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# D Bhanu Prakash

*PhD Student, Mathematics*

*I am a third year PhD student in Mathematics working on the stochastic optimal control problems for prey-predator systems and apply these results to biological conservation and pest management.*

## Current Appointment

October 2023– **Senior Research Fellow (SRF)**

Project title: *Time - Optimal Control Studies and Bifurcation Analysis of Coupled Non-Linear Dynamical Systems with Application to Pest Management* under the supervision of Dr. Krishna kiran Vamsi Dasu. This work is being funded by National Board of Higher Mathematics, DAE, Government of India.

## Areas of Specialization

- Mathematical Ecology: Prey-Predator Dynamics
- Mathematical Epidemiology: Disease Modeling
- Optimal Control Theory - Deterministic and Stochastic
- Dynamical Systems
- Bifurcation Analysis

## Education

- 2018–2020 **Sri Sathya Sai Institute of Higher Learning**, M.Sc., Mathematics specialization in Computer Science, GPA:8.3/10
- 2015–2018 **Sri Sathya Sai Institute of Higher Learning**, B.Sc., Mathematics(Hons.) specialization in Computer Science, GPA:7.5/10
- 2013–2015 **Sri Chaitanya Junior College**, Intermediate, Mathematics, Physics, Chemistry, Score:975/1000
- 2012–2013 **Sree Balajee Vidyalayam**, S.S.C. , GPA:9.7/10

## Experience

Oct 2023– **Senior Research Fellow (SRF)**

Project title: *Time - Optimal Control Studies and Bifurcation Analysis of Coupled Non-Linear Dynamical Systems with Application to Pest Management* under the supervision of Dr. Krishna kiran Vamsi Dasu. This work is being funded by National Board of Higher Mathematics, DAE, Government of India.

Oct 2021 – **Junior Research Fellow (JRF)**

Sept 2023 Project title: *Time - Optimal Control Studies and Bifurcation Analysis of Coupled Non-Linear Dynamical Systems with Application to Pest Management* under the supervision of Dr. Krishna kiran Vamsi Dasu. This work is being funded by National Board of Higher Mathematics, DAE, Government of India.

2020–2021 **Research Assistant**, Sri Sathya Sai Institute of Higher Learning, Doing Literature Review , on *Stochastic Modeling, Optimal Control Theory and Bayesian Statistics*

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## Publications

### Preprints

- 2023 **D. B. Prakash** and D. K. K. Vamsi, "Time-optimal control studies for additional food provided prey-predator systems involving holling type-iii and holling type-iv functional responses," *arXiv preprint arXiv:2309.13592*, 2023. [Online]. Available: <https://doi.org/10.48550/arXiv.2309.13592>

