# Jaykrishnan G.

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## Education

**Doctor of Philosphy in Combinatorial Optimization**

*The Technion – Israel Institute of Technology, Israel*                                    *July 2021 – December 2024*

**Master of Science in Operations Research and Optimization**                                    GPA 85.9/100

*The Technion – Israel Institute of Technology, Israel*                                    *March 2019 – July 2021*

**Master of Technology in Industrial Engineering and Management**                                    CGPA 8.39/10

*National Institute of Technology, Tiruchirappalli, India*                                    *June 2013 – May 2015*

**Bachelor of Technology in Mechanical Engineering**                                    CGPA 8.18/10

*University of Kerala, India*                                    *May 2008 – July 2012*

## Professional Experience

### Deep Learning

*Deep Learning courses and projects*                                    *PhD*

- Completed foundational Deep Learning course, advanced Geommetric Deep Learning course, as well as specialized course in MLOps.

- **Project 1: Adversarial attack on Vision Systems**. Designed and developed adversarial patches to disrupt the functionality of TartanVO, a learning-based visual odometry model. Leveraged Projected Gradient Descent and Auto-PGD optimizations to craft highly effective patches that significantly deviated camera motion predictions. Conducted experiments with optimization criteria, including translation, rotation, and optical flow errors, and created universal adversarial patches using custom loss functions for targeted disruptions.

- **Project 2: Self-supervised Graph Representation Learning**. Enhanced the preprocessing stage of Simple Graph Convolution by integrating a self-supervised graph representation learning framework. Selected the framework based on extensive experimentation and comparative analysis of generation-based, auxiliary property-based, and contrast-based pretext task methodologies. Evaluated unsupervised models such as Graph Autoencoders, Variational Graph Autoencoders, and Graph Barlow Twins to improve latent feature extraction, enabling superior performance in downstream graph analytics tasks.

- **Project 3: Deep Learning pipeline with MLOps**. Developed a deep learning model pipeline adhering to MLOps best practices for generating piano performance frames. Utilized Google Cloud's Vertex AI for model training and Docker for containerization. Employed Google Compute Engine and Cloud Storage for efficient deployment and data management. Established a CI/CD pipeline with GitHub Actions to automate model building and deployment, ensuring seamless integration and delivery.

### Research in Combinatorial Optimization

*Advisor: Prof. Asaf Levin, Faculty of Decision and Data Sciences*                                    *MSc and PhD*

Developed Approximation schemes (EPTASs and APTASs) for bin packing and scheduling subjected to cardinality constraints and variants of it.

1. G. Jaykrishnan and A. Levin. EPTAS for load balancing problem on parallel machines with a non-renewable resource. *Discrete Optimization*, 48:100775, 2023

2. G. Jaykrishnan and A. Levin. EPTAS for parallel identical machine scheduling with time restrictions. *Journal of Combinatorial Optimization*, 47(2):10, 2024

3. G. Jaykrishnan and A. Levin. EPTAS for the dual of splittable bin packing with cardinality constraint. *Theoretical Computer Science*, 979:114202, 2023

4. G. Jaykrishnan and A. Levin. Scheduling with cardinality dependent unavailability periods. *European Journal of Operational Research*, 316(2):443–458, 2024

5. G. Jaykrishnan and A. Levin. APTAS for bin packing with general cost structures. *arXiv preprint arXiv:2407.07677*, 2024

**Research Assistant**

*Advisor: Prof. Avi Ostfeld, Faculty of Civil Engineering* *September 2020 - September 2024*

Formulated linear and convex programs for water quality analysis, addressing both deterministic and uncertain scenarios. Employed Robust optimization techniques to mitigate uncertainty in program formulations.

1. B. S. Pankaj, G. Jaykrishnan, and A. Ostfeld. Optimizing water quality treatment levels for water distribution systems under mixing uncertainty at junctions. *Journal of Water Resources Planning and Management*, 148(5):04022013, 2022

2. S. P. Boindala, G. Jaykrishnan, and A. Ostfeld. Robust optimal booster disinfectant injection in water systems under uncertainty. *Water*, 15(9):1777, 2023

3. S. P. Boindala, G. Jaykrishnan, and A. Ostfeld. Booster disinfection scheduling under uncertainty in water distribution systems: Approximate robust reformulation approach. *Journal of Water Resources Planning and Management*, 151(2):04024070, 2025

**EpyT-C**

*Python* *November 2023 – Present*

- Currently engaged in the development of an open-source python package for water quality modeling, slated for publication in a paper for the Journal of Open Source Software.

## TECHNICAL SKILLS

**Languages**: Python, C, LaTeX
**Libraries**: CVXPY, CVXOPT, PyTorch, PyG, DGL, PyTorch Lightning, Hydra
**MLOps**: Git, DVC, GitHub, Docker, Google Cloud Platform, CI/CD