# Japneet Singh

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## Education

**Purdue University** **Aug 2022 -present**
*Ph.D. in Electrical and Computer Engineering, West Lafayette, IN, USA* *GPA: 4.0 / 4.0*

**Indian Institute of Technology Kanpur** **Jul 2017 - May 2022**
*B.Tech-M.Tech (Dual Degree) in Electrical Engineering, Kanpur, India* *B.Tech GPA: 9.6/10.0, M.Tech GPA: 10.0/10.0*

## Professional Experience

**Purdue University** | Graduate Research Assistant **Aug 2022 - present**
- Developed a hypothesis testing framework to evaluate the goodness of fit for a BTL model to pairwise comparison data.
- Established the minimax optimality of the test and conducted evaluations on real-world datasets using Python.
- Currently working on extending the hypothesis test to Thurstonian models and finding complementary lower bounds.

**Indian Institute of Technology Kanpur** | Researcher (Master's Thesis) **Jan 2021 - Apr 2022**
- Researched on weighted matrix completion and analyzed the impact of subspace information on the reconstruction error.
- Designed a weighted nuclear-norm minimization algorithm, provided its convergence analysis and Python simulations.
- Quantified performance gains in multi-user wireless networks, demonstrating a 20% increase in per-user data rate.

**University of California Santa Cruz** | Research Intern **May 2021 - Jul 2021**
- Introduced two new architectures that achieve a 1000x reduction in storage costs and a 200x decrease in communication costs associated with blockchain's historical data and simultaneously provide the confidentiality of the stored data.
- Developed a construction of the secret sharing scheme satisfying the requirements of the protocol.

**Indian Institute of Technology Kanpur** | SURGE Research Fellow **May 2019 - Jul 2019**
- Trained conditional generative models in *TensorFlow* to combat slowing down of MCMC algorithm near criticality.
- Used trained generative adversarial network models for unsupervised phase transition detection.
- Proposed a hybrid conditional GAN & MCMC algorithm adapting to distribution errors and improving accuracy by 10%.

## Projects

**IEEE Signal Processing Cup 2021** | *MATLAB, Python*
- Developed channel estimation techniques for frequency selective channels through Dictionary Learning.
- Optimized IRS configuration for maximizing spectral efficiency using gradient ascent and Newton's Algorithm.

**Ticket Purchasing Database** | *SQL, Python*
- Developed and designed a ticketing system to manage transaction details, ticket availability, and venue information.
- Implemented SQL queries and sub-queries to conduct in-depth analysis of popular routes based on recent transactions.

**Movie Recommendation System** | *Python*
- Designed and implemented a Python-based movie recommendation system using the Alternating Projection algorithm with IMDb Dataset to provide users with tailored movie suggestions based on their preferences.

**BAJA SAE, IIT-K Motorsports** | *MATLAB, Solidworks*
- Designed and implemented a multi-link suspension system for both the front and rear of an All-Terrain vehicle.
- Utilized MATLAB for kinematic analysis, optimization, and graphical insights into dynamic suspension parameters.

## Technical Skills

**Languages**: Python, Java, C, C++, SQL, LaTeX, MATLAB, HTML, CSS
**Software's/Libraries**: Linux, Github, TensorFlow, PyTorch, Solidworks, MATLAB Simulink, ETL, Apache Kafka

## Selected Publications

- A. Makur and **J. Singh**. On Properties of Doeblin Coefficients. Proceedings of IEEE ISIT 2023. [Link]
- A. Makur and **J. Singh**. Testing for the Bradley-Terry-Luce model. Proceedings of IEEE ISIT 2023. [Link]
- **J. Singh**, M. Scheurer, and V. Arora. Conditional generative models for sampling and phase transition indication in spin systems. SciPost Physics, 2021. [Link]

## Awards

- **2022**: Recipient of the **Dr. Vijay K. Varma Talent Award**, graduation award at IIT-Kanpur.
- **2021**: **Qualcomm Innovation Fellowship 2022**, India.
- **2019**: **Summer Undergraduate Research Grant for Excellence (SURGE)**, IIT-Kanpur.
- **2017-21**: **Academic Excellence Award**, for 4 consecutive years at IIT-Kanpur,
- **2016**: **KVPY scholarship Awardee**, India.