

# Ria Das

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## EDUCATION

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**Massachusetts Institute of Technology** Jan. 2021 – Present  
Candidate for M.Eng. in Computer Science. GPA: 5.00/5.00.

**Massachusetts Institute of Technology** Sept. 2017 – June 2021  
S.B. in Computer Science and Engineering, S.B. in Mathematics. GPA: 4.96/5.00.

## RESEARCH EXPERIENCE

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**Computer-Aided Programming and Computational Cognitive Science Groups (CSAIL)** March 2020 – Present  
*Undergraduate Research Assistant* March 2020 – Dec. 2020

- Designed and implemented AUTUMN, a functional reactive programming language for expressing causal dynamics in Atari-style, interactive, time-varying grid worlds.
- Developed benchmark suite of AUTUMN programs, called the Causal Inductive Synthesis Corpus (CISC), to evaluate inductive program synthesis algorithms and perform human cognitive experiments.
- Built web interface that allows users to interact with AUTUMN programs in the benchmark suite, as well as write, compile, and run their own AUTUMN programs.

*Graduate Research Assistant* Jan. 2021 - Present

- (M.Eng. Thesis) Led the development of a novel, cognitive-inspired program synthesis algorithm capable of synthesizing an AUTUMN program given observation data (sequence of grid frames and user actions).
- Approach is based on a new method of combining functional synthesis and automata synthesis to efficiently discover (stateless) functional data transformations along with time-varying latent program state.
- Overcame inability of Sketch-based automata synthesis implementation to scale to large automata by designing new heuristic-driven algorithm that scales well.
- Currently thinking about extensions to synthesizing probabilistic AUTUMN programs, finishing first implementation, and preparing manuscript.
- (Side Proj.) Briefly paused M.Eng. work to help post-doc run ICML experiments: trained a neural ODE model to predict blood glucose monitoring data and implemented ray marching for an inverse graphics problem.
- PIs: Armando Solar-Lezama, Joshua B. Tenenbaum, Zenna Tavares.

**Coley Research Group (MIT Department of Chemical Engineering)** April 2021 – June 2021  
*Undergraduate Research Assistant*

- Performed variety of statistical analyses ( $k$ -means, hierarchical clustering, etc.) to explain performance of machine learning models that predict enzyme activity given an enzyme-substrate pair.
- Explored whether existing models for predicting protein-ligand binding affinity could be transferred to predict enzyme activity.
- PI: Connor Coley.

## PAPERS

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1. **Ria Das**, Joshua B. Tenenbaum, Armando Solar-Lezama, Zenna Tavares. AUTUMNSYNTH: Synthesis of Reactive Programs with Structured Latent State. *Advances in Programming Languages and Neurosymbolic Systems (AIPLANS) Workshop and Causal Inference and Machine Learning (WHY-21) Workshop, Neural Information Processing Systems (NIPS) 2021*. To appear.
2. Samuel Goldman, **Ria Das**, Kevin K. Yang, Connor W. Coley. Machine learning modeling of family wide enzyme-substrate specificity screens. <https://arxiv.org/abs/2109.03900>. In submission.
3. Zenna Tavares, James Koppel, Xin Zhang, **Ria Das**, Armando Solar-Lezama. A Language for Counterfactual Generative Models. *International Conference on Machine Learning (ICML) 2021*.
4. Zenna Tavares, **Ria Das**, Elizabeth Weeks, Kate S. Lin, Joshua B. Tenenbaum, Armando Solar-Lezama. Causal Inductive Synthesis Corpus. *Computer-Assisted Programming Workshop, Neural Information Processing Systems (NIPS) 2020*.

## PRESENTATIONS

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1. Causal Inductive Synthesis Corpus.  
*Computer-Assisted Programming Workshop Poster Session, NIPS 2020.*
2. (Scheduled) AUTUMNSYNTH: Synthesis of Reactive Programs with Structured Latent State.  
*Advances in Programming Languages and Neurosymbolic Systems (AIPLANS) Workshop Poster Session, NIPS 2021.*  
*Causal Inference and Machine Learning (WHY-21) Workshop Poster Session, NIPS 2021.*

## AWARDS

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<b>3rd Place Team Website, 6.170 Software Studio Competition</b>	2019
<b>Bronze Medalist, Math Prize for Girls (MPfG) Olympiad</b>	2016
<b>Bronze Medalist, Math Prize for Girls (MPfG) Olympiad</b>	2015

## INDUSTRY

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<b>Software Engineering Intern, Palantir Technologies.</b>	Summer 2019
<b>Software Engineering Intern, Optum (UnitedHealth Group).</b>	Summer 2018