

SATHVIK ANANTAKRISHNAN

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EDUCATION

University of California, Berkeley, USA	Aug 2022 – Present
PhD in Biophysics	CGPA: 4.0/4.0
Indian Institute of Technology, Madras, Chennai, India	August 2017 – July 2022
BS-MS in Biological Sciences	CGPA: 9.57/10
Specialization in Computational Biology	CGPA: 10/10
Rank: 1	

AWARDS AND HONORS

• H2H8 Graduate Research Grant	2025
• Governor's Prize for all-round proficiency in curricular and extra-curricular activities	2022
• IIT Madras Institute Blues Award	2022
• The Divashri Award for the best academic record in the Biological Sciences program	2022
• Institute Merit Prize for the highest 4 th -year Biological Sciences CGPA	2022
• Akash Dube Prize for the highest 3 rd -year Biological Sciences CGPA	2021
• Mrs. Jayalakshmi Sambasivam Prize for the highest 2 nd -year Biological Sciences CGPA	2020
• Silver Medal at the iGEM Giant Jamboree in Boston, USA	2019
• Gold Medal at the iGEM Giant Jamboree in Boston, USA	2018
• INSPIRE Fellowship for Higher Education awarded by the Government of India	2017 – 2021
• All India Rank 2 in the Indian Institutes of Science Education and Research Examination	2017

RESEARCH EXPERIENCE

Investigating the kinetics of transcription factor cooperativity	Aug 2023 – Present
Tjian-Darzacq Lab, University of California, Berkeley	
- Using single-molecule tracking to observe the dynamics of Oct4 and Sox2 in live human and mouse stem cells. - Building Markov-state models to infer the rates of transitions between Oct4 and Sox2 dimerization and DNA-binding rates from imaging data. - Developing a single-molecule footprinting assay to deconvolve the effects of binding cooperativity and functional synergy between transcription factors.	
Modeling the zebrafish segmentation clock	Jun – Dec 2021
Prof. Hernan Garcia's Lab, University of California, Berkeley	
- Constructed mathematical models to simulate gene expression and signaling in the segmentation clock, which controls somite formation. - Analyzed transcriptional traces obtained from live imaging of zebrafish embryos with MS2-tagged clock genes. - Performed time series analysis to infer the clock's biochemical parameters and predict the consequences of experimental perturbations.	
Simulating the growth of microbial consortia on 2-dimensional surfaces	Jan – Oct 2020
Prof. Karthik Raman's Systems Biology Lab, IIT Madras	
- Developed a quorum sensing-mediated fitness modulation framework to couple the growth rates of bacterial strains. - Implemented this framework using an agent-based cellular automaton model in MATLAB and developed a flux balance analysis-based method to design appropriate microbial strains. - Recapitulated experimental data to validate the model and performed statistical analyses to identify key parameters.	
Statistical mechanical modeling of GPCR dynamics	Oct 2019 – July 2022
Prof. Athi Naganathan's Protein Biophysics Lab, IIT Madras	
- Developed a modified Wako-Saitô-Munōz-Eaton model to simulate the folding of large membrane proteins over timescales inaccessible through molecular dynamics simulations and implemented it in MATLAB. - Derived the folding free energy landscapes of 45 G-protein-coupled receptors (GPCRs) using the model.	

- Analyzed the native dynamics of GPCRs in active and inactive states and performed Monte Carlo simulations to identify folding trajectories and partially-structured intermediates.

International Genetically Engineered Machine (iGEM) 2019: IITM Team Leader

Jan 2018 – Oct 2019

- Participated in the iGEM synthetic biology competition as a member of the IIT Madras team (2018, gold medal) and as the team leader (2019, silver medal).
- Developed and optimized protocols for culturing and transforming the endophytic fungus *Fusarium solani*.
- Designed and constructed plasmids for the heterologous expression of the enzyme strictosidine synthase in *F. solani* to enable the microbial production of the anti-cancer drug camptothecin.
- Developed a library of synthetic promoters, ribosome-binding sites, and codon-optimized reporter proteins to enable the precise modulation of gene expression in the naturally competent bacterium *Acinetobacter baylyi*.
- Participated in the Interlab Study, contributing data to a consortium effort that determined the optimal methods to measure fluorescence and bacterial cell densities.