### Journal Articles

- 2023 **D. B. Prakash** and D. K. K. Vamsi, "Stochastic time-optimal control and sensitivity studies for additional food provided prey-predator systems involving holling type-iv functional response," *Frontiers in Applied Mathematics and Statistics*, vol. 9, p. 1122107, [Online]. Available: <https://doi.org/10.3389/fams.2023.1122107>
- 2023 **D. B. Prakash** and D. K. K. Vamsi, "Stochastic optimal and time-optimal control studies for additional food provided prey-predator systems involving holling type iii functional response," *Computational and Mathematical Biophysics*, vol. 11, no. 1, p. 20220144, 2023. [Online]. Available: <https://doi.org/10.1515/cmb-2022-0144>
- 2022 B. Chhetri, D. K. K. Vamsi, **D. B. Prakash**, S. Balasubramanian, and C. B. Sanjeevi, "Age structured mathematical modeling studies on covid-19 with respect to combined vaccination and medical treatment strategies," *Computational and Mathematical Biophysics*, vol. 10, no. 1, pp. 281–303, 2022. [Online]. Available: <https://doi.org/10.1515/cmb-2022-0143>
- 2022 B. Chhetri, V. M. Bhagat, D. K. K. Vamsi, V. S. Ananth, **D. B. Prakash**, S. Muthusamy, P. Deshmukh, and C. B. Sanjeevi, "Optimal drug regimen and combined drug therapy and its efficacy in the treatment of covid-19: A within-host modeling study," *Acta Biotheoretica*, vol. 70, no. 2, pp. 1–28, 2022. [Online]. Available: <https://doi.org/10.1007/s10441-022-09440-8>
- 2022 D. S. S. M. Kanumoori, **D. B. Prakash**, D. K. K. Vamsi, and C. B. Sanjeevi, "A study of within-host dynamics of dengue infection incorporating both humoral and cellular response with a time delay for production of antibodies," *Computational and Mathematical Biophysics*, vol. 9, no. 1, pp. 66–80, 2021. [Online]. Available: <https://doi.org/10.1515/cmb-2020-0118>
- 2021 **D. B. Prakash**, B. Chhetri, D. K. K. Vamsi, S. Balasubramanian, and C. B. Sanjeevi, "Low temperatures or high isolation delay increases the average covid-19 infections in india: A mathematical modeling approach," *Computational and Mathematical Biophysics*, vol. 9, no. 1, pp. 146–174, 2021. [Online]. Available: <https://doi.org/10.1515/cmb-2020-0122>
- 2021 B. Chhetri, D. K. K. Vamsi, **D. B. Prakash**, and C. B. Sanjeevi, "Combined drug interventions and its efficacy in the reduction of covid-19 burden: A within-host modeling study with reference to hcq and bcg vaccination," *Advances in Dynamical Systems and Applications (ADSA)*, vol. 16, no. 1, pp. 369–403, 2021 [Link](#)
- 2021 B. Chhetri, V. M. Bhagat, D. K. K. Vamsi, V. S. Ananth, **D. B. Prakash**, R. Mandale, S. Muthusamy, and C. B. Sanjeevi, "Within-host mathematical modeling on crucial inflammatory mediators and drug interventions in covid-19 identifies combination therapy to be most effective and optimal," *Alexandria Engineering Journal*, vol. 60, no. 2, pp. 2491–2512, 2021. [Online]. Available: <https://doi.org/10.1016/j.aej.2020.12.011>
- 2020 **D. B. Prakash**, D. K. K. Vamsi, D. B. Rajesh, and C. B. Sanjeevi, "Control intervention strategies for within-host, between-host and their efficacy in the treatment, spread of covid-19: A multi scale modeling approach," *Computational and Mathematical Biophysics*, vol. 8, no. 1, pp. 198–210, 2020. [Online]. Available: <https://doi.org/10.1515/cmb-2020-0111>

## Teaching

Assisted in teaching the following courses

- Mathematical Modeling
- Stochastic Differential Equations
- Optimal Control Theory
- Probability and Statistics

## Workshops/Conferences

### Workshop Lectures

- [1] **Lecture on Infectious Disease Modeling**, organized by ICMR-National Institute for Research in Tuberculosis (ICMR-NIRT), Department of Health, Chennai, Government of India, during March 14-15, 2024. Organised Hands-on session for three hours on the topic: **Introduction to Python programming and exploring basic disease models in Python**.

### Conference Talks

- [1] **International Conference on Differential Equations and Control Problems (ICDECP23)**, organized by School of Mathematics and Statistical Sciences, Indian Institute of Technology Mandi (IIT Mandi), during June 15-17, 2023. Title of the talk: **Stochastic Time-Optimal Control Studies for Additional Food Provided Prey-Predator System involving Holling Type-IV Functional Response and Mutually Interfering Predators**.
- [2] **National Conference on Recent Trends in Mathematical Biology - Theory, Methods and Applications**, organized by Department of Mathematics and Computer Science, Sri Sathya Sai Institute of Higher Learning (SSSIHL), during July 20-22, 2023. Title of the talk: **Deterministic and Stochastic Studies on Additional Food Provided Prey-Predator System involving Holling Type-III and Holling Type-IV Functional Responses**.

