

D BHANU PRAKASH

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PROFILE —

I am an Assistant Professor in Mathematics at Vignan's Foundation for Science, Technology & Research (Deemed to be University), India. I completed my Ph.D. in Mathematics from Sri Sathya Sai Institute of Higher Learning, India. My research focuses on Dynamical Systems and Optimal Control Theory, particularly in Mathematical Biology. I bring a strong foundation in both theoretical and applied mathematics, strengthened by three years as a Research Fellow on a DAE-NBHM funded project. This journey has sharpened my analytical skills and deepened my commitment to teaching and mentoring.

AREAS OF EXPERTISE

- Mathematical Modeling • Dynamical Systems • Optimal Control Theory • Scientific Machine Learning
- Physics Informed Neural Network • Data Analysis • Mathematical Ecology • Mathematical Epidemiology • Ordinary Differential Equations • Stochastic Differential Equations • Bayesian Statistics

EXPERIENCE

Assistant Professor

June 2025 – Ongoing

Department of Mathematics and Statistics, School of Applied Science & Humanities, Vignan's Foundation for Science, Technology & Research (Deemed to be University), Vadlamudi, Guntur - 522 213, Andhra Pradesh, India.

- As part of my teaching responsibilities, I am offering the following courses:
 - [25MT101 - Fundamentals of Engineering Mathematics](#)
 - [25MT103 - Linear Algebra](#)
- I am also a member of the Center of Excellence, Space Science and Technology.

Senior Research Fellow (SRF) - NBHM Research Project

Oct 2023 – Sep 2024

Project funded by Department of Atomic Energy-National Board of Higher Mathematics (DAE-NBHM), GoI

- Project Title: "Time Optimal Control Studies and Bifurcation Analysis of Coupled Nonlinear Dynamical Systems with Applications to Pest Management"
- Esteemed stipendiary Research Fellowship, granted for one year upon successful attainment of objectives during the initial two years.
- Two Journal papers are communicated and one paper is under preparation. Delivered a talk in an international conference (RAAM-2024) organised by IIT BHU.

Junior Research Fellow (JRF) - NBHM Research Project

Oct 2021 – Sep 2023

Project funded by Department of Atomic Energy-National Board of Higher Mathematics (DAE-NBHM), GoI

- Project Title: "Time Optimal Control Studies and Bifurcation Analysis of Coupled Nonlinear Dynamical Systems with Applications to Pest Management"
- Prestigious stipendiary Research Fellowship for two years, awarded on the basis of outstanding track record and research plans.
- Two Journal papers are published and one paper is communicated. Delivered a talk in an international conference (ICDECP23) organised by IIT Mandi.

TEACHING EXPERIENCE

Assistant Professor

Department of Mathematics and Statistics, Vignan's Foundation for Science, Technology & Research (Deemed to be University), Vadlamudi, Guntur - 522 213, India.

- 25MT101 - Fundamentals of Engineering Mathematics
- 25MT103 - Linear Algebra

June 2025 – Present

Pre Semester, 2025-2026
Semester I, 2025-2026

Teaching Assistant

Department of Mathematics and Computer Science, Sri Sathya Sai Institute of Higher Learning (SSSIHL) Prasanthi Nilayam - 515 134, India.

- Probability and Statistics
- Mathematical Modeling
- Calculus of Variations and Optimal Control Theory
- Real Analysis
- Linear Algebra
- Methods of Differential Equations

Dec 2021 – Apr 2025

Semester II, 2021-2022
Semester II, 2022-2023
Semester I, 2023-2024
Semester II, 2023-2024
Semester I, 2024-2025
Semester II, 2024-2025

EDUCATION

PhD., Mathematics

Sri Sathya Sai Institute of Higher Learning (SSSIHL)

Mar 2021 – Sept 2025

Prasanthi Nilayam - 515 134, India.

