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Basic Details

- **D.O.B** : 15-09-1991
- **Address** : B/19, Jayashree Park, Behala, Kolkata - 700034, W.B. , India.
- **Ph. No.** : 9051106631

Research Interests

- During my masters I had looked into Resolution Proof Systems. I am generally very interested towards this Notion of Proofs. And aspects of it such as understanding them - like in the case of resolution proof systems or algebraic proof systems - like the Hilbert Nullstellensatz Proof System, etc or even theorem proving using industry tools like ACL2, Isabelle, Lean, etc.
- Descriptive Complexity - in particular understanding the limitations of the least fixed point logic, LFP.
- Modal Logic - understanding the reasons why modal logic is so powerful and use it to contrast with an undecidable logic like FO(LFP).
- Game Theory - model social choice phenomena and offer logics wherein the said phenomena can be formalised. From the game logic, if we are able to extract a game algebra then we might have more foray into the social phenomena than what might have been known previously.
- Algorithms - design algorithms for the problems arising out of the above investigations by having a closer look at the computational resources like - determinism, randomness, approximation and parameterised complexity.

Conference Publications

1. **Ramit Das**, R. Ramanujam, Sunil Simon. *A logical description of Priority Separable Games* Logic, Rationality, and Interaction - 9th International Workshop, LORI 2023, Jinan, China, October 26-29, 2023, Proceedings
2. **Ramit Das**, Anantha Padmanabha, R. Ramanujam. *Reasoning in Large Games with Unboundedly Many Players* Logic, Rationality, and Interaction, 8th International Workshop, LORI 2021, Xi'an, China LORI 2021: 41-57

3. **Ramit Das**, R. Ramanujam. *A logical description of strategizing in social network games* Proceedings of LNGAI 2021, First International Workshop, Hangzhou, China LNGAI 2021 : 107-119

4. **Ramit Das**, R. Ramanujam, Sunil Simon. *Reasoning about Social Choice and Games in Monadic Fixed-Point Logic* Proceedings of the 17th TARK 2019: Toulouse, France TARK 2019: 106-120

Journal Publications

1. **Ramit Das**, Anantha Padmanabha, R. Ramanujam. *Implicit quantification for modal reasoning in large games* accepted at *Synthese Journal*. DOI:10.1007/s11229-023-04156-9

Expertise

1. **Mathematical Logic**
   - Expressibility in different logics
   - Game theoretic modelling of social phenomena
   - Understanding of inexpressibility and axiomatisation
2. **Programming Skillsets**
   - Transform groff documents to pdf for short quick notes written as a groff document.
   - Python projects like a maze solver using a randomised algorithm that has components of building a maze and then trying to solve it.
   - Have dabbled in languages from C, C++, Java, Haskell, etc. Currently more fluent in **Python**. Learning Verilog, Verilog Assertions and **Forte** which is a functional programming language inside Intel for a BDD based formal verification of circuits.
   - For the internship work at Ericsson I needed to develop familiarity with the machine learning procedures on scikit-learn specially for DecisionTreeClassifiers. I do have an intuitive understanding of ML algorithms that I can play around with and get basic jobs done, but I am not yet at the theoretical level where I can propose new novel changes to the inner workings of the abstractions I play around with.

- Since my understanding comes through logic and having dabbled with different programming languages, I feel confident about picking up any programming language or a framework for the said use. Would like to pick up programming with proof assistants like **Coq, Isabelle or Lean**.

  I share curiosity interests, **reverse engineering**, **codegolfing** - in particular vimgolfing, **obfuscation** and **procedurally generated art, music**.

Work Experience

- **Intel** : November 2023 - now

  Formal Verification Engineer at Intel working in the capacity as a datapath engineer.

  Worked on the Extended Math unit in Intel in the capacity as an assistant to my lead. The project was undertaken by the C2RTL framework and needed some interesting assumes to help the tool solve the complex pathways taken during the transcendental operation computations.

  Worked on verifying two formal equivalence checking of 2 RTLs generated by two different High Level Synthesis(HLS) tools of the same algorithm. It was a 13 stage pipelined design. We were checking under correct constraints whether the 2 RTL outputs match at the stage. It was finally solved with Jasper's Sequential Equivalence check (SEC) tool.

  Work with the US team on verification of Error Correction Coding. Finished verifying the algorithm proof of the LPDDR5 Lockstep Algorithm. Will be working on the RTL verification next. We use intel's proprietary Symbolic Trajectory Evaluation Tool (STE) for these purposes which is a functional programming language with a bdd based backend to do formal verification of large industry level circuits.
  Currently working on *High Bandwidth Memory (HBM4)*'s ECC algorithm.

  For EU4.0, Intel is bringing this framework of Abstract Specification Language (ASL) from which the architect's want to generate verilog and formal friendly C and CPP from the design specification of their CORE units. Was working on coming up with a framework to verify all instruction opcodes in EU4.0. Also, generated constraints by parsing the XML files which have information for each instruction.

