Narmada Sambaturu

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Current Position

Director's Postdoctoral Fellow, Oct 2021 - Present
Theoretical Biology and Biophysics,
Los Alamos National Laboratory,
Los Alamos, USA.
Mentors: Dr. Thomas Leitner, Prof. Carmen Molina-París.

Education

PhD, Interdisciplinary Mathematical Sciences, 2015 - 2021
Mathematical and Computational Biology Stream,
IISc Mathematics Initiative,
Indian Institute of Science, Bangalore, India.
Supervisors: Prof. Nagasuma Chandra, Prof. N. Srinivasan.
Thesis: *Multi-scale Modelling of Immune Response and Disease Spread: Methods and Applications.*

Master of Science, School of Computing, 2012 - 2015
National University of Singapore, Singapore.
Supervisor: Prof. Wing-Kin Sung.
Thesis: *Towards Handling Repeats in Genome Assembly.*

Bachelor of Engineering, Computer Science and Engineering, 2005 - 2009
M.S.Ramaiah Institute of Technology, Bangalore, India.
Visvesvaraya Technological University.

Awards

- Director's Postdoctoral Fellow, Los Alamos National Laboratory (2021).
- Best Student Paper Award, 2015 IEEE International Conference on Bioinformatics and Biomedicine (BIBM).
- One of 50 students selected from all over India for participation in a summer camp in Biotechnology at M.S.Swaminathan Research Foundation, Chennai, India (2003).
- All India Rank 25 in Secondary School Certificate Examination (Grade 10) (2003).

Research Experience

- **Director's Postdoctoral Fellow,** Oct 2021 - Present
  Theoretical Biology and Biophysics, Los Alamos National Laboratory.
  Mentors: Dr. Thomas Leitner, Prof. Carmen Molina-París.
  Within and between host scale integration to model HIV transmission.
- **Senior Research Scientist,** Summer 2021
  HealSeq Precision Medicine.
  Analyzing immune response to vaccinations.
- **PhD Fellow,** 2015 - 2021
  Interdisciplinary Mathematical Sciences, IISc Mathematics Initiative,
  Indian Institute of Science, Bangalore, India.
  Supervisors: Prof. Nagasuma Chandra, Prof. N. Srinivasan.
  Developing algorithms for multi-scale modeling of immune response and disease spread, including methods for mining omics-integrated biological networks to identify dysregulated paths and influential nodes, incorporating genetic heterogeneity into epidemic models, and designing vaccine candidates maximising population coverage.

- **Visitor,** Winter 2016
  Department of Applied Mathematics,
  University of Leeds, Leeds, UK
  Supervisors: Prof. Carmen Molina-París, Prof. Grant Lythe.
  Developing method to study the role of genetic heterogeneity in epidemiological spread of H1N1 influenza, as well as modeling tumour immune surveillance.
- **Junior Research Fellow,** Summer 2015
  Indian Institute of Science, Bangalore, India.
  Supervisor: Prof. Nagasuma Chandra.
  Introduction to Systems Biology and graph-theoretical analysis of biological networks.
- **MSc Student,** 2012 - 2015
  School of Computing, National University of Singapore, Singapore.
  Supervisor: Prof. Wing-Kin Sung.
  Developing method to improve handling of repeat regions in genome assembly by exploiting an overhang between adjacent genomic fragments caused by using certain transposons for library preparation.
- **Intern,** 2006
  Bioinformatics Centre,
  Indian Institute of Science, Bangalore, India.
  Supervisor: Prof. K. Sekar.
  Contributed towards development of a method to identify intergenic sRNAs in completely sequenced bacterial genomes.

Teaching Experience

- **Guest Lecturer** for course *Molecular Biology.* Winter 2021
  Pre-Medical Program leading to Doctor of Medicine (MD).
  International Medical School (St. George's University) Bangalore campus, Karnataka, India.
  Topics: *Molecular Biology Tools and Concepts of OMICS, Bioinformatics, Transgenic Plants, Transgenic Animals, Molecular Medicine, Gene Therapy.*
- **Teaching Assistant** for course *Current trends in drug discovery.* Summer 2018
  Indian Institute of Science, Bangalore, Karnataka, India.
- **Learning Enabler**, Tata Consultancy Services. 2010
  Common Initial Learning Program. Bidadi, Karnataka, India.

Work Experience

- **Senior Research Scientist, HealSeq Precision Medicine.** Summer 2021
  Bangalore, India.
- **Developer, Tata Consultancy Services.** 2009 - 2011
  Technology Excellence Group,
  Bangalore, India.

Publications

1. **Narmada Sambaturu**. "Multi-scale Modelling of Immune Response and Disease Spread: Methods and Applications." *PhD dissertation, Indian Institute of Science*, 2021.
2. **Narmada Sambaturu**, Vaidehi Pusadkar, Sridhar Hannenhalli, Nagasuma Chandra, "PathExt: a general framework for path-based mining of omics-integrated biological networks." *Bioinformatics* 37, no. 9 2021: 1254-1262.
3. **Narmada Sambaturu**, Sumanta Mukherjee, Martín López-García, Carmen Molina-París, Gautam I. Menon, and Nagasuma Chandra. "Role of genetic heterogeneity in determining the epidemiological severity of H1N1 influenza." *PLoS Computational Biology* 14, no. 3, 2018: e1006069.