- Thesis Title: "Dynamics and Control of Additional Food Provided Prey-Predator Systems: A Deterministic and Stochastic Study with reference to Holling Type-III/IV Responses Incorporating Mutual Interference and Intraspecific Competition".
- Research Supervisor: Dr. Krishna Kiran Vamsi Dasu
- Current Status: Three journal papers are published and three papers are communicated. Delivered talks in two international and one national conferences.

M.Sc. Mathematics specialization in Computer Science

2018–2020

Sri Sathya Sai Institute of Higher Learning (SSSIHL); GPA: 8.3/10 Prasanthi Nilayam - 515 134, India.

B.Sc. Mathematics (Hons.) specialization in Computer Science

2015–2018

Sri Sathya Sai Institute of Higher Learning (SSSIHL); GPA: 7.5/10 Prasanthi Nilayam - 515 134, India.

Intermediate

2013–2015

Sri Chaitanya Junior College; Score: 975/1000

Machilipatnam - 521 001, India.

S.S.C

2012–2013

Sree Balajee Vidyalayam; GPA: 9.7/10

Machilipatnam - 521 001, India.

CERTIFICATIONS

Bayesian Statistics by Duke University offered through Coursera ([Certificate](#))

Mar 2025

Stochastic Processes by HSE University and offered through Coursera ([Certificate](#))

Oct 2024

PUBLICATIONS

Preprints

- D. B. Prakash and D. K. K. Vamsi, "Deterministic and stochastic studies on additional food provided prey-predator systems with group defence among prey and mutual interference among predators," *arXiv preprint arXiv:2504.21114*, 2025. [Online]. Available: <https://www.arxiv.org/abs/2504.21114>. Manuscript submitted for review to *Acta Applicandae Mathematicae, Springer Nature*.

- **D. B. Prakash** and D. K. K. Vamsi, “Dynamics and control of additional food provided prey-predator systems exhibiting holling type-iii functional response and intra-specific competition among predators,” *arXiv preprint arXiv:2504.18035*, 2025. [Online]. Available: <https://arxiv.org/abs/2504.18035>. Manuscript submitted for review to *Qualitative Theory of Dynamical Systems*, Springer.
- **D. B. Prakash** and D. K. K. Vamsi, “Role of intra-specific competition and additional food on prey-predator systems exhibiting holling type-iv functional response,” *arXiv preprint arXiv:2504.09078*, 2025. [Online]. Available: <https://arxiv.org/abs/2504.09078> - Manuscript submitted for review to *Journal of Biological Dynamics*, Taylor & Francis.

Journal Articles

- **D. B. Prakash** and D. K. K. Vamsi, “Global dynamics and time-optimal control studies for additional food provided holling type-iii mutually interfering prey-predator systems with applications to pest management,” *Discov Appl Sci* 7, 874, 2025. [Online]. Available: <https://doi.org/10.1007/s42452-025-07255-z>
- **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, 2023. [Online]. Available: <https://doi.org/10.3389/fams.2023.1122107>
- **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>
- 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>
- 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>
- 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>
- **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>
- 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](#)
- 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>
- **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>

