

Prashant Vaidyanathan

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🌐 <http://prashantvaidyanathan.github.io>

🌐 <https://github.com/PrashantVaidyanathan>

I am a researcher working at the interface of computer science, design automation, and biology. As a researcher, I have used my formal training as an electronics and computer engineer, to identify and solve computational and mathematical problems in the field of genetic engineering and synthetic biology. I am currently working on designing a platform for programming biological systems which will be used to design genetic circuits encoded with synthetic decision making capabilities. Throughout my research, I have worked in diverse interdisciplinary academic and industrial environments in both research and software development roles, which have resulted in articles published in Science and Proceedings of IEEE among other journals and conferences. I have significant experience in functional and project management, writing project proposals and technology documents, leading strategic discussions, mentoring, and organizing workshops and conferences.

Career

- **Senior Researcher** 1/21 - Present
Microsoft Research Cambridge, UK
In collaboration with research scientists, I am currently developing a knowledge graph for biological data. I am also developing a workflow to enable the automated design of biological experiments using Machine Learning.
- **Researcher** 1/19 - 1/21
Microsoft Research Cambridge, UK
I developed proofs-of-concept and prototypes for external partners to store structured data that could be used in Machine Learning frameworks. I also played a leading role in identifying and evaluating strategic external research partnerships.
- **Research Intern** 6/17 - 9/17
Microsoft Research Cambridge, UK
A 12 week internship where I created an F# implementation for the SBOL standard data model and implemented an inference graph to chain parameters for inference in large and complex genetic circuits.
- **Assistant Computer Programmer** 9/12 - 1/14
Boston University - Information Services & Technology Boston, Massachusetts USA
- **Junior Software Developer** 2/12 - 7/12
Microsoft (Gulf) - Developer Platform Technologies Dubai, UAE
A 6 month internship where I created Windows Phone 7 Apps for the Gulf region, developed internal software tools and Apps for the Microsoft Gulf Team, and conducted and organized hackathons and workshops.
- **Research & Development Intern** 6/09 - 8/09
Larsen & Toubro - EBG Department Mumbai, Maharashtra India

Education

- **Ph.D., Computer Engineering** 9/14 - 1/19
Boston University Boston, Massachusetts USA
Dissertation: "Functional Synthesis of Genetic Systems"
- **M.S., Computer Engineering** 9/12 - 1/14
Boston University Boston, Massachusetts USA
Thesis: "Implementation, Benchmarking, And Evaluation of FPGA Multipliers"
- **B.E., Electronics and Electrical Engineering** 8/08 - 8/12
Birla Institute of Technology and Science - Pilani Dubai, UAE

Technical Proficiency

- **Programming Languages:** C, C++, C#, F#, Python, Java, Verilog, L^AT_EX
- **Operating Systems:** Linux (Ubuntu, CentOS, Amazon Linux, and RHEL) and Windows
- **Tools and Frameworks:** Microsoft Azure Stack, Amazon EC2, Amazon S3, Visual Studio, Expression Studio, Adobe Illustrator

Awards and Fellowships

- *Outstanding Dissertation of the Year (Computer Engineering)*, **Boston University**, 2019
- *First-place winner of company-wide Hackathon*, **Microsoft**, 2019
- *BBF Scholar Travel Award*, **BioBricks Foundation**, 2017
- *Distinguished Electrical and Computer Engineering Fellowship*, **Boston University**, 2014
- *Award for Science and Technology Transfer*, **World Association for Innovative Technologies**, 2011

Grants

- *AWS Cloud Credits for Research*, **Amazon Web Services**, \$10,000, 8/16-8/17
- *AWS Research Grant*, **Amazon Web Services**, \$12,000, 9/15-9/16

Publications

total citations = 627 (Google Scholar, 30th November 2020)

*Joint first authorship

Journal Articles

1. Alec Nielsen, Bryan Der, Jonghyeon Shin, **Prashant Vaidyanathan**, Vanya Paralanov, Elizabeth Strychalski, David Ross, Douglas Densmore, and Christopher A. Voigt, *Genetic Circuit Design Automation*, Science, vol. 352, iss. 6281, 2016. **PMID: 27034378**
2. **Prashant Vaidyanathan**, Bryan Der, Swapnil Bhatia, Nicolas Roehner, Ryan Silva, Christopher A. Voigt, and Douglas Densmore, *A Framework for Genetic Logic Synthesis*, Proceedings of IEEE, vol. 103, iss. 11, pp. 2196-2207, 2015.
3. Göksel Misirli, Tramy Nguyen, James Alastair McLaughlin, **Prashant Vaidyanathan**, Timmothy Jones, Douglas Densmore, Chris Myers, Anil Wipat, *A computational workflow for the automated generation of models of genetic designs*. ACS Synthetic Biology, 2018.
4. **Prashant Vaidyanathan**, Nitish Malhotra, and Jagadish Nayak, *A new encryption technique for the secured transmission and storage of text information with medical images.*, Engineering Review 32, no. 1, pp. 57-63, 2012. Initially presented in the IN-TECH 2011 conference where the paper won an award.
5. Hasan Baig, Pedro Fontanarrosa, Vishwesh Kulkarni, James McLaughlin, **Prashant Vaidyanathan**, et. al, *Synthetic Biology Open Language (SBOL) Version 3.0.0*, Journal of Integrative Bioinformatics, 2020
6. Hasan Baig, Pedro Fontanarrosa, Vishwesh Kulkarni, James McLaughlin, **Prashant Vaidyanathan**, et. al, *Synthetic Biology Open Language Visual (SBOL Visual) Version 2.2*, Journal of Integrative Bioinformatics, 2020
7. James Alastair McLaughlin, Jacob Beal, Göksel Mısırlı, Raik Grünberg, Bryan Bartley, James Scott-Brown, Thomas E. Gorochofski, **Prashant Vaidyanathan**, Pedro Fontanarrosa, Ernst Oberortner, Anil Wipat, and Chris J. Myers, *The Synthetic Biology Open Language (SBOL) version 3: A lightweight standard for data exchange across scales of bio-engineering*, Frontiers in Bioengineering and Biotechnology, 2020

