

# Julian D'Costa

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## Interests

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**Scientific Research:** I am interested in research (and teaching) in computer science, mathematics, economics, synthetic biology and neuroscience.

**Public Policy:** I want to use my analytical skills to help improve decision-making, especially that pertaining to government policy on technology.

**Communication:** I enjoy non-fiction writing, especially figuring out the analogies and methods that work best at communicating technical material to an unfamiliar audience.

## Education

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### University of Oxford

*Oxford*

Inaugural Stephen Cameron Scholar at Keble College · Departmental Fellowship

**2020–present**

*DPhil in Computer Science*

### Indian Institute of Science

*Bangalore*

First Class with Distinction · KVPY Fellow · CGPA: 9/10

**2016–2020**

*B.S. (Research) in Mathematics*

## Publications

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**How fast can you escape a compact polytope?:** With Engel Lefauchaux, Joël Ouaknine and James Worrell. Accepted to **STACS 2020**. ([link](#))

## Graduate-Level Coursework

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- Mathematics: Measure Theory, Linear Algebra, Abstract Algebra, Ordinary Differential Equations, Topology, Matrix Analysis and Positivity
- Computer Science: Machine Learning, Practical Data Science, Foundations of Data Science & High Dimensional Probability, Automata Theory and Computability, Deep Learning Theory and Practice (IISc & Microsoft Research), Digital Epidemiology

## Experience

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### Innovate India Drug Discovery Hackathon 2020

**July 2020–present**

*ddhackiisc*

Collaborating with a team of biochemists in a Govt of India project competition to develop machine learning models to identify drugs with liver toxicity and generate promising antiviral molecules using GANs and variational autoencoders

### Monsoon Math Camp

**April 2020**

*IISc, MIT, GMU undergraduates*

Helped organize a online mathematics camp for talented Indian high-schoolers, aiming to introduce them to advanced mathematical topics not covered in the school or university curriculum.

### Bachelor Thesis: Error-Prone Model Learning

**January–June 2020**

*IISc*

Worked on speeding up classical automata learning techniques with recurrent neural networks. Experimental work joint with Alvin George. Advised by Deepak D'Souza and Chiranjeev Bhattacharya (IISc CSA) and Sriram Rajamani (Microsoft Research)

### Machine Learning Experiment Contractor and Analyst

**July 2019–February 2020**

*Ought, San Francisco (Remote)*

Participated in experiments and ran analyses for [ought.org](#), a research lab aiming to train machine learning systems to answer complex and open-ended questions

**MPI-SWS Summer Internship****May - July 2019***Max Planck Institute for Software Systems, Saarbrücken*

Worked on applications of continuous linear dynamical systems to hybrid automata with Prof. Joël Ouaknine and Prof. James Worrell (Oxford CS)

**Human-Aligned AI Summer School****July 2019***Faculty of Mathematics and Physics, Charles University, Prague*

Interacted with researchers from DeepMind, OpenAI, Oxford and UC Berkeley studying alignment of advanced AI agents

**European Summer Program on Rationality****August 2017***King's College London*

Invited back to ESPR on a full scholarship as a Junior Counselor, after attending as a student in 2016. Studied functional programming, deep learning and statistical inference, guided younger students.

**Sakura Japan-Asia Youth Exchange in Science****May 2015***Kyoto University and Tokyo University of Science*

Worked on polymer chemistry experiments under Nobel laureate Prof. Hideki Shirakawa.

## Selected Awards and Honours

**International Genetically Engineered Machine Competition (iGEM) Gold Medallist****2017 and 2018***Gold Medal + Best Hardware Nomination for iFLOAT ('17), Gold Medal for PhageShift ('18)**Boston**iGEM Foundation***National Bal Shree Awardee in Creative Scientific Innovation****2012***1 of 8 Science Awardees that year**Delhi**Ministry of HRD, Government of India***Kishore Vaigyanik Protsahan Yojana (KVPY) Fellowship****2014***All India Rank 57 (SA) out of ~50,000 candidates**Bangalore**Indian Institute of Science***Microsoft Research Fellow (declined)****2020***Offered an RF position working with Neeraj Kayal and Ankit Garg**Bangalore**Microsoft Research Bangalore***IIT-Bombay Mathematics Olympiad****2015***2nd Place in India**Mumbai**Indian Institute of Technology, Powai***National College Ultimate Championship****2018***Captained IISc to 4th place in India at Ultimate Frisbee Nationals**Delhi**Ashoka University and Ultimate Players Association of India*

## Selected Research and Writing

**Adversarial Examples for CNNs:** Analysed Wasserstein distance based approaches to building robust image classifiers. With Gaurang Sriramanan. Final project for Deep Learning: Theory and Practice. ([link](#))

**Resistance: Tales from A Post-Antibiotic World:** Edited an anthology of short fiction themed around antibiotic resistance. 96pp. Published by IIScPress (2019).

**Functional Programming in Scala:** Reading project, Summer-Winter 2018. Studied functional programming and homotopy type theory with applications to natural language processing of mathematical text under Prof. Siddhartha Gadgil, Math, IISc.

**GCODE:** Engineering project, Summer-Fall 2017. Designed an automated process to speed up synthetic biology experiments as part of iFLOAT, the IISc iGEM 2017 project. Wrote the wiki at <http://2017.igem.org/Team:IISc-Bangalore/Hardware>.

## Skills

- Technical and creative writing (340/340 GRE)
- Programming: Python, C++ (basic), Haskell (basic)
- Leadership: City-wide Quiz Club Co-founder and College Ultimate Frisbee Team Captain
- Public Speaking: Invited motivational speaker