4. **Narmada Sambaturu**, Madhulika Mishra, and Nagasuma Chandra. "EpiTracer - an algorithm for identifying epicenters in condition-specific biological networks." *BMC genomics* 17, no. 4, 2016: 543.
5. **Narmada Sambaturu**, Madhulika Mishra, and Nagasuma Chandra. "EpiTracer - an algorithm for identifying epicenters in condition-specific biological networks." *Proceedings of the 2015 IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*. IEEE Computer Society, 2015. (Best Student Paper Award).
6. **Narmada Sambaturu**. "Towards handling repeats in genome assembly." *MSc dissertation, National University of Singapore*, 2014.
7. Sridhar, Jayavel, **Narmada Sambaturu**, Radhakrishnan Sabarinathan, Hong-Yu Ou, Zixin Deng, Kanagaraj Sekar, Ziauddin Ahamed Rafi, and Kumar Rajakumar. "sRNAscanner: a computational tool for intergenic small RNA detection in bacterial genomes." *PLOS ONE* 5, no. 8, 2010: e11970.
8. Annapurna P. Patil, **Narmada Sambaturu**, and Krittaya Chunhaviriyakul. "Convergence time evaluation of algorithms in MANETs." *International Journal of Computer Science and Information Security*, Vol. 5, No. 1, pp. 144-149, September 2009.

Workshop and Conference Presentations

- **Narmada Sambaturu**, Sumanta Mukherjee, Martín López-García, Carmen Molina-París, Gautam I Menon, and Nagasuma Chandra. **(Talk)** *Incorporating genetic heterogeneity into epidemic models for H1N1 influenza.* Mathematical and Statistical Explorations in Disease Modelling and Public Health, International Centre for Theoretical Sciences (ICTS), Bangalore, India, Jul 1 - 11 2019.
- **Narmada Sambaturu**, Madhulika Mishra, Rahul Metri and Nagasuma Chandra. *An Algorithm for Identifying Druggable Targets Among Influential Mutations in Individual Cancer Patients.* **(Poster)** Indo-US Conference on Sculpting the future of medicine - Gateway to the post-proteogenome era, at Advanced Centre For Treatment, Research And Education In Cancer (ACTREC), Mumbai, India, Dec 10 - 11 2018.
- **Narmada Sambaturu** and Nagasuma Chandra. *OptiNeo – an algorithm to optimise the number of neo-antigenic peptides for cancer immunotherapy.* **(Poster)** Nature Big Data and Cancer Precision Medicine, Boston, Massachusetts, Oct 1 - 2 2018.
- **Narmada Sambaturu**, Sridhar Hannenhalli, and Nagasuma Chandra. **(Poster)** *Cutting through the complexity of genomic data: A general method to identify candidate genes.* RECOMB/ISCB Conference on Regulatory and Systems Genomics with DREAM Challenges, New York, NY, Nov 19 - 21 2017.
- **Narmada Sambaturu**, Sumanta Mukherjee, Martín López-García, Carmen Molina-París, Gautam I. Menon, and Nagasuma Chandra. **(Talk)** *Role of genetic heterogeneity in determining the epidemiological severity of H1N1 influenza.* Discussion meeting on Mathematical Models of Infection, Immunity and Inflammation, Indian Institute of Science, Bangalore. April 2017.

Invited Talks

- **Data Science in Bioinformatics.** Women in Data Science (WiDS) Mysuru, India, Sep 2020.
- **Network Algorithms and their Applications in Biology.** Sanjay Ghodawat University, Kolhapur, India, Dec 2018.
- **Statistical Thinking in Biomedical Research.** KLE College of Pharmacy, Bangalore, India, Apr 2018.

Graduate Coursework

- PhD (IISc): Current Trends in Drug Discovery, Special Topics in Theoretical Biology.
- MSc (NUS): Advanced Combinatorial Methods in Bioinformatics, Advanced Algorithms, Knowledge Discovery and Data Mining, Modeling and Analysis Techniques in Systems Biology, Advanced Topics in Data Mining.

Skills

Programming languages:	Python, R, MATLAB, C, C++, Java, Perl, HTML.
Database management:	SQL.
Machine learning packages:	scikit-learn, scipy, Weka.
Bioinformatics tools:	IEDB tools, Cytoscape, STRING, BLAST, CLUSTALW, SAMtools, BWA.
Version control:	SVN, Git.
Writing and typesetting:	LaTeX, MS Office, Google Docs.
Operating systems:	Linux, Windows.

Outreach

- Tutoring underprivileged children in local community in topics ranging from arithmetic and English, to Engineering Mathematics and Programming. Helped a student pass Engineering Mathematics course after two prior unsuccessful attempts.
- Presenting talks in workshops and undergraduate colleges, aimed at encouraging students to pursue a career in science.
  - Women in Data Science (WiDS) Mysuru, India, Sep 2020.
  - Sanjay Ghodawat University, Kolhapur, India, Dec 2018.
  - KLE College of Pharmacy, Bangalore, India, Apr 2018.

Community Service

- Participated in tree planting initiatives.
- Participated in initiatives to clean up hiking trails.