Conference Papers

8. Curtis Madsen*, **Prashant Vaidyanathan***, Sadra Sadraddini*, Cristian Ioan Vasile*, Nicholas A. DeLateur, Ron Weiss, Douglas Densmore, Calin Belta, *Metrics for Signal Temporal Logic Formulae*, 57th IEEE Conference on Decision and Control, Miami Beach, FL, USA, 2018
9. **Prashant Vaidyanathan**, Rachael Ivison, Giuseppe Bombara, Nicholas A. DeLateur, Ron Weiss, Douglas Densmore, and Calin Belta, *Grid-Based Temporal Logic Inference*, 56th IEEE Conference on Decision and Control, Melbourne, Australia, 2017.

In Review

10. **Prashant Vaidyanathan***, Evan Appleton*, David Tran, Alex Vahid, George Church, and Douglas Densmore, *Algorithms for the selection of fluorescent reporters*, bioRxiv. (Accepted in Nature Communications Biology)
11. Neil Dalchau, Paul K. Grant, **Prashant Vaidyanathan**, Colin Gravill, Carlo Spaccasassi, and Andrew Phillips, *Scalable dynamic characterization of synthetic gene circuits*, bioRxiv.

Selected Tools, Frameworks, and Projects

I have worked as either the lead or co-lead developer for various software frameworks, packages, and tools. To see the full list, please visit: <http://prashantvaidyanathan.github.io/project/>

Synthetic Biology

- **Cello** - A compiler to automate the design of Boolean Genetic circuits - www.cellocad.org
- **Phoenix** - Automated design of genetic circuits with temporal verification
- **FPselection** - Selection algorithms to pick an optimal set of Fluorophores for a measurement instrument - <http://fpselection.org>
- **FSBOL** - An F# implementation for the Synthetic Biology Open Language data model
- **GEC** - Genetic Engineering of Living Cells - A tool for modular design of genetic circuits.
- **BCKG** - A knowledge graph representation for synthetic biology and genetic circuits.

Formal Methods

- **Grid TLI** - A Temporal Logic Inference tool to infer temporal properties from data
- **STL Metrics** - A metric to compute the distance between two bounded Signal Temporal Logic formulas

Teaching

I have worked as a teaching fellow and have designed lectures, exams, and courses for both undergraduate and postgraduate courses in Software Engineering, Computational Synthetic Biology, Digital Logic Design at Boston University. I have also been a guest lecturer for 4 courses at Boston University.

Professional Activities

Positions

- **Editor**, The Synthetic Biology Open Language Group (01/20 - Present)
- **Technical Advisor and Development Support**, NONA Research Foundation (6/16 - 12/18)

Talks

- 2018 - **Invited Talk**, MIT Synthetic Biology Center - Data on Tap
- 2016 - **Plenary**, NSF Biological Cyber-Physical Systems - Kickoff meeting

Technical Reviewer

- International Workshop on Bio-Design Automation (IWBD A) 2018, 2019, 2020
- Journal of Open Source Software 2019
- Engineering Review 2014

Organizing Committee

- Program Committee Chair and Publication Chair - IWBD A 2019
- Program Committee - IWBD A 2018, 2019, 2020
- Session Chair - IWBD A 2018, 2020
- Co-organized Microsoft Imagine Cup UAE Regional Finals in Microsoft Gulf - 2012
- Organized the Windows Phone App Hackathon in Microsoft Gulf - 2012
- Student Convener for the Inter-university Technology Fest - 2011

Outreach Activities

Mentoring

- *Boston University Undergraduate Research Opportunity Program (UROP)* mentor, 2013 - 2016
I have mentored **12 undergraduate students**, each for at-least 2 semesters or more.
- *Boston University Research Internship in Science and Engineering (RISE)* mentor, 2016

Workshops

- *Microsoft - Windows Phone 7 App Workshop, Dubai, UAE, 2012*
I conducted 20+ workshops in 4 major universities in UAE (BITS Pilani, University of Wollongong, University of Sharjah, American University of Sharjah)
- *Basics of .NET, Dubai, UAE, 2012*
I conducted 10+ workshops to train over 30 students in the basics of App and Software development