

### Peer-Reviewed Conferences

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 and 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.

### Workshop Papers

LOLA 2016 *Ankush Das, Jan Hoffmann*, **Learning Cost Semantics for Modeling Running Time of OCaml Programs**, Syntax and Semantics of Low-Level Languages.

## Patents

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

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## Current Research Work

- Oct 2016 – Present **Parallel Complexity Analysis of Session-Typed Programs**,  
*Research Project*, Carnegie Mellon University,  
Advisors: *Prof. Jan Hoffmann, Prof. Frank Pfenning*.

The two main resources of interest for concurrent programs, in general, are **work**, i.e. the total number of steps taken and **span**, i.e. the earliest time the computation completes. We are designing **type systems** to prove bounds on work and span for the linear fragment of session types, a type discipline for concurrent programming where processes communicate via typed channels that specify the communication protocol.

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## Honors and Awards

- 2009 Secured **All India Rank 1** in **Indian National Mathematics Olympiad (INMO)**  
2010 Secured **All India Rank 45** in **IITJEE** amongst 470,000 aspirants  
2006 – 2009 Awarded Certificate of Merit for being placed in National Top 1% in **National Standard Examination in Physics (NSEP)**, 2009, twice for **National Standard Examination in Astronomy (NSEA)**, 2006 and 2009 and thrice for **Regional Mathematical Olympiad (RMO)**, 2006, 2008 and 2009  
2008–14 **NTSE Scholarship**: Awarded by the MHRD, Govt. of India

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## Schools and Seminars

- Jul 2017 **Dagstuhl Seminar**, *Schloss Dagstuhl*, Germany.  
Jun 2016 **Oregon Programming Languages Summer School**, *University of Oregon*.  
May 2009–10 **International Mathematical Olympiad Training Camp**, *HBCSE*, Mumbai.  
May 2011 **Nurture Programme**, *TIFR*, Mumbai.

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## Talks

- Jul 2017 **Work Analysis of Session-Typed Programs**, *Schloss Dagstuhl*, Germany.  
Apr 2017 **ML for ML: Learning Cost Semantics by Experiment**, *Uppsala Konsert & Kongress*, Uppsala, Sweden, TACAS 2017.  
Jul 2016 **Learning Cost Semantics for Modeling Running Time of OCaml Programs**, *Columbia University*, New York, LOLA 2016.  
May 2015 **On Pure Nash Equilibria in Stochastic Games**, *National University of Singapore*, Singapore, TAMC 2015.  
May 2014 **Termination of Initialized Integer Linear Programs**, *Microsoft Research*, Bangalore, India, Invited talk for the position of research fellow.

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## Academic and Organizer Work

- Fall 2017 **MS in Computer Science**, *Admissions Committee*, Carnegie Mellon University.  
Spring 2017 **Programming Languages Group Lunch**, *Organizer*, Carnegie Mellon University.  
Fall 2016 **Type Systems**, *Teaching Assistant*, Carnegie Mellon University.  
2016 **Logic in Computer Science (LICS)**, *Student Volunteer*, Columbia University.