PUBLICATIONS

* indicates equal contributions as co-first authors

- Walther, N., **Anantakrishnan, S.**, Dailey, G.M., Maurer, A.C., Cattoglio, C. (2026). Distinct SOX9 single-molecule dynamics characterize adult differentiation and fetal-like reprogrammed states in intestinal organoids. *Stem Cell Reports*. <https://doi.org/10.1016/j.stemcr.2025.102787>
- Esbin, M., Cookis, T., **Anantakrishnan, S.**, Abidi, A., Karr, J., Cattoglio, C., Dazacq, X., Tjian, R. (2025). Assembly and Dynamics of Transcription Initiation Complexes. *Annual Reviews in Biochemistry* 2025. <https://doi.org/10.1016/j.molcel.2025.06.028>
- Gerstner, N., McCann, J., Martin, J., Henn, K., Riske, K., **Anantakrishnan, S.**, Graham, T., Darzacq, X., Miller, E. (2024). bis(trifluoromethyl)-carborhodamines for live cell imaging. *JACS*. <https://doi.org/10.1021/jacs.5c05473>
- Walther, N., **Anantakrishnan, S.**, Graham, T.G.W., Dailey, G.M., Tjian, R., Darzacq, X. (2024). Automated live-cell single-molecule tracking in enteroid monolayers reveals transcription factor dynamics probing lineage-determining function. *Cell Reports* 43. <https://doi.org/10.1016/j.celrep.2024.114914>
- Anantakrishnan, S.**, Naganathan, A.N. (2023). Thermodynamic architecture and conformational plasticity of GPCRs. *Nat Commun* 14, 128. <https://doi.org/10.1038/s41467-023-35790-z>
- Venkatraghavan, S. *, **Anantakrishnan, S. ***, Raman, K. (2022). Probing patterning in microbial consortia with a cellular automaton for spatial organisation. *Sci Rep* 12, 17159. <https://doi.org/10.1038/s41598-022-20705-7>
- Beal, J., Baldwin, G. S., Farny, N. G., Gershater, M., Haddock-Angelli, T., Buckley-Taylor, R., ... **iGEM Interlab Study Contributors**. (2021). "Comparative analysis of three studies measuring fluorescence from engineered bacterial genetic constructs." *PLoS One*, 16(6), e0252263. <https://doi.org/10.1371/journal.pone.0252263>
- Gopi, S., Devanshu, D., Rajasekaran, N., **Anantakrishnan, S.**, & Naganathan, A. N. (2020). "pPerturb: A Server for Predicting Long-Distance Energetic Couplings and Mutation-Induced Stability Changes in Proteins via Perturbations." *ACS Omega*, 5(2), 1142–1146. <https://doi.org/10.1021/acsomega.9b03371>
- Beal, J., Farny, N. G., Haddock-Angelli, T., Selvarajah, V., Baldwin, G. S., Buckley-Taylor, R., ... **iGEM Interlab Study Contributors**. (2020). "Robust estimation of bacterial cell count from optical density." *Commun. Biol.*, 3(512), 1–29. <https://doi.org/10.1038/s42003-020-01127-5>

CONFERENCE TALKS AND POSTER PRESENTATIONS

- Anantakrishnan, S.**, McKenna, J., Dailey, G.M., Tjian, R., Darzacq, X. "Distinguishing between thermodynamic and kinetic modes of transcription factor cooperativity using single-molecule footprinting" – *UC Berkeley Biophysics Retreat* Nov 2024
- Venkatraghavan, S. *, **Anantakrishnan, S. ***, & Raman, K. "picCASO: A Cellular Automaton for Spatial Organisation" – *Initiative for Biological Systems Engineering Symposium, IIT Madras* Nov 2020
- Anantakrishnan, S.**, et al. "A microbial production platform for camptothecin synthesis" – *Bio Wissen Symposium, Indian Institute of Science Education and Research, Tirupati* Nov 2020
- Anantakrishnan, S.**, et al. "A microbial production platform for camptothecin synthesis" – *India|EMBO Symposium – Engineering Meets Evolution, IIT Madras* Jan 2020
- Anantakrishnan, S.**, et al. "A library of genetic tools for the naturally competent soil bacterium *Acinetobacter baylyi*" – *iGEM Giant Jamboree, Boston* Oct 2018
- Anantakrishnan, S.**, et al. "A library of genetic tools for the naturally competent soil bacterium *Acinetobacter baylyi*" – *All-India iGEM Meet, Indian Institute of Science* Jul 2018

SKILLS

Computational	MATLAB, Python, C++, NetworkX, Cytoscape, molecular dynamics simulations (GROMACS), molecular visualization (VMD and PyMol), flux-balance analysis (COBRA Toolbox), NCBI BLAST, COPASI, Secure Shell, high-performance computing, HTML, CSS, JavaScript
Wet Lab	Primer design, PCR, plasmid preparation, molecular cloning, DNA and protein quantification, agarose gel electrophoresis, protein purification, SDS-PAGE, western blotting, culture and transformation of bacteria (<i>Escherichia coli</i> and <i>Acinetobacter baylyi</i>), yeast (<i>Saccharomyces cerevisiae</i>), and filamentous fungi (<i>Fusarium solani</i>), mammalian cell culture and cell line generation (U2OS, HCT116, mESCs), competent <i>E. coli</i> cell preparation, yeast spotting assays, single-molecule localization microscopy, single-molecule tracking

TEACHING AND LEADERSHIP

• Teaching assistant for an undergraduate-level course on cell biology	Mar – Jun 2022
• Teaching assistant for a graduate-level course on vascular biology	Aug – Dec 2021
• Teaching assistant for an undergraduate biochemistry MOOC	Jan – May 2021
• Founded and led a journal club called the Biotech Research Club	Aug 2019 – Aug 2021
• Student leader of the IITM iGEM team and head of the wet lab group	Jan – Nov 2019

INCLUSION AND OUTREACH

• Mentor for a first-year Biophysics graduate student as part of the Peer Mentoring Program	Sep 2024 – Jul 2025
• Project EduAccess mentor for student researchers from marginalized groups in South Asia	May 2022 – Present
• Mediator for Science Gallery Bengaluru's exhibition on Contagion	May – Jun 2021
• Moderated panels on sustainability and governance at the iGEM 2020 Giant Jamboree	Nov 2020
• Student mentor for a group of 15 freshmen at IIT Madras	Aug 2019 – July 2021
• Member of the Indian Scientists Response to COVID-19 communications team	Apr – Aug 2020
• Writer and editor for the IITM Biotechnology Research Magazine	Aug 2019 – Dec 2021
• Contributor to the Language Project , an initiative to make biology accessible by producing introductory content in 35 languages. Nominated for the iGEM 2019 Best Public Engagement and Education Award.	Jul 2018 – Aug 2019
• Tutored economically disadvantaged middle school students in mathematics as part of the National Service Scheme.	Aug 2017 – Aug 2018