Deepak Sharma

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Area of Interest

- **DNA Data Storage:** Developing novel and efficient methods for synthesizing, sequencing, encoding, decoding, error correcting, and compressing DNA data to achieve high-density, long-term, and cost-effective information storage solutions.
- **Bioinformatics and Computational Biology:** Applying machine learning and deep learning techniques to analyze and optimize DNA data storage processes, including error correction algorithms, data compression algorithms, and biomolecular simulations.
- **Medical Image Analysis:** Utilizing computer vision and machine learning algorithms for medical image segmentation, classification, and reconstruction, to aid in clinical diagnosis and treatment.

Work Experience

- Research Fellow, National University of Singapore, Singapore — Feb 2023 - Present
- Remote Consultant, National University of Singapore, Singapore — Oct 2021 - Jan 2023
- Research Associate, Indian Institute of Technology Delhi, New Delhi, India — Mar 2020 - Sept 2021
- Early Doc Fellowship, Indian Institute of Technology Delhi, New Delhi, India — Oct 2019 - Jan 2020

Education

- Ph. D., Chemical Engineering, Indian Institute of Technology Delhi — 2014 - 2019
  Computing using DNA systems.
- M. Tech, Pulp and Paper Technology, Indian Institute of Technology Roorkee — 2011 - 2013
  Experimental and Simulation Study of Grafting of Gelatin on Polymethyl methacrylate (PMMA) in Emulsion Reactor.
- B. Tech, Biotechnology, Maharshi Dayanand University — 2006 - 2010
  Synthesize peptide of the envelope protein of Chikungunya Virus by using solid-phase peptide synthesis (SPPS)

Fellowships/Awards

- 2020, *Early Doc Fellowship*, Indian Institute of Technology Delhi, New Delhi
- 2016, *Open House*, Indian Institute of Chemical EngineersParticipated and adjudged second in poster presentation.
- 2014, *Ministry of Human Resource Development Scholarship*, Government of India, Indian Institute of Technology DelhiAwarded 100 Percent Scholarship for Ph. D. in Chemical Engineering
- 2013, *Cognizance*, Indian Institute of Technology Roorkee, RoorkeeParticipated and adjudged second in Newton's $1/3^{rd}$ law.
- 2011, *Ministry of Human Resource Development Scholarship*, Government of India, Indian Institute of Technology RoorkeeAwarded 100 Percent Scholarship for masters in Pulp and Paper Technology

Projects

- Practical Data Storage and Computation in DNA Molecules, Advanced Research and Technology Innovation Centre (ARTIC), 10-Oct-2020 09-Oct-2024, Djordje Jevdjic (former PI), Wong Weng Fai (current PI).

Publications

Book Chapter

- **Sharma D.** and Ramteke M., DNA computing methodologies and challenges, DNA-and RNA-Based Computing Systems, Wiley Online Library (2021): 15 - 29.
- **Sharma D.** and Ramteke M., DNA Computing based Big Data Storage. Elsevier (Accepted).

Conference

- **Sharma D.** and Ramteke M., DNA mediated Logic Gates, The Sixth International Conference on Advances in Computing, Communication and Information Technology, 2018.
- **Sharma D.**, Fageria A., and Ramteke M., Computing using DNA, Open House Indian Institute of Technology Delhi, 2016.
- **Sharma D.** and Ramteke M., Modeling of gelatin grafted PMMA polymerization, International conference on Advanced Polymeric Materials, Kottayam, Kerala, India, 2013.
- **Sharma D.**, Emerging Trends in Biotechnology, University Institute of Engineering and Technology, Maharshi Dayanand University, Rohtak, India, 2009.
- **Sharma D.**, National Conference on Biotechnology, Advanced Centre for Biotechnology, Maharshi Dayanand University, Rohtak, India, 2007.

Journal

- **Sharma D.** and Ramteke M., In Vitro Identification of the Hamiltonian Cycle Using a Circular Structure Assisted DNA Computer, ACS Combinatorial Science, 22, no. 5, (2020): 225 - 231.
- **Sharma D.** and Ramteke M., A Note on Short-term Scheduling of Multi-grade Polymer Plant using DNA Computing, Chemical Engineering Research and Design, 135 (2018): 78 - 93.
- Dube T., **Sharma D.**, Gupta S., and Ramteke M., Impedance-based DNA switches for Solving Boolean Logic Circuit, (Submitted).
- **Sharma D.**, Vas D. and Ramteke M., Modeling, Simulation and Optimization of Graft Copolymerization of Gelatin on Poly-Methyl Methacrylate (PMMA), (Submitted).
- **DNA Storage Toolkit:** A Modular End-to-End DNA Data Storage Codec and Simulator. (ISPASS 2024), (Submitted).
- True Random Numbers as byproducts of DNA/RNA sequencing (In preparation).
- Block-Based DNA Storage through Two-Sided Primer Elongation (In preparation).
- Algorithms for entropy extraction from DNA sequencing (In preparation).

Thesis Supervised

M. Tech.

- 2022, *Shubham Nayyar*, Patent quality check using natural language processing technique, Birla Institute Of Technology and Science Pilani, Rajasthan, India.

Administrative Responsibilities

- **Established and Led *DNA Computing Lab* at Indian Institute of Technology Delhi**
    - **Setup and Development**

- – Secured grant for lab establishment and development.
  - – Acquired 6 critical research instruments for DNA computing process,
  - – Established protocols, and trained the fellow researcher.
  - – Authored 7 publications in journals, book chapter, and conferences, identified key mechanism in DNA computing process, and presented research at 2 international conferences.
  - – **Mentorship and Training** Trained 2 PhD students and 5 master students in the molecular biology techniques, bio-informatics, and python programming.

- **Established and Led *DNA Storage Lab* at National University of Singapore**

  - – **Setup and Development**
  - – Establishment a DNA storage lab for the experimental purposes. This lab is first of its kind in School of Computing, NUS.
  - – Acquired 4 critical research instruments for DNA data storage.
  - – Established protocols, and trained the fellow researcher.
  - – Developed a DNA Storage Toolkit and other three publications are in preparation.

- Ensured appropriate inventory of equipment and materials.

- Conducted routine examinations of instruments and kept a hygienic environment according to lab safety standards.

Extra-Curricular Activities (Fine Arts and Theatre)

- Former member of research scholar committee at Department of Chemical Engineering Indian Institute of Technology Delhi.
- Participated in various stage play as an Actor and Production member at IIT Delhi.
- Cognizance 2012, Indian Institute of Technology Roorkee, (Participated in Ideaz biotech).
- Antaragni 2012, Indian Institute of Technology Kanpur, (Participated in Street Play).
- Zonal Youth Festival of Technical Zone, Maharshi Dayanand University Rohtak, 2006, 2008 and 2009, (Third, One act play).
- 6th Techno-Management Fest, Maharshi Dayanand University Rohtak, 2007-08, (Volunteer of Organizing Committee).
- 24th Inter-University North zone youth festival, Punjab University Chandigarh, 2008-2009, (Participated in Quiz).
- 24th Inter-University North zone youth festival, Punjab University Chandigarh, 2008-2009, (Third, Mime).
- 1st International Child Art Exhibition, 2003, (Certificate of Merit).
- 2nd All India Child Art Exhibition, 2000, 2001, 2002, (Certificate of Merit).
- Bharat Vikas Parishad, Art competition, 2001, (Third).