Prateek Ganguli

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Research Interests

My research interests are at the intersection of **Formal Verification** and **Machine Learning**. I am particularly interested in 1) developing novel techniques and tools to improve the reliability of Machine Learning-based systems, and 2) Machine Learning programming to tackle challenging Verification tasks in the domain of **Cyber Physical Systems**.

Education

University of North Carolina — **Chapel Hill, NC, USA**
Doctor of Philosophy in Computer Science — *Aug 2024 – (ongoing)*
- Advised by Prof. Samarjit Chakraborty.

University of Calcutta — **Kolkata, India**
Bachelor of Technology in Computer Science and Engineering — *Aug 2020 – Jun 2024*
- 9.51 CGPA
- Consistently ranked first in class.

Indian Institute of Technology, Madras — **Online**
Bachelor of Science in Data Science — *Jan 2021 – Dec 2023*
- 8.07 CGPA
- Distance learning undergraduate certificate course.

Experience

Indian Statistical Institute, Kolkata — **Kolkata, India**
Research Intern — *Oct 2023 – Jan-2024*
- Researched the selection of Bounded Model Checkers for the verification of safety properties of circuits from the HWMCC competition.
- Researched the applications of Large Language Model (LLM) based tools for Electronic Design Automation and Formal Verification.

Google Summer of Code at Debian — **Online**
Software Developer Intern — *Jun 2021 – Aug 2021*
- Required to compile and update 2 year old Android SDK tools package for Debian to the latest version. Worked in a team of 5 people. See: wiki.debian.org/PrateekGanguli/SummerOfCode2021
- Wrote build scripts in GNU Make and set up a CI/CD pipeline to automatically build the patched upstream sources from Google, passing all automated test cases.

Research

Bounded Model Checker engine selection — **Indian Statistical Institute, Kolkata**
under Dr. Ansuman Banerjee and Dr. Sumana Ghosh — *Dec-2023 – Jan 2024*

Verilog Code Generation and Debug Using Large Language Models — **Indian Statistical Institute, Kolkata**
under Dr. Ansuman Banerjee — *Oct 2023 – Dec 2023*

Open-Source Projects

Sign Language Recognition — *Jun 2023 – Jul 2023*
- Used American Sign Language hand images dataset to train a Convolutional Neural Network (CNN) based on transfer learning of MobileNet v2, using TensorFlow, achieving 95% accuracy.
- Awarded winner of the IBM SkillsBuild Data Analytics Program.

Student Dropout Prediction — *May 2022 – Aug 2022*
- Used Student Dropout dataset from Kaggle to predict susceptibility of dropping out, based on anonymized features.
- Best performing model trained was Gradient Boosted Decision Tree, using Scikit-Learn, which achieved a F1-score of 0.78, obtaining rank 21 on the public leader-board out of 200 participants.

Mentoring

- *Jun 2023* – Mentored a cohort of students in Machine Learning Practice and Linux System Commands in the IIT-M BS Degree Program.
- *Oct 2022* – Teaching Assistant for B.Tech Semester 3 students in Data Structures and Algorithms Lab under Dr. Pritha Banerjee at CU CSE.