

# Md Solimul Chowdhury

## PERSONAL INFORMATION

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Name: Md Solimul B. Chowdhury  
Nationality: Canadian and Bangladeshi  
Languages: English (non-native, fluent), Bengali (native), Hindi (listening) and Urdu (listening)  
Email: solimul.chowdhury@gmail.com  
Profile: <https://www.cs.cmu.edu/~mdsolimc/>

## EDUCATION

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**Doctor of Philosophy** 2016 - 2021  
Thesis: Empirical Insights Driven CDCL SAT Algorithms  
**\*nominated for a dissertation award\***  
Supervisors: Prof. Martin Müller and Prof. Jia-Huai You  
Department of Computing Science  
University of Alberta, Edmonton, AB, Canada

**Masters of Science** 2009 - 2011  
Thesis: SAT with Global Constraints  
Supervisor: Prof. Jia-Huai You  
Department of Computing Science  
University of Alberta, Edmonton, AB, Canada

**Bachelor of Science** 2004 - 2007  
Thesis: Haplotype Inference by Pure Parsimony by SAT Solver in Distributed Environment  
Supervisor: Prof. Sardar Haque  
Department of Computer Science and Information Technology  
Islamic University of Technology, Gazipur, Dhaka, Bangladesh

## PUBLICATIONS

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### Under Review Publications Peer-reviewed Publications

1. **Md Solimul Chowdhury**, Cayden Codel, and Marijn J. H. Heule: TASSAT: Transferring and Sharing in SAT (To appear in TACAS-2024).
2. **Md Solimul Chowdhury**, Cayden Codel, and Marijn J. H. Heule: A Linear Weight Transfer Rule for Local Search. NASA Formal Methods-2023: 447-463.
  - \* Acceptance Rate: 38.66%
- †3. Armin Biere, **Md Solimul Chowdhury**, Marijn J. H. Heule, Benjamin Kiesl, and Michael W. Whalen. Migrating Solver State. In Proceedings of SAT 2022:27:1-27:24
  - \* Acceptance Rate: 44.28%
  - \* Nominated for a **Best Paper Award** (top 4.28% of the submitted papers)
4. **Md Solimul Chowdhury**, Martin Müller, and Jia-Huai You. Guiding CDCL SAT Search via Random Exploration amid Conflict Depression. In Proceedings of 34th AAAI conference on artificial intelligence (AAAI-2020): 1428-1435.
  - \* Acceptance Rate: 20.6%
  - \* Selected for **Oral Presentation**

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†Authors are sorted alphabetically

· Oral Presentation Acceptance Rate: 5.8%

5. **Md Solimul Chowdhury**, Martin Müller, and Jia-Huai You: Exploiting Glue Clauses to Design Effective CDCL Branching Heuristics. In Proceedings of 25th International Conference on Principles and Practice of Constraint Programming (CP-2019): 126-143.

\* Acceptance Rate: 36.36%

6. **Md Solimul Chowdhury**, Martin Müller, and Jia-Huai You: Preliminary Results on Exploration-Driven Satisfiability Solving. In Proceedings of 32nd AAAI Conference on Artificial Intelligence (AAAI-2018): 8069-8070.

\* Student Abstract **Finalist**

\* **Top 18%** of the accepted abstracts

7. Fangfang Liu, Yi Bi, **Md Solimul Chowdhury**, Jia-Huai You, and Zhiyong Feng: Flexible Approximators for Approximating Fixpoint Theory. In Proceedings of the 29th Canadian Conference on AI (Canadian AI-2016): 224-236.

\* Acceptance Rate: 40.20%

8. **Md Solimul Chowdhury**, Fangfang Liu, Wu Chen, Arash Karimi, and Jia-Huai You: Polynomial Approximation to Well-Founded Semantics for Logic Programs with Generalized Atoms: Case Studies. In Proceedings of the 24th International Symposium on Logic Based Program Synthesis and Transformation (LOPSTR-2014): 279-296.

\* Acceptance Rate: 52.95%

9. **Md Solimul Chowdhury** and Jia-Huai You: SAT with Global Constraints. In Proceedings of the 24th International Conference on Tools with Artificial Intelligence (ICTAI-2012): 73-80.

