

# EASHAN GUPTA

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## Education

University of Illinois Urbana-Champaign

2021-2023 (Expected)

Master of Science in Computer Science

Started in Fall 2021

Indian Institute of Technology Bombay

2016-2020

Bachelor of Science in Computer Science with Honours

GPA: 9.13/10

## Technical Skills & Coursework

**Languages:** C++, C, Golang, Python, P4, Bash, Racket/Scheme, Haskell, Prolog, MIPS, SQL, Java

**Technologies:** Kubernetes, GitHub, Keras, Jupyter Notebooks, MATLAB, Simulink, Android Studio, Jenkins

**Coursework:** Machine Learning for Signal Processing, Advanced Operating Systems, Advances in Intelligent and Learning Agents, Advanced Machine Learning, Functional Programming Languages, Web Search & Information Retrieval, Digital Image Processing, Artificial Intelligence, Computer Graphics, Graph Theory

## Work Experience

Nutanix, Bengaluru | *Software Developer, Karbon/MSP team*

July 2020 - July 2021

- Used **Kubernetes** to deploy microservices on a Hyper-converged Infrastructure using virtual machines
- Worked to support the Karbon platform on **VMware's hypervisor ESX** other than Nutanix's own hypervisor - AHV
- Added multiple features to the Karbon controller like migration to **CoreDNS** on k8s upgrade, network segmentation for efficient traffic handling, redacting logs, and tracking metrics using **Prometheus** and middlewares
- Wrote test sets and unit tests for various scenarios related to system upgrades, DNS entries and service discovery
- Managed a new version release including testing and publishing to production;Handled Customer Oncalls and feature bugs

Tower Research Capital, Gurgaon | *Summer Internship*

May-July 2019

- Automated the performance **testing platform** for the software processing the order book data broadcast
- Empirically investigated patterns in performance on using **cache allocation technology** with different configurations

## Research Experience

Improving bounds of Policy Iteration Algorithm

Feb-June 2020

Guide: Prof. Shivaram Kalyanakrishnan | *Research Project*

IIT Bombay

- Proved exponentially better upper bounds for the number of steps taken by Policy Iteration Algorithm (**PI**) to determine the optimal policy in deterministic Markov Decision Processes (**DMDPs**) by bounding number of path-cycles in a digraph
- Studied literature concerning the structure of policy space of MDPs and simplified their proofs
- Conducted various empirical experiments on lower order AUSOs to observe the family of randomized PI

Towards validation of RTL passes of the GCC compiler

Jan-June 2020

Guides: Prof. Amitabha Sanyal & Prof. Supratik Chakraborty | *Bachelor's Thesis*

IIT Bombay

- Analysed the various Register Transfer Language (**RTL**) optimization passes in **GCC-4.7.2** and implemented a **block-by-block** validation technique to validate program transformations done by the passes
- Realized obligations based on the return values, heap memory and function calls of programs in the **Z3 Theorem Prover** tool to prove semantic equivalence between different control flow graphs (**CFGs**)
- Studied the internal workings of GCC-4.7.2 compiler and developed various plugin tools for analysis

Reduction in Games played on recursion schemes

May-July 2018

Guide: Prof. Roland Meyer | *Summer Internship*

TU Braunschweig, Germany

- Worked on the reduction of parity games to safety games played on higher order recursion schemes (**HORS**), using similar results on reduction in games played on collapsible pushdown automata (**CPDA**)
- Studied equivalence between HORS and CPDA using **Krivine machines** and  $\lambda$ -labelled deterministic digraph
- Proposed a new approach to model games on recursion schemes using **computation trees** of the HORS

## Key Projects

- Abstract Interpretation and Program Verification:** Used domain specific techniques and fixed point analysis to implement **congruence** and **array** abstract domains for integration into the **CAnalyzer** tool
- Strong Password Generation:** Devised methods to evaluate a password based on the metrics of **guessability** and **memorability** and used them to compare the generative models developed
- Monadic Parser:** Modernised the parser implementation for core language in **Haskell** using Monads
- ADCS, Advitiy:** Advitiy is the 2<sup>nd</sup> student satellite of IITB after Pratham. Performed **battery simulations** for the satellite in MATLAB to analyze its charging and discharging cycles and validate the control law