Education

- Doctor of Philosophy (Ph.D.)

  The Institute of Mathematical Sciences, Chennai, India
  Discipline : Senior Research Fellow, Theoretical Computer Science
  Advisor : Dr. R. Ramanujam
  Area of Study : Formalisation of Some Pure Strategy Games using Logic, Least Fixed Point Logic, Propositional Dynamic Logic, Large Games, Social Network Games
  Thesis Title : **A Logical Study of the Improvement Graphs formed from Games**
  Status : Granted
  Duration : 2016 - 2023

- Industry Internship

  Contractual Consultant at Ericsson Global Services, Bangalore, India.
  Under Dr. Swarup Kumar Mohalik
  Research Project : **Explainability of Neural Networks.**
  Duration : 5 July, 2023 - November, 2024

- Visitorships

  IIT, Kanpur
  Host : **Dr. Sunil Simon**
  Duration : September 2022 - January 2023

- Master of Science (M.Sc.)

  Chennai Mathematical Institute, Chennai, India
  Masters thesis : **Point Line Games**. It attempts to explore these games in the context of **Resolution Proof Systems.**
  Discipline : Computer Science. Passed with CGPA 8.44 in 2016.

- Bachelor of Engineering (B.E.)

  Indian Institute of Engineering, Science and Technology, Shibpur, West Bengal, India
  Bachelor's project on Convolution Coding Theory and represented my college ACM, ICPC India regionals, 2012, 2013.
  Discipline : Computer Science and Technology. First Class with Honours, 76%, in 2014.

Academic Activities

- Examinations
  - Qualified for the TIFR interviews for TCS in 2016. Secured a postdoc position in 2023 as well.
  - Qualified for CMI Masters through competitive JEST 2014.

- Secured a GATE(CSE) rank of 785 in 2014 out of approximately 1 lakh students.
- Represented my UG in ACM, ICPC India college levels, 2012, 2013.
- WBJEE state rank of 717 (out of approximately 2.5 lakh students) to bag the UG.

- Talks and Teachings
  - Talk on Verification Methodology at SVNIT, Surat.
  - Talk on Hardware Formal Verification at IIT Madras on April 29, 2025.
  - Talk on Descriptive Complexity in Boston Computing Club Forum on April 19, 2025.
  - Talk Formal Verification at Krea University on April 2, 2025.
  - Gave a talk on "Some Results at the Intersection of Game Theory and Logic" on July 27, 2023 at IIT D while being hosted by Prof. Rohit Vaish.
  - Gave a two-part series of talks on **Descriptive Complexity** at IIIT D as part of their *Mathematics Seminar Series* on June 6th and 9th, 2023.
  - Gave a postdoc job **talk** at TIFR Mumbai titled "Some Results at the Intersection of Game Theory and Logic" on May 18, 2023. (Available online, click on "talk")
  - Gave a talk on, An introduction to **Descriptive Complexity** at IIT Kanpur's student seminar series called SIGTACS, in January 2023.
  - Gave a **presentation talk** in a summer school hosted by Council of Scientific and Industrial Research, CSIR, and Central Scientific Instruments Organisation, CSIO, and Ashoka University, India for the Summer Institutes of Computational Social Science, SICSS, 2022. This was an interesting summer school that consisted of participants engaging in **Experimental Game Theory**. It needed us to form a team and submit some preliminary investigation on a problem of our choice. I lead our team for this activity.
  - Gave an **online talk** on basics of descriptive complexity called **Descriptive complexity - An Introduction** at the 21st annual meet of Calcutta Logic Circle, CLC, January, 2022.
  - Gave an **online talk** on the ideas linking **game theory and logic** in a student seminar at IIT Kanpur logic series in 2021.
  - Gave an **online talk** at the *TCS Seminar* series held at *IMSc* itself in 2021 regarding the work presented in the conferences LNGAI and LORI.
  - Gave **online talks** for the LNGAI and LORI conferences on the conference material respectively in 2021.
  - Gave an **offline talk** at the TARK conference held at Toulouse, France in 2019.
  - Gave the **logic and automata tutorials** for the summer school at IMSc during 2018.
  - Talked about the notion of connectivity (**Konigsberg's bridge prob-**

lem and linked mobius strips when cut) to school children aimed at promoting women in science in IMSc in 2017.

