Rahul, Ph.D.

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SUMMARY

I am an applied mathematician with extensive experience in developing mathematical models, university teaching, and data analysis. I am interested in designing and using efficient computational methods to analyze high throughput biological data, big data, and machine learning problems. Also, I am well versed in teaching methodologies and facilitating problem-solving sessions. As a sessional instructor at the University of Waterloo, I taught and developed exercises to stimulate deep thinking among my students.

POSITIONS

Manager Aug, 2018 - Present
Trafigura Global Services, Mumbai, India

Associate Sep, 2015 - Aug, 2018
Blackrock Services India Pvt.Ltd, Gurgaon, India

Research Scientist Jan, 2015 - Aug, 2015
Data Science Practice, Impetus Infotech (India) Pvt. Ltd., Noida, India

Postdoctoral Research Fellow Feb, 2014 - Dec, 2014
Department of Biochemistry, McGill University, Montreal, Canada

Sessional Lecturer 2012 - 2013
Department of Applied Mathematics, University of Waterloo, Waterloo, Canada

EDUCATION

Doctor of Philosophy: Optimization, Control Theory, Systems Biology 2008-2012
Department of Applied Mathematics, University of Waterloo, Waterloo, Canada

- Thesis: Kinetic Modeling of Pyruvate Recycling Pathways in Pancreatic β-Cells
- Relevant courses: Stochastic Process, Computational Biology, Numerical Analysis, Applied Functional Analysis, Academic Writing, Statistical Physics and other courses

Certificate in University Teaching: Teaching in University 2009-2011
Center of Teaching Excellence, University of Waterloo, Waterloo, Canada

- Project Title: Using Wiki course page to enhance learning in a system biology course
- Workshops and Course works: Course Design, Understanding the Learner, Clickers for the Classroom, Academic Interview Skills, Evaluation of Teaching through trained observers, Midterm Evaluations

Master of Technology: Bioinformatics, Statistical learning, Stochastic Modelling 2006-2008
School of Computational and Integrative Sciences, Jawaharlal Nehru University, Delhi, India

- Thesis: Stochastic modeling of septation in *Escherichia coli* using Monte Carlo cell (MCELL)
- Relevant courses: Systems Biology, Computational Physics, Computational Methods for Sequence Analysis, Design and Analysis of Algorithms, Data Mining and Knowledge Discovery, Advanced Computational Methods in Bioinformatics, Introduction to Databases, and other courses

Master of Science: Control Theory, Statistics, Solar Cells 2003-2005
Department of Electronic Sciences, University of Delhi South Campus, Delhi, India

- Thesis: Conducting Polymers and its Application to Solar Cells
- Relevant courses: Control Engineering, Signal and Systems, Modern Communication Systems, Advance Engineering Mathematics and other courses

Bachelor of Science: Electronic Sciences 2000-2003
Sri. Aurobindo College, Delhi University, Delhi, India

CERTIFICATION

Massive Open Online Course (MOOC) Certificates:

- Coursera, Social and Economic Networks: Models and Analysis — November, 2015
- edX, Scalable Machine Learning (Apache Spark) — August, 2015
- Coursera, Learning How to Learn — March, 2015
- Coursera, Linear and Integer Programming — December, 2014
- edX, LFS101x: Introduction to Linux — September, 2014
- Coursera, Reproducible Research — July, 2014
- edX, Big Data and Social Physics — May, 2014
- Stanford Online, Statistical Learning — April, 2014
- edX, Effective Thinking Through Mathematics — April, 2014
- edX, Introduction to Computer Science and Programming Using Python — December, 2013
- Udacity, Statistics — December, 2013
- Coursera, Computing for Data Analysis (R programming course) — October, 2013
- Stanford Online, EDUC115N How to Learn Math — September, 2013
- Coursera, Crafting an Effective Writer: Tools of the Trade — June, 2013

Certificate in MATLAB, Indian Institute of Technology Kanpur — 2005

Certificate in Japanese Language, Reiyukai — 2004

ADDITIONAL TRAINING

Participated in the high performance computing training workshops, McGill University — 2014

- Introduction to Matlab Distributed Computing Server (MDCS)
- Advanced MPI workshop
- Introduction to message passing interface (MPI)
- Introduction to open multi-processing (OpenMP)
- Introduction to high performance computing (HPC)

