# Harshwardhan **Praveen**

PhD Candidate | Cornell University | Scientific Machine Learning, Deep Learning, Algorithms

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## Education

**Cornell University** — *Ithaca, USA*

PhD in Civil and Environemental Engineering (GPA: 4.13/4) — *Jan. 2021 - PRESENT*

- PhD Thesis: Learning Green's functions from Data

**Indian Institute of Technology, Hyderabad** — *Hyderabad, India*

Dual Degree M.Tech. in Mechanical Engineering (Mehanics and Design) — *Aug. 2019 - Aug. 2020*

**Indian Institute of Technology, Hyderabad** — *Hyderabad, India*

B.Tech. (Honours) in Mechanical Engineering (GPA: 9.17/10) — *Jul. 2015 - Aug. 2019*

## Experience

**Cornell University** — *Ithaca, USA*

Graduate Research Assistant — *Jan. 2021 - PRESENT*

- Broadly working on Scientific Machine Learning.
- Discovering of Green's functions from Data.

**Boeing Research and Technology, Bangalore** — *Bengaluru, India*

Research Intern — *Jun. 2018 - Jul. 2018*

- Worked for the Material and Manufacturing lab of Boeing R&T, Bangalore.
- Numerical modeling of Multipoint forcing using ABAQUS.

**IIT, Hyderabad** — *Hyderabad, India*

Teaching Assistant — *Jan. 2017 - Dec. 2019*

- Teaching Assistant for the courses: Dynamics of Chemical Systems, Digital Fabrication, Statistics, Fluid Mechanics-I, Advanced Mechanics of Solids, Thermodynamics - II, Mechanics of Solids - II

## Publications

**Principled interpolation of Green's functions learned from data** — *10.1016/J.CMA.2023.115971*

Computer Methods in Applied Mechanics and Engineering — *Mar. 10, 2023*

- Introduced two data-driven approaches to mathematically model unknown physical systems, by learning a Green's function for its hidden, governing partial differential equations.
- Proposed a way to interpolate between Green's functions learned for different modeling contexts, by performing principled interpolation on a manifold.
- Demonstrated our methods on 1D and 2D problems.

## Research Projects

**Crack Modeling with Floating Node Method** — *Hyderabad, India*

Masters Project — *May. 2019 - Jul. 2020*

- Developed a code in C++ for modelling cracks in solids.
- Modelled crack propagation using Floating Node Method.

**Finite Element Package with CUDA** — *Hyderabad, India*

Undergraduate Project — *Aug. 2017 - Nov. 2017*

- Made a simple Finite Element Package with parallel processing.
- Used Nvidia CUDA for parallel processing.

## Talks

**American Physical Society March Meeting** — *Las Vegas, USA*
Data-driven discovery and interpolation of Green's functions — *Mar. 2023*

**SIAM Conference on Uncertainty Quantification 2024** — *Trieste, Italy*
Modelling unknown systems using "continuous" Green's functions learned from data — *Mar. 2024*

## Skills

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|---|---|
| **Machine Learning** | PyTorch, Tensorflow 1 and 2, scikit-learn |
| **Simulations** | FENICS, ABAQUS, ANSYS Workbench, ICEM CFD, FLUENT |
| **Programming** | C/C++, Python, MATLAB, Basic CUDA and OpenMP, LaTeX |
| **Operating Systems** | MacOS, Linux, Windows |
| **Languages** | Hindi, English |

## Coursework

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|---|---|
| **Cornell University** | Inverse Problems, Mathematical Modelling of systems, Stochastic Processes, Data Science Numerics, Introduction to Machine Learning |
| **IIT Hyderabad** | Algorithms and Data Structures, FEM and Advanced FEM, CFD and Advanced CFD |

## Certificates

2020 **Deep Learning Specialization**, Coursera — *PWJCGX9NE2FL*
2020 **Machine Learning with TensorFlow on Google Cloud Specialization**, Coursera — *AH747CW2N5QG*

## Honors & Awards

2018 **Academic Excellence**, B.Tech. Mechanical Engineering, IIT Hyderabad — *Hyderabad, India*
2014 **KVPY Scholarship, All India Rank 86**, IISc Bangalore — *India*
2013 **NTSE Scholarship**, National Council of Educational Research and Training — *India*

## Extracurricular Projects

**Hult Prize | Singapore Regionals** — *Singapore* — *Nov. 2017 - Mar. 2018*
- Worked in a team of 4, which represented IIT Hyderabad in the Singapore Regionals of Hult Prize 2018.
- Drafted a business model for a solar micro-grid with internet services for rural areas.

**UAS NW Switzerland - IIT Hyderabad Joint Project** — *Hyderabad, India* — *Mar. 2016 - Apr. 2016*
- Among the 14 students from IIT Hyderabad who worked in a cross-cultural team with UAS Northwest Switzerland.
- Drafted a framework for designing shared, open office spaces in an Indo-Swiss work context.

**Hand Symbol Interpreter** — *Hyderabad, India* — *Dec. 2015 - Jan. 2016*
- Independent group project in second semester of undergraduate degree.
- Used flex sensors to convert hand symbols into text using Arduino to make a Hand-symbol interpreter.

## Positions of Responsibility

Jan. 2021 - May. 2022 **Cornell University Civil & Environmental Engg. Grad Student Association**, VP | Social Chair — *Ithaca, USA*
Apr. 2017 - Apr. 2018 **Competitive Program Club, IIT Hyderabad**, Coordinator — *Hyderabad, India*
Apr. 2016 - Apr. 2017 **Music Club, IIT Hyderabad**, Coordinator — *Hyderabad, India*
Apr. 2016 - Apr. 2017 **Sunshine, Counselling cell of IIT Hyderabad**, Student Mentor — *Hyderabad, India*
Oct. 2015 - Apr. 2016 **TEDxIITHyderabad**, Core Member (Hospitality Team) — *Hyderabad, India*