- Conferences attended and Academic Visits
  - Attended Lean for the Curious Mathematician workshop from April 24-26, 2025.
  - TIFR visit organised by Prof. Shibashis Guha from May 17th - May 24th, 2023 and also gave my postdoc job talk there on May 18th.
  - IIIT D visit organised by Prof. Sankha Basu from May 25th - June 16th, 2023.
  - IIT K visit to Prof. Sunil Simon from September 2022 - January 2023.
  - SICSS, 2022 - Summer School held online by Ashoka University & CSIR & CSIO
  - FSTTCS - 2016-20
  - ICLA and ISLA 2016,17,18
  - TARK , LNGAI. LORI - 2019,21
  - Academic visit to Hans Van Ditsmarch in 2019.
  - WACT 2019
  - SAT SMT - 2016,18,19

Non Academic Activities

- Organised the Fresher's Program at IMSc in 2017.
- Hosted the Badminton Tournament at IMSc in 2020

  Had a feel of **real life Game theory** when came up with a **complicated auction mechanism** to distribute players.
  Had a feel of solving a **NP-hard scheduling problem** when solving a conflict free match scheduling problem with given constraints of playable and non playable dates within the tournament line up.
  Also took part in the tournament and won it with the team.

- Designed a process for the servicing of food at the institute during the last covid phase.

  Formalised the mess problem - identified the variables that played an important part in the problem we faced and also understood how they were linked with each other.
  Designed a **constitutional draft** for the mess committee - a committee to be in charge of solving the mess problem which was dynamically going to vary over time. The constitution was supposed to provide the framework within which the solutions to the mess problem could be articulated.
  Successfully **executed** our solution with my team and got good reviews from the then members of the mess.

- Was playing in the winning team at the Football tournament in IMSc in 2019 and the runners up team in 2020.

References

- **Dr. R. Ramanujam**, Retired Professor.
  The Institute of Mathematical Sciences, Chennai - 600 113, India.
  E-mail : jam@imsc.res.in
- **Dr. Sunil Simon**, Assistant Professor.
  IIT, Kanpur - 208 016, India.
  E-mail : simon@cse.iitk.ac.in
- **Dr. Hans Van Ditsmarch**, Senior Researcher.
  CNRS, IRIT, Toulouse, France
  E-mail : hansvanditmarsch@gmail.com
- **Dr. Anantha Padmanabha**, Assistant Professor.
  IIT, Madras - 600036, India.
  E-mail : ananthap@cse.iitm.ac.in
- **Dr. Sujata Ghosh**, Associate Professor.
  ISI, Chennai - 600 029, India.
  E-mail : sujata@isichennai.res.in
- **Dr. Abhisekh Sankaran**, Consultant.
  Tata Consultancy Services (TCS),
  Tata Research, Development and Design Centre, Pune - 411013, India
  Email: abhisekh.sankaran@tcs.com

The Institute of Mathematical Sciences, Chennai

(A constituent institution of Homi Bhabha National Institute, Mumbai)

MARKSHEET

Program name: Ph.D.
Student name: Ramit Das

Discipline: Theoretical Computer Science
Enrolment number: MATH10201604001

Semester I: August-December, 2016

Course	Credits	Marks	Grade
Algorithms	7	80	B
Discrete Mathematics	7	82	B
Mathematical Logic	7	85	B
Theory of Computation	7	81	B

Semester II: January-April, 2017

Course	Credits	Marks	Grade
Computational Complexity	7	81	B
Theory of Computation II	7	86	B
Mathematical Logic II	7	84	B
Algebraic Graph Theory	7	95	A
Methodology	4	91	A

Total credits earned: 60
Date: Aug. 30, 2017

Academic Coordinator

PROFESSOR
THE INSTITUTE OF MATHEMATICAL SCIENCES
CHENNAI - 600 113.

Dean Academic
Mathematical Sciences

Dean
The Institute of Mathematical Sciences
a Constituent Institution
Homi Bhabha National Institute

CHENNAI MATHEMATICAL INSTITUTE

http://www.cmi.ac.in

National Graduate Programme in Mathematical Sciences

M.Sc. in Computer Science

Academic Transcript (2014–2016)

Name: Ramit Das
Roll No.: MCS201410

Date of Birth: 15 September, 1991
Date of Admission: 2014, August

Year	Semester	Course	Grade	Credits
2014 (Aug-Nov)	I	Basic Programming Languages	AB	4
		Design & Analysis of Algorithms	C	4
		Discrete Mathematics	B	4
		Theory of Computation	B	4
2015 (Jan-Apr)	II	Complexity Theory	B	4
		Mathematical Logic	AB	4
		Programming Language Concepts	AB	4
		Quantitative Automata Theory	B	4
2015 (Aug-Nov)	III	Linear Programming & Combinatorial Optimization	B	4
		Logic, Automata & Games	C	4
		Randomness in Computation	A	4
		Online & Approximation Algorithms	C	4
2016 (Jan-Apr)	IV	Thesis	A	16

†*Not for CGPA*

Cumulative Grade Point Average: 08.44

Madhavan Mukund
Dean of Studies
Chennai Mathematical Institute

Chennai Mathematical Institute Siruseri 603 103.

Rajeeva L Karandikar
Director
Chennai Mathematical Institute