Participated in the learning to teach day conference, McGill University — 2014

Attended graduate students skill-set workshops, McGill University — 2014

- Strategies to support active and collaborative learning
- Clarifying expectations in graduate supervision
- Supervisory alliance
- Writing effective reference letters
- Evaluation and feedback in large classes using poster presentations
- Presentation skill workshop

Participated in the math faculty teaching workshop, University of Waterloo — 2013

Participated in the teaching squares, a faculty training program, University of Waterloo — 2013

COMPUTER SKILLS

Programming Languages: MATLAB, MUPAD, Octave, R, C, Unix Shell Programming, FORTRAN 77, Python, IPython, Java Script, CSS, HTML, Markdown, LaTeX

Software Tools: SBTOOLBOX2, SBPD, SUNDIALS, XPPAUT, MATCONT, MCELL, Celldesigner, Systems Biology Markup Language (SBML), Bioinformatics tools like BLAST, ClustalW, Visual Molecular Dynamics (VMD), *Version control system:* Git and SVN

Visualization Tools: Circos, Inkscape, Xfig, Blender 3D (Basic Knowledge)

Knowledge of:

- Global sensitivity analysis and metabolic control analysis
- SPACE (Sparse Partial Correlation Estimation) and WGCNA (Weighted correlation network analysis) data analysis methods implemented in R programming environment non-linear equations

Educational Technologies: *iClickers* an audience response system, *Yed graph editor*, *Open-Sankore* an interactive whiteboard software, *Wiki* as a learning management system

SUPERVISORY EXPERIENCE

Undergraduate student, Department of Biochemistry, McGill University — May, 2014 - August, 2014
Project: Model curation of genome scale metabolic model of mouse

RESEARCH EXPERIENCE

Research Assistant, Postdoctoral fellow 2014
Department of Biochemistry, McGill University
- Project: Genome Scale Metabolic model for cancer cells using constraint based reconstruction and analysis (COBRA) method.

Research Assistant, Doctoral level 2008-2012
Department of Applied Mathematics, University of Waterloo
- Projects: Kinetic Modeling of Metabolic Pathways, Parameter Estimation and Global Sensitivity Analysis

Collaboration research with Parimal Samir in Andrew Link lab at Vanderbilt University School of Medicine 2013
- Project: I analysed the quantitative proteomics and transcriptomics data of baker's yeast, Saccharomyces cerevisiae using SPACE (Sparse Partial Correlation Estimation) method implemented in R SPACE package. We identified functionally relevant hub proteins and modules in the co-expression network, which respond to differential signalling cues under different environmental conditions. The project codes are available on request.

Research Assistant, Master of Technology level 2007-2008
School of Computational and Integrative Sciences, Jawaharlal Nehru University
- Project: Modelling of Distribution of Min proteins in daughter cells after cell division in *Escherichia coli*

Research Assistant, Master of Science level 2004-2005
Department of Electronic Sciences, University of Delhi South Campus
- Project: Design and analysis of conducting polymers based solar cells

Research Assistant, Master of Science level May-September 2004
Indian Meteorological Department, Delhi
- Project: Analysis of upper atmosphere humidity data obtained through humidity sensors (Carbon Hygristors)

Research Assistant, Undergraduate Research Assistantship 2002-2003
Sri. Aurobindo College, Delhi University
- Project: 8085 based resistance and capacitance measurement meter

TEACHING EXPERIENCE

Lecturer, University of Waterloo, Waterloo 2012-2013
- Calculus III for Honours Mathematics
- Calculus I for Engineers
- Calculus II for Sciences

Graduate Teaching Assistance, University of Waterloo, Waterloo 2008-2012
- Computational Cell Biology (Graduate Course)
- Environmental Informatics (Graduate Course)
- Calculus I, II, III for Engineers
- Introduction to differential equations
- Linear Algebra I
- Calculus I, II, III for Honours Mathematics

SELECTED HONOURS AND AWARDS

International Doctoral Student Award, University of Waterloo 2008-2012
Mathematics Graduate Student Award, University of Waterloo 2008-2012
MITCAS student travel award to attend conference, University of Waterloo 2011
Department of Biotechnology Center of Excellence Award 2006-2008
Merit Certificate B.Sc(Hons) Electronic Sciences at Sri. Aurobindo College, Delhi University 2003
Qualified, **Graduate Aptitude Test in Engineering (GATE)** 2007
Subject: Electronics and Communication Engineering. GATE is conducted by Indian Institutes of Technology and Indian Institute of Sciences for admission to their graduate programs.