WORKSHOP AND SPEAKING ENGAGEMENTS

- **Resource Person**, FDP on “*Statistical Process Design using R & Python*”, Mangalore Institute of Technology & Engineering (MITE), Karnataka - May 8-10, 2025. Conducted a 4-hour lecture and hands-on session on **Stochastic Processes and Multivariate Analysis**.
- **Resource Person**, FDP on “*Advances in Mathematical Modeling Techniques, AI/ML & Bioinformatics*”, Sri Sathya Sai Institute of Higher Learning (SSSIHL) and Indian Society for Mathematical Modeling and Computer Simulation (ISMMACS) - April 12-13, 2025. Conducted a 2-hour hands-on session on **A Python primer on Optimal Control Problems**.
- **Resource Person**, Online workshop on “*Mathematical Modelling of Infectious Diseases*”, MedPro, Tamilnadu - February 20, 2025. Organized a two hour hands-on session on the topic: **Mathematical Modeling of Infectious Diseases using Python**.
- **Resource Person**, A 6-day In-person “*National Winter School for Women in AI and Computational Biology - 2024*”, Centre for Excellence in Mathematical Biology (CEMB-SSSIHL) - December 2-7, 2024. Organized a hands-on session for four hours on the topic: **Introduction to Programming and Disease Modeling using Python**. ([Report](#))
- **Resource Person**, FDP on “*Dynamical Systems & Optimal Control Theory, AI/ML, and Bioinformatics with Applications to Healthcare*”, Centre for Excellence in Mathematical Biology (CEMB-SSSIHL) - July 8-15, 2024. Organised a hands-on session for six hours on the topic: **Dynamical Systems and Optimal Control Theory with Python**.
- **Guest Lecture**, A 2-day In-person workshop on “*Infectious Disease Modeling*”, ICMR-National Institute for Research in Tuberculosis (ICMR-NIRT), Department of Health, Chennai, Government of India - March 14-15, 2024. Organised a hands-on session for four hours on the topic: **Introduction to Python Programming and Exploring Basic Disease Models in Python**.

CONFERENCE TALKS

- *Deterministic and Stochastic Time Optimal Control Studies of Coupled Nonlinear Dynamical Systems with Applications to Pest Management*. **2nd International Conference on Recent Advances in Applied Mathematics** (RAAM 2024) organized by Indian Institute of Technology IIT BHU, Varanasi during July 2024.
- *Deterministic and Stochastic Studies on Additional Food Provided Prey-Predator System involving Holling Type-III and Holling Type-IV Functional Responses*. **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 2023.
- *Stochastic Time-Optimal Control Studies for Additional Food Provided Prey-Predator System involving Holling Type-IV Functional Response and Mutually Interfering Predators*. **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 2023.

PROJECTS

Neural Differential Equations Framework

 [Link](#) - Dec 2025

- Implemented Neural ODEs, SDEs, and PINNs with memory-efficient adjoint backpropagation.
- Developed adaptive RK45 solver and Euler-Maruyama integrator for continuous-time learning.
- Applied to spiral dynamics, heat equation solving, and irregular time-series prediction.
- Achieved $O(1)$ memory complexity for arbitrary-depth networks using adjoint sensitivity analysis, enabling training on resource-constrained hardware.

Neural Control Systems for Autonomous Robotics

 [Link](#) - Dec 2025

- Developed controllers for inverted pendulum stabilization and 2-DOF manipulator trajectory tracking, achieving 95%+ success rate and sub-5-second stabilization.
- Integrated Lagrangian mechanics with deep learning for physically-consistent dynamics modeling.
- Implemented real-time MPC with gradient-based optimization, handling hard control constraints via differentiable projections.
- Achieved 95%+ success in pendulum stabilization and $\pm 2\text{cm}$ accuracy in 2-link manipulator control with real-time performance (10-50ms).

Risk Assessment of Cyberattacks Using Bayesian Networks

 [Link](#) - Jan 2025

- Designed and implemented a Bayesian Network model to assess the probabilistic risk of successful cyberattacks on network assets using real-world cybersecurity data.
- Analyzed pre-processed datasets to identify relationships between vulnerabilities, threat actors, attack vectors, and asset exploitation probabilities.
- Computed risk levels for various assets and developed a ranked list with actionable mitigation insights.
- Delivered data-driven strategies for prioritizing cybersecurity defenses.

Numerical Simulation of a Two-Stage Rocket

 [Link](#) - Dec 2024

- This project simulates the vertical flight of a two-stage rocket by solving a **system of ordinary differential equations (ODEs)** numerically using `scipy.integrate.solve_ivp` with the RK45 method. The simulation accounts for quadratic air drag and gravitational forces but does not include parachute deployment during descent.