\* Acceptance Rate: 55.00%

10. **Md Solimul Chowdhury**, Sakibul Hasan, and Sardar Haque: Haplotype Inference with Pure Parsimony by SAT solver in a distributed environment. International Journal of Computer Science and Network Security (IJCSNS), 2008. Vol 8, No 8: 247-254.

### **Refereed Workshop/Doctoral Program Publications**

11. **Md Solimul Chowdhury**, Martin Müller, and Jia-Huai You: Exploration via Random Walks in CDCL SAT amid Conflict Depression. In Proceedings of Doctoral Program at the 25th International Conference on Principles and Practice of Constraint Programming (CP-2019).

12. **Md Solimul Chowdhury** and Jia-Huai You: A System for Embedding Global Constraints into SAT. In Proceedings of International Joint Workshop on Implementation of Constraint and Logic Programming Systems and Logic-based Methods in Programming Environments (CICLOPS-2014): 93-108.

### **Informal Publications**

13. **Md Solimul Chowdhury**: The Graceful Production Problem. In Proceedings of SAT Competition 2022: 61-62

14. **Md Solimul Chowdhury**: CDCL Solvers based on Bounded Exploration and the Glue Bumping method. In Proceedings of SAT Competition 2022: 16-17 (**\*Three bronze medals at the competition\***)

15. **Md Solimul Chowdhury**, Martin Müller, and Jia-Huai You: Safe Population Growth with Rule 30. In Proceedings of SAT Competition 2021: 50-51.

16. Saeed Nejati, **Md Solimul Chowdhury**, and Vijay Ganesh: MapleSSV SAT Solver for SAT Competition 2021. In Proceedings of SAT Competition 2021: 35-36.

17. **Md Solimul Chowdhury**, Martin Müller, and Jia-Huai You: Four CDCL solvers based on expLRB, expVSIDS and Glue Bumping. In Proceedings of SAT Competition 2021: 17-18 (**\*Two bronze medals at the competition\***)

18. **Md Solimul Chowdhury**, Martin Müller, and Jia-Huai You: A Deep Dive into Conflict Generating Decisions. CoRR abs/2105.04595 (2021)

19. **Md Solimul Chowdhury**, Martin Müller, and Jia-Huai You: Population Safety- A SAT Benchmark based on Elementary Cellular Automaton. In Proceedings of SAT Competition 2020: 75-76.

20. **Md Solimul Chowdhury**, Martin Müller, and Jia-Huai You: Four CDCL SAT Solvers based on Exploration and Glue Variable Bumping, Proceedings of SAT Race 2019:17-19 (**\*A silver medal at the competition\***)

21. **Md Solimul Chowdhury**, Martin Müller, and Jia-Huai You: Description of expSAT Solvers, Proceedings of SAT Competition, 2018: 59-60.

22. **Md Solimul Chowdhury**, Martin Müller, and Jia-Huai You: GrandTour<sup>obs</sup> Puzzle as a SAT Benchmark, Proceedings of SAT Competition, 2018: 22-23.

**Postdoctoral Researcher**, *Carnegie Mellon University, Pittsburgh, PA, USA*, FEB 2022 - PRESENT

- Developing techniques to transfer clause weights between SLS algorithms **\*\*in progress\*\***
- Developing better understanding on the inner workings of CDCL SAT solvers **\*\*in progress\*\***
- Developed efficient local search algorithms and solvers for SAT
- Coauthored two papers (for NFM-2023 and TACAS-2024)
- Developed award winning CDCL SAT solvers
- Coauthored a NSF grant proposal for improving local search **\*\*to be submitted soon\*\***
- Mentored students for a grand course project

**Applied Scientist Intern**, *Amazon Web Services*, JUN 2021 - SEP 2021

- Developed algorithm and data-structures for SAT state migration for the CaDiCaL SAT Solver
- Coauthored a paper on the above internship project (for SAT-2022)

**Teaching & Research Assistant**, *University of Alberta, Canada*, SEP 2016 - NOV 2021

- Worked on improving CDCL SAT solvers, which formed the basis of my PhD thesis
- Coauthored three papers (for AAAI-2018, CP-2019, and AAAI-2020)
- Developed award winning CDCL SAT solvers.
- Designed two *cellular automaton* based SAT benchmark, submitted to the SAT competitions
- Conducted classes for various undergraduate courses