DOCTORAL DISSERTATION WORK

Dissertation title: Kinetic modeling of pyruvate recycling pathways in pancreatic β-cells.
Electronic copy of thesis work: https://uwspace.uwaterloo.ca/handle/10012/7044

PUBLICATIONS

Parimal Samir, **Rahul**, James C. Slaughter, and Andrew J. Link. Environmental Interactions and Epistasis Are Revealed in the Proteomic Responses to Complex Stimuli. *PLoS ONE*, 10(8):e0134099, August 2015

Parimal Samir, Christopher M. Browne, **Rahul**, Ming Sun, Bingxin Shen, Wen Li, Joachim Frank, and Andrew J. Link. Identification of changing ribosome protein compositions using mass spectrometry. *PROTEOMICS*, 18(20):1800217

Presentations

- Parimal Samir, **Rahul**, and Andrew Link. Quantitative proteomic analysis reveals environmental interaction and epistasis in the responses to complex stimuli in saccharomyces cerevisiae, 2015. 63rd ASMS Conference on Mass Spectrometry and Allied Topics
- **Rahul**. A survey of wiki based collaborative learning environments for the interdisciplinary training of the students in maths and biology, 2012. Opportunities and New Directions Conference, Centre of Teaching Excellence, University of Waterloo
- **Rahul**, Adam Stinchcombe, Jamie Joseph, and Brian Ingalls. Kinetic modelling of pyruvate recycling pathways in pancreatic β-cells., 2012. The 8th International Conference on Differential Equations and Dynamical Systems
- **Rahul**, Adam Stinchcombe, Jamie Joseph, and Brian Ingalls. Dynamic modelling of metabolism in pancreatic β-cells., 2011. The International Conference on Applied Mathematics, Modelling and Computational Science (AMMCS)
- **Rahul**, Adam Stinchcombe, Jamie Joseph, and Brian Ingalls. Dynamic modelling of metabolism in pancreatic β-cells, 2011. Graduate Student Conference

Posters

- **Rahul**, Fanny Dupuy, Sébastien Tabariès, Nicholas Bertos, Daina Z. Avizonis, Morag Park, Peter Siegel, and Uri D. Akavia. A computational method to integrate gene expression and metabolomics data to identify metabolic adaptations in cancer, 2014. Mechanisms & Models of Cancer Conference
- **Rahul** and Brian Ingalls. Optimal parameter estimation of kinetic models using the surrogate-modelling framework, 2013. RECOMB/ISCB Conference
- **Rahul**, Adam Stinchcombe, Jamie Joseph, and Brian Ingalls. Dynamic modelling of pyruvate recycling pathways in pancreatic β-cells, 2012. 13th International Conference on System Biology, Toronto
- **Rahul**, Adam Stinchcombe, Jamie Joseph, and Brian Ingalls. Dynamic modelling of metabolism in pancreatic β-cells, 2011. 7th International Congress on Industrial and Applied Mathematics ICIAM
- **Rahul**, Adam Stinchcombe, Jamie Joseph, and Brian Ingalls. Dynamic modelling of metabolism in pancreatic β-cells, 2009. Chemical Biophysics Symposium

PROFESSIONAL INVOLVEMENT AND MEMBERSHIPS

Reviewed manuscript in the following journal:

- Transactions on Biomedical Engineering, Institute of Electrical and Electronics Engineers Inc. (IEEE)

Conference Attended:

- 1st Annual Montreal Postdoctoral Research Day, Montreal, Canada 2014
- International Biomedical Modelling School and Workshop, NCBS, Bangalore, India 2008

Conference Volunteer: International Conference in Bioinformatics 2006, New Delhi, India

Professional memberships:

- Academic member International Society for Computational Biology (ISCB) 2013-2015
- Student member Society for Industrial and Applied Mathematics (SIAM) 2008-2012
- Student member International Society for Computational Biology (ISCB) 2006-2008

REFERENCES *Available on request.*