Parul Vijay Patil

CONTACT INFORMATION

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Virginia Tech
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RESEARCH INTEREST

Bayesian Statistics, Gaussian Processes, Model Calibration, Surrogate Models, Stochastic Inference. Areas of applications include forecasting, ecology, and environmental sciences.

EDUCATION

Ph.D. in Statistics, Virginia Tech, GPA: 3.98/4 *Aug 2021 – May 2026 (anticipated)*
Advised by Robert B. Gramacy and Leah R. Johnson
Dissertation: *Heteroskedastic Gaussian processes for ecological forecasting applications*

M.Sc. in Statistics, University of Mumbai, GPA: 9.25/10 *Aug 2018 – Oct 2020*

B.Sc. in Statistics, Ramnarain Ruia Autonomous College, GPA: 6.93/7 *Aug 2015 – May 2018*

RESEARCH APPOINTMENTS

Graduate Research Assistant *Spring 2024 – Present*
Virginia Tech

Funded by NSF Rules of Life project for forecasting phytoplankton blooms. The General Lakes Model (GLM) provides stochastic simulation of chlorophyll-A, temperature, etc., using input settings and weather data from NOAA. Aim 2 focuses on using a surrogate to calibrate the GLM which will be done via `bhetGP`.

Graduate Research Assistant *Summer 2023*
Virginia Tech

Supported by NSF (MRA), which uses NEON data to study the ecological effects of global environmental change on phenology across time and space. I worked within the NEON Forecasting Challenge under the Tick Populations theme, developing a Gaussian process model to generate near-term forecasts of tick abundance.

PUBLICATIONS

Patil, P. V., Gramacy, R. B., et al. (2025). **Vecchia approximated Bayesian heteroskedastic Gaussian processes**. arXiv:2507.07815

Patil, P. V., Gramacy, R. B., Johnson, L.R. (2025). **Gaussian process forecasting for sparse ecological time series**. bioRxiv 2025.07.10.664121

Resler, L. M., **Patil P. V.**, et al. (2024). **Patterns of native and invasive lianas of Virginia's Ridge and Valley forests in relation to land use history**. *Southeastern Geographer*.

SOFTWARE

`bhetGP`: An R package to fit Bayesian heteroskedastic Gaussian processes which also supports Vecchia approximation for large scale problems. https://CRAN.R-project.org/package=bhetGP

AWARDS AND HONORS

Student Travel Award, *Fall Technical Conference* *Oct 2025*
Travel award to attend Fall Technical Conference in Houston.

Best Poster Presentation Award – 1st place, *2025 Virginia Chapter of ASA* *Sept 2025*
Honored for outstanding research contributions and effective presentation.

EFI Futures Outstanding Presentation Award, *EFI Conference* *May 2025*
Awarded Best Poster Presentation for excellence in research and presentation quality. .

MBM Travel Award, *Mechanistic Biological Modeling Group* *July 2024*
Travel support to attend ISBA conference in Venice, Italy.

SAIG Collaborator of the Year Award, *Department of Statistics, Virginia Tech* *Oct 2023*
Acknowledged for contributions to the Liana Project and for coordinating pilot sessions for the Generalized Linear Mixed Models short course.

Merit Scholarship, *Department of Statistics, University of Mumbai* *Aug 2018 - Oct 2020*
Received competitive scholarship for consecutive years, recognizing consistent performance and academic distinction.

PRESENTATIONS

CT = Contributed Talk, **CP** = Contributed Poster

Vecchia Approximated Bayesian Heteroskedastic Gaussian Processes

CT	**Oct 2025**	Fall Technical Conference, Houston
CP	**Sept 2025**	ASA Virginia Chapter, Virginia Tech, Blacksburg

Gaussian Process Forecasting for Tick Population Dynamics

CP	**May 2025**	EFI Conference, Blacksburg
CP	**Mar 2025**	IMSI Workshop on Uncertainty Quantification, Chicago
CP	**Mar 2025**	Douglas C. Montgomery Distinguished Lecture Series, Blacksburg
CP	**Nov 2024**	Corporate Partners Presentation, Blacksburg
CP	**July 2024**	ISBA World Meeting, Venice, Italy
CP	**Feb 2024**	WiDS Conference, Blacksburg

WORK EXPERIENCE

Statistical Collaborator *Aug 2022 – Dec 2023*
Virginia Tech SAIG

Consulted with several clients from industry and academia with experimental design, statistical analysis, visualization, and methodological guidance. Conducted weekly walk-in sessions to advise on analyses, review and approve methodologies, and troubleshoot or debug code. Developed, reviewed, and taught short courses, including Linear Regression, Mixed Models, and Bootstrapping in R.