**Software Developer**, *Technology North Corporation, Canada*, OCT 2011 - AUG 2016

- Software development and research,
- Mentoring intern students

**Research Assistant**, *University of Alberta, Canada*, SEP 2009 - JUN 2011

- Integrated *constrained programming* features to SAT, which formed the basis of my MSc thesis
- Coauthored a paper (for ICTAI-2012)
- Conducted various undergraduate lab classes

**Lecturer**, *Sylhet International University, Bangladesh*, NOV 2007 - JUL 2009

- Conducted lectures and labs for *data-structures*, *algorithms*, and *discrete mathematics* courses

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## WORK EXPERIENCE

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## INVITED TALKS

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- (1) Engineering of Automated Reasoning Systems  
Department of ECE, University of Alberta, Canada (May 12 th, 2023).  
Host: Dr. Scott Dick
- (2) Pushing the Frontier of Automated Reasoning.
  - (i) Department of CS, University of Regina, Canada (March 13th, 2023).  
Host: Dr. Sandra Zilles
  - (ii) Department of CS, University of Manitoba, Canada (March 6th, 2023).  
Host: Dr. David Gerhard

- (iii) Department of CS, University of Texas at San Antonio, USA (February 2nd, 2023)  
Host: Dr. Xiaoyin Wang
- (iv) School of CS, Queen’s University, Canada (January 30th, 2023)  
Host: Dr. Salimur Choudhury
- (3) Extensions of CDCL Branching Heuristics by Exploration during Conflict Depression. At the workshop of Theoretical Foundations of SAT/SMT Solving, Simons Institute for the Theory of Computing, University of California, Berkeley, USA (April 28th , 2021)  
Host: Dr. Vijay Ganesh

## PRESENTATIONS

- (1) Guest Lecture. *Local Search Techniques*. Grad course on *Advanced Topics in Logic: Automated Reasoning and Satisfiability* at Carnegie Mellon University, Winter-2023, Pittsburgh, PA, USA.
- (2) Guest Lecture. *Boolean Satisfiability with Stochastic Local Search*. Grad course on *Optimization Methods* at Lakehead University, Fall-2022, Thunderbay, Ontario, Canada.
- (3) Paper presentation. *Linear Weight Transfer Rule for Local Search*. Technical Program at NFM-2023, New York, USA.
- (4) Paper presentation. *Guiding CDCL SAT Search via Random Exploration amid Conflict Depression*. Technical Program at AAAI-2020, New York, USA.
- (5) Poster presentation. *Guiding CDCL SAT Search via Random Exploration amid Conflict Depression*. Poster Session. AAAI-2020, New York, USA.
- (6) Paper presentation. *Exploiting Glue Clauses to Design Effective CDCL Branching Heuristics*. Main Technical Program at CP2019, Stamford, Connecticut, USA.
- (7) Poster presentation. *Exploration via Random Walks in CDCL SAT amid Conflict Depression*. Doctoral Program at CP-2019, Stamford, Connecticut, USA.
- (8) Poster presentation. *Preliminary Results on Exploration-Driven Satisfiability Solving*. Poster Session, AAAI-2018, New Orleans, USA.
- (9) 3-minute abstract presentation. *Preliminary Results on Exploration-Driven Satisfiability Solving*. 3-minute paper presentation contest. AAAI-2018, New Orleans, USA.
- (10) Paper presentation. *Flexible Approximators for Approximating Fixpoint Theory*. Canadian Conference on AI-2016, Victoria, Canada.
- (11) Guest Lecture. *Introduction to Automated Planning*. Grad course on *Knowledge Representation and Reasoning*, Winter-2012, Edmonton, Canada.

