# Karan Grover
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## EXPERIENCE

- **University of Wisconsin-Madison** — Madison, WI
  *Research Scientist* — *June 2023 - Present*
  - **Infrastructure**: Developing the backend infrastructure of a Knowledge Extraction Framework - an advanced ML-assisted search engine for scientific publications. Supporting over 15 million scientific documents. <u>Details</u>.

- **Meta (Facebook)** — New York
  *Software Engineering Intern* — *May 2022 - August 2022*
  - **Infrastructure Tools**: Developed CLI tools to help ML Engineers quickly onboard models on the Inference Platform. The command-line tools reduced the model onboarding time from a few days to a couple of hours.
  - **A/B Testing**: Developed the A/B Testing Framework for Facebook's Inference Service using Python and C++. The framework allows ML Teams to integrate their A/B testing workflows into the CI/CD pipeline. <u>Details</u>.

- **Microsoft Research** — Bangalore, India
  *Software Engineer* — *Jan 2018 - June 2021*
  - **Backend Development**: Worked on building a Project Management System for India's largest Non-Profit Organization. Developed the features to provide real-time insights on project progress and highlight areas requiring attention. Features: task tracking, milestone tracking, Gantt charts and progress reports. <u>Details</u>.
  - **Infrastructure Automation**: Developed the backend for Blockene, a high throughput blockchain protocol by Microsoft. Created a VM Orchestration and Monitoring service handling up to 2500 VMs. <u>Details</u>.
  - **Cloud Security**: Developed a cloud-native secure ML service using Intel SGX and Torch. Modified the C++ Torch library to be SGX-compatible, profiled ML models inside Intel SGX and introduced techniques to patch existing security vulnerabilities. Merged into Azure Confidential Computing. <u>Details</u>.

- **Singapore Management University** — Singapore
  *Research Assistant* — *Jun 2016 - Dec 2016*
  - **Lifestyle Analytics**: Developed a system to identify item interactions of customers in a retail store via machine learning using sensor data from smartwatches and smartphones. Published research in ISWC '18. <u>Details</u>.
  - **Side Channel Attack**: Built a keystroke inference framework using the inertial sensor data obtained from a smartwatch. Published research in WristSense Workshop '17. <u>Details</u>.

- **Nexleaf Analytics** — Los Angeles, CA
  *Full Stack Developer* — *May 2015 - Sep 2015*
  - **Backend Development**: The Coldtrace Project aims to bring real time transparency into vaccine supply chains. A smartphone is placed inside a refrigerator with medicines which communicates with the sensors to monitor the internal conditions. Developed a dashboard which shows real time information from the smartphones. <u>Details</u>.
  - **Android**: Developed an App Manager for the smartphone which relays data to and from the central server. Implemented compression techniques and partial requests to address problems of unreliable network conditions.

- **Backpack Labs** — New Delhi, India
  *Full Stack Developer* — *May 2014 - Mar 2015*
  - **Backend Development**: Backpack is a Learning Management System built using Ruby on Rails. Developed the "Discussions" feature - Reddit-style posts, responses and voting used by both instructors and students.
  - **Android**: Developed the Android App supporting all the features of the website. Enabled offline support using SQLite databases. Integrated Google Analytics. Used by around 1500 students each day. <u>Details</u>.

## PROJECTS

- **Fault Tolerant Collective Communication**: Modified the Pytorch and Gloo library to make collective communication process fault tolerant. Analyzed the system with various distributed training settings and compared different approaches. Details.
- **Cloud-Native LevelDB**: LevelDB is a key-value store based on LSM Trees. Modified LevelDB to make it cloud-native using Amazon S3 as the backend. Developed a naive implementation and then tuned it to be 3x faster using Distributed Systems concepts. Details.
- **Disaggregated Memory**: Demonstrated the promise of Disaggregated Memory for certain applications. Implemented a B+ Tree - underlying data structure in a database - on disaggregated memory connected by RDMA. Details.
- **Cracking MD5 Hash using NVidia GPU**: In this project, I implemented a MD5 Hash cracking system on NVidia GPUs using CUDA. I compared and contrasted different ways of splitting the problem over multiple threads and blocks to find the pre-image of the hash value.

## PUBLICATIONS

- Sambhav Satija, Apurv Mehra, Sudheesh Singanamalla, **Karan Grover**, Muthian Sivathanu, Nishanth Chandran, Divya Gupta, Satya Lokam. Blockene: A High-throughput Blockchain Over Mobile Devices. In OSDI 2020: USENIX Symposium on Operating Systems Design and Implementation.
- **Karan Grover**, Shruti Tople, Shweta Shinde, Ranjita Bhagwan, Ramachandran Ramjee. Privado: Practical and Secure DNN Inference. CoRR abs/1810.00602
- Sougata Sen, Archan Misra, Vigneshwaran Subbaraju, **Karan Grover**, Meera Radhakrishnan, Rajesh Krishna Balan, Youngki Lee. I4S: capturing shopper's in-store interactions. In ISWC 2018: Proceedings of ACM International Symposium on Wearable Computer.
- Sougata Sen, **Karan Grover**, Vigneshwaran Subbaraju, Archan Misra. Inferring smartphone keypress via smartwatch inertial sensing. In WristSense 2017: IEEE International Conference on Pervasive Computing and Communications Workshops (PerCom Workshops).
- **Karan Grover**, Vinayak Naik. Monitoring of Android devices using SNMP. In COMSNETS 2016: 8th International Conference on Communication Systems and Networks.

## EDUCATION

- **University of Wisconsin-Madison**                                              Madison, Wisconsin
  *MS in Computer Science*                                                       *Aug 2021 – May 2023*
  - **Courses**: Advanced Systems for ML, Distributed Systems, Introduction to AI, Big Data Systems, Topics in Databases, High Performance Computing, Intro to Information Security, Programming Languages and Compilers
- **Indraprastha Institute of Information Technology**                                     Delhi, India
  *Bachelor of Technology in Computer Science*                                    *Aug 2013 – Dec 2017*
  - **Courses**: Software Defined Networking, Security Engineering, Network Security, Wireless Networks, Analysis and Design of Algorithms, Operating Systems, Fundamentals of Databases

## CERTIFICATIONS

- **Docker & Kubernetes, The Complete Guide - Udemy**: Learned production workflows of deploying Docker apps with Kubernetes. Built CI/CD pipelines from scratch with Github, Travis CI, and AWS. Certificate.
- **Infrastructure as Code with Terraform - Google**: Learned how to build, change, provision, and destroy infrastructure using Terraform via the Google Cloud console. Certificate.

## SKILLS

- **Languages**: C++, Python, Java, Javascript, Bash

- **Technologies**: git, linux, REST, API, Relational Database, noSQL, DynamoDB, AWS CDK, HTML, Azure, Pytorch, Tensorflow, CUDA, Apache Spark, Hadoop, GRPC, Flask, Ruby on Rails, Docker, Kubernetes