Quality Control Intern *Feb 2021 – July 2021*
Xpress Minds Edutainment Pvt. Ltd., India

Applied Six Sigma methodologies to analyze and optimize call-based operational processes, leading to a 10% increase in quiz registrations over a six-month period. Weekly quality and hygiene audits were conducted to evaluate and improve the productivity of business development executives. Additionally, statistical forecasting methods were used to predict expected daily registrations for the upcoming month based on one year of historical data.

WORKSHOPS

Gaussian Process Modeling for Time Dependent Data

Conducted a workshop on Gaussian Processes for ecological audiences, developing lecture notes, slides, and hands-on R exercises. Guided participants in applying the methods to their own datasets and provided support in analysis.

- VectorByte Training Workshop, University of Notre Dame *June 2025*
- Ecological Forecasting Initiative Conference Workshop, Virginia Tech *May 2025*
- VectorByte Training Workshop, Virginia Tech Research Centre *July 2024*

TEACHING EXPERIENCE

COURSE DEVELOPMENTS

Research Reproducibility Course, *Virginia Tech SAIG* *Fall 2025*

Actively designing materials for a short course on research reproducibility from a statistical perspective, including data organization, analysis planning, and reproducible code practices.

Generalized Linear Mixed Models, *Virginia Tech SAIG* *Fall 2023*

Coordinated pilot sessions, managed logistics, and facilitated reviewer feedback to refine course materials. Revised content on nested and crossed effects, identifying datasets that clearly illustrate the differences between these effects.

Simple Linear Regression, *Virginia Tech SAIG* *Spring 2023*

Developed course material and hands-on practicals in R for a short course on Simple Linear Regression directed towards applied audiences.

LECTURING

Methods of Regression Analysis (STAT 4214), *Virginia Tech* *Summer 2021*

Six-week online asynchronous undergraduate course with 15 students. Covered concepts such as linear regression, parameter estimation, hypothesis testing, checking for multicollinearity, residual analysis and transformations with implementation in R. Additionally, also covered multiple linear regression, non linear regression, indicator variables and logistic regression.

SHORT COURSES

Bootstrapping in R, *Virginia Tech SAIG* *Spring 2023*

Instructed a short course on bootstrapping for non-statisticians, simplifying statistical concepts for applied audiences. Provided hands-on training and guided participants to apply the methods independently.

TEACHING ASSISTANT

Graded assignments and supported instruction for large statistics and data analysis courses. Provided one-on-one assistance during office hours to reinforce key concepts.

Integrated Quantitative Sciences (CMDA 2005), *Virginia Tech* *Fall 2023*
Statistics in Research (STAT 5616), *Virginia Tech* *Spring 2022*
Experimental Designs (STAT 4204), *Virginia Tech* *Spring 2022*
Biological Statistics (STAT 3615), *Virginia Tech* *Fall 2021*
Statistics for Engineering Applications (STAT 3704), *Virginia Tech* *Fall 2021*

SERVICE

Mu Sigma Rho Committee, Virginia Tech, *Vice President* *May 2025 – Present*
Mu Sigma Rho Honors Society, Virginia Tech, *Member* *Oct 2023 – Present*
WiDS Organizing Committee, Virginia Tech, *Member* *Oct 2025 – Feb 2025*
Data Science Camp "Statapult", Virginia Tech, *Volunteer* *July 2024, July 2025*
Mu Sigma Rho Committee, Virginia Tech, *Secretary* *Aug 2024 – May 2025*
Corporate Partners Organizing Committee, Virginia Tech, *Member* *Oct 2021 – Oct 2024*
Placement Committee, University of Mumbai, *Volunteer* *Aug 2019 – Nov 2019*
ESSQUE, Ramnarain Ruia Autonomous College, *Volunteer* *Nov 2017 – Dec 2017*

PROFESSIONAL MEMBERSHIPS

Society of Industrial and Applied Mathematics (SIAM)
International Society for Bayesian Analysis (ISBA)
American Statistical Association (ASA)
Mu Sigma Rho Honors Society