### Workshop Participation

- [1] **SERB Sponsored High-End Workshop (KARYASHALA) on Bifurcations and Chaos: Computations and Applications**, organized in **completely offline mode** by Department of Mathematics, Indian Institute of Technology Indore (IIT Indore), during July 03-09, 2023.
- [2] **National Center for Mathematics Workshop on Control Theory for Partial Differential Equations (NCMW-CTPDE)**, organized in **completely offline mode** by IISER, Thiruvananthapuram, during December 04-16, 2023.
- [3] **Winter School on Games in Evolutionary Dynamics**, organized in **completely offline mode** by Department of Mathematics, Shiv Nadar Institute of Eminence (Deemed to be University), Delhi NCR, during December 18-23, 2023.
- [4] **International Workshop on Recent advances on control theory of PDE systems**, in **online mode** by the International Centre for Theoretical Sciences (ICTS), Bangalore, during February 12-23, 2024.

### Conference Participation

- [1] **International Workshop on Modeling Dynamics, Statistical Inference and Prediction of Infectious diseases (MoDSIP-2018)**, held at Sri Sathya Sai Institute of Higher Learning (SSSIHL), during August 12-15, 2018.
- [2] **National Workshop on Stochastic Differential Equations & Applications**, conducted by Department of Mathematics, Periyar University, Salem, during March 10-13, 2021.
- [3] **Indo-US Conference-II on the Science of Mathematical Modeling and Decision Making**, held at Sri Sathya Sai Institute of Higher Learning (SSSIHL), during October 28-30, 2021.
- [4] **Third National Conference on Control and Inverse Problems**, jointly organized by Central University of Kerala, Central University of Tamilnadu and Periyar University, during February 25-26, 2022.

- [5] **Workshop on Nonlinear Phenomena in Mathematical Biology (WoNPMB-2022)**, held online at Department of Applied Sciences, ABV- Indian Institute of Information Technology and Management (IIITM), Gwalior, during December 19-23,2022.

## Achievements

- [1] APSET 2021 - **Qualified**
- [2] AP EAMCET 2015 - **Rank 1939**
- [3] TS EAMCET 2015 - **Rank 2048**
- [4] IIT JEE Main 2015 - **Rank 17003**

## Certifications

- [1] **Understanding Research Methods** by University of London and offered through **Coursera**
- [2] **Stochastic Processes** by HSE University and offered through **Coursera**
- [3] **Understanding Research Methods** by University of London and offered through **Coursera**

## Membership

- [1] Life Member - **Forum for Industrial and Applied Mathematics (FIAM)**

## Technical skills

- [1] Programming Languages: C, C++, Python
- [2] Applications:  $\text{\LaTeX}$ , Microsoft Office
- [3] OS: Linux, Windows, MacOS

## Leadership and Extracurricular Activities

- [1] Head of Audio Control group at the University and Hostel, 2016-2018.
- [2] Head of the Hostel General Stores, 2019-2023.
- [3] Participated in Sri Sathya Sai Village Service Program - Grama Seva, providing food and clothing to over 180 villages in Andhra Pradesh, India.
- [4] An active volunteer in Service programs of Sri Sathya Sai Seva Organisations, India.

## Personal Data

Date of Birth: 23 March, 1998

Nationality: Indian

Sex: Male

Marital Status: Single

Languages: English, Telugu, Hindi

## References

- [1] **Dr. Krishna Kiran Vamsi Dasu** (Ph.D. Advisor) , Associate Professor - Stage I, Department of Mathematics and Computer Science, Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam, [dkkvamsi@sssihl.edu.in](mailto:dkkvamsi@sssihl.edu.in)
- [2] **Prof. Pallav Kumar Baruah**, Professor, Department of Mathematics and Computer Science, Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam, [pkbaruah@sssihl.edu.in](mailto:pkbaruah@sssihl.edu.in)
- [3] **Dr. N Uday Kiran**, Associate Professor, Department of Mathematics and Computer Science, Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam, [nudaykiran@sssihl.edu.in](mailto:nudaykiran@sssihl.edu.in)