## FELLOWSHIPS, SCHOLARSHIPS, AND GRANTS

1. NSERC Postdoctoral Fellowship	◇◇	C\$90,000	◇◇	Feb 2022 - Jan 2024
2. Alberta Excellence Graduate Scholarship	◇◇	C\$12,000	◇◇	Jan 2021
3. Ernst Mach Scholarship <sup>†</sup>	◇◇	U\$2,100	◇◇	May 2021
4. AAAI Student Scholarship	◇◇	U\$250	◇◇	Feb 2020
5. CP Doctoral Program Travel Grant	◇◇	U\$7,00	◇◇	Sept 2019
6. Alberta Innovates Graduate Student Scholarship	◇◇	C\$24,000	◇◇	2018-2020
7. President’s Doctoral Prize of Distinction	◇◇	C\$15,800	◇◇	2018-2020
8. NSERC PGS Doctoral Scholarship	◇◇	C\$49,000	◇◇	2018-2020
9. GSA Travel Award	◇◇	C\$500	◇◇	Jan 2018
10. AAAI Student Scholarship	◇◇	U\$350	◇◇	Feb 2018
11. Queen Elizabeth II Doctoral Scholarship	◇◇	C\$7,500	◇◇	Sep 2016
12. AITF R&D Associate Award <sup>†</sup>	◇◇	C\$110,000	◇◇	2012-2014
13. Bangladesh-Sweden Trust Travel Scholarship	◇◇	U\$1,000	◇◇	Jan 2010

<sup>†</sup>I declined this grant due to the COVID-19 pandemic situation.

<sup>†</sup>This award money was given to Technology North Corporation to exclusively fund my work at the company.



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## VOLUNTARY SERVICES

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### Councillor-at-Large

2020 - 2021

*Graduate Student Association (GSA), University of Alberta.*

I am serving as an elected Councillor-at-Large (CAL) at GSA at the University of Alberta. As a CAL, I represent the interest of the graduate student population at GSA.

### Committee Member

Jan. 2020 - Jun 2020

*Canadian Cancer Society (CCS)*

I served as a committee member for the event Relay at Home, an annual event organized by CCS. My responsibilities were: (i) to raise funding for the event, and (iii) to advertise for the event in the social media.

### Alumni Ambassador

2014

*Alumni Association of University of Alberta*

I was an Alumni Ambassador for the Alumni Association of the University of Alberta . My *volunteering responsibilities* were to help students by providing them food/beverages during the exam time.

### Vice President, Culture

2010

*Bangladeshi Student Association of University of Alberta (BSAUA)*

I acted as the Vice President, Culture for BSAUA, where I *organized* and *managed* the multicultural programs on behalf of the association.

### Programming Competition Organization

2009

*Sylhet International University*

During my full-time employment at Sylhet International University, I *co-organized* a national (Bangladesh) level programming contest and acted as a *problem setter* and *judge* for the competition.

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## MEDIA APPEARANCE

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1. *Convocation '22: Md Solimul Chowdhury, PhD Computing Science.* Interviewed by *Faculty of Science* as University of Alberta as an outstanding graduating doctoral student (June 06, 2022).
2. Radio interview at *Radio Active* a popular program at Canadian Broadcasting Corporation/CBC Radio, where I talked about part of my PhD work (Broadcasted on February 20, 2020, 3:05pm).
3. *New computing technique could help make Bitcoin mining faster and greener.* Published in *Folio* (February 14, 2020). Also appeared in *EnergiMedia*, *MirageNews*, and *The gateway*.

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## REFERENCES

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1. Dr. Marijn Heule  
Associate Professor and Amazon Scholar  
School of Computer Science  
Carnegie Mellon University  
Pittsburgh, Pennsylvania, USA  
email: marijn@cmu.edu
2. Dr. Martin Müller  
Professor  
CIFAR/DeepMind Chair in Artificial Intelligence  
Department of Computing Science  
University of Alberta  
Edmonton, Alberta, Canada  
email: mmueller@ualberta.ca
3. Dr. Jia-Huai You  
Professor  
Department of Computing Science  
University of Alberta  
Edmonton, Alberta, Canada  
email: you@cs.ualberta.ca
4. Dr. Armin Biere  
Professor  
Chair of Computer Architecture  
University of Freiburg  
Freiburg, Germany  
email: biere@cs.uni-freiburg.de
5. Dr. Mike Whalen  
Principal Applied Scientist  
Automated Reasoning Group  
Amazon Web Services  
Minneapolis, Minnesota, USA  
email: mww@amazon.com