WORKSHOPS/CONFERENCES PARTICIPATION

Workshop Participation

- Workshop on **Foundations Of Computational Mathematics And Scientific Machine Learning** by Department of Engineering Sciences, ABV-IIITM Gwalior during December 5-9, 2025.
- 12-Day Online Refresher Course on **Foundations of Data Science and Machine Learning for STEM Professionals** organized by NIT Warangal, Telangana during November 3–15, 2025.
- Lecture Series on **Satellite System Engineering** organised by Vignan's Foundation for Science, Technology & Research (Deemed to be University) during November 28 – 29, 2025
- Online Faculty Development Programme on **Research Horizons in Mathematics, Electronics and Applied Computer Science** organised by E&ICT Academy IIT Guwahati in association with Vignan's Foundation for Science, Technology & Research (Deemed to be University) during November 10 – 14, 2025
- **International Online Workshop on the Ethical AI toolkit for Researchers** in *online mode* by the Department of Applied Chemistry, Amity University, Madhya Pradesh, India on August 6, 2025.
- **14-day Faculty Development Program (FDP) on Foundations and Applications of Quantum Computing** in *online mode* by the Department of Mathematics and Computer Science, Sri Sathya Sai Institute of Higher Learning (SSSIHL), Andhra Pradesh, India during March 18- April 3, 2024.
- **Certificate Program in Infectious Disease Modeling** in *online mode* by Center for Excellence in Mathematical Biology, Sri Sathya Sai Institute of Higher Learning, India during March - November 2024.
- **5-day International Faculty Development Program (FDP) on Advances in Non-linear Dynamics: Methods and Applications (ANDMA 2024)** in *online mode* by the Department of Mathematics, School of Advanced Sciences, VIT-AP University, Andhra Pradesh, India during June 11-15, 2024.
- **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.

- 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.
- 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.
- 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.

Conference Participation

- 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.
- National Workshop on Stochastic Differential Equations & Applications conducted by Department of Mathematics, Periyar University, Salem during March 10-13, 2021.
- 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.

MEMBERSHIP

- Graduate Student Member - Society for Industrial and Applied Mathematics ([SIAM](#))
- Life Member - Indian Academy of Mathematical Modeling and Simulation ([IAMMS](#))
- Life Member - Forum for Industrial and Applied Mathematics ([FIAM](#))

HONORS AND AWARDS

- APSET 2021 - Qualified in Mathematics
- AP EAMCET 2015 - Rank 1939
- TS EAMCET 2015 - Rank 2048
- IIT JEE Main 2015 - Rank 17003

TECHNICAL SKILLS

Programming Python, R, MATLAB, C, C++
Softwares LaTeX, MS Office
OS Ubuntu, macOS, Windows
Framework PyTorch

LEADERSHIP AND EXTRACURRICULAR ACTIVITIES

- Lead the team of Audio Control group at the University and Hostel during 2016-2018.
- Lead the team of the Hostel General Stores during 2019-2023.
- Participated in Sri Sathya Sai Village Service Program - Grama Seva, providing food and clothing to over 180 villages in Andhra Pradesh, India.
- 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

- Dr. Krishna Kiran Vamsi Dasu (Ph.D. Supervisor), Associate Professor, Department of Mathematics and Computer Science, Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam - 515 134, Andhra Pradesh, India. ✉ dkkvamsi@sssihl.edu.in
- Dr. N Uday Kiran, Associate Professor & Head of the Department, Department of Mathematics and Computer Science, Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam - 515 134, Andhra Pradesh, India. ✉ nudaykiran@sssihl.edu.in
- Prof. Pallav Kumar Baruah, Senior Professor & Dean of Sciences, Department of Mathematics and Computer Science, Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam - 515 134, Andhra Pradesh, India. ✉ pkbaruah@sssihl.edu.in
- Dr. N Seshagiri Rao, Professor & Head of the Department, Department of Mathematics and Statistics, Vignan's Foundation for Science, Technology and Research, Vadlamudi - 522 213, Guntur, Andhra Pradesh, India. ✉ seshu.namana@gmail.com