# **Gautam Kumar**

□ (+91)9430425857 | Segautam1994kumar@gmail.com | 🖸 gautamgtm | 🗖 gautamgtm | 🛣 gautamgtm

Education

#### Indian Institute of Technology Roorkee, India

GPA: 8.46 / 10

B.Tech. IN ELECTRICAL ENGINEERING

July'11 - May'15

# **Experience** \_

**Qualcomm** San Diego, USA

Machine Learning Engineer Sep'22 – Present

- Designed, developed, debugged, and tested the Qualcomm Neural Processing (QNN) SDK, enabling efficient machine learning on edge devices.
- Architected and implemented profiling APIs for QNN, including support for opaque objects, continuous profiling, and multi-graph profiling.
- Designed and developed APIs to support multi-branch GenAI LLM models.
- Led the profiling and signal efforts for QNN across Qualcomm.
- Owned and maintained API compliance tests for QNN, ensuring consistent and reliable functionality for all developers.

**Qualcomm** Hyderabad, India

Machine Learning Engineer

March'18 – Sept-22

- Developed, debugged, and tested Snapdragon Neural Processing Engine (SNPE) SDK, enabling machine learning on edge devices.
- Optimized hardware-accelerated inferences for power and performance across CPU, GPU, and DSP runtimes on Qualcomm chipsets.
- Worked extensively on deep learning model conversion of Tensorflow, Caffe, Onnx, and PyTorch pre-trained models to Qualcomm Proprietary format for SNPE SDK.
- Developed and maintained the performance infrastructure of SNPE SDK.
- Analyzed and debugged the power and performance of neural networks. Led the development of power and performance testing framework
  for SNPE SDK, ensuring high reliability and consistency in performance evaluation.

**Qualcomm** Hyderabad, India

CHIPSET POWER SYSTEMS ENGINEER

June'15 - Feb'18

- Led the roadmap for power management features (hardware and software) of Snapdragon processors, coordinating cross-functional teams to deliver innovative solutions.
- Chipset Power Lead of Snapdragon 425 SoC and Snapdragon 632 SoC.
- Designed power grids to achieve optimal power efficiency within cost constraints. Tuned clock plans for multiple cores and sub-systems.
- Modeled and projected power usage (average and peak) goals for Snapdragon processors, aligning with product performance and efficiency targets.
- Investigated hardware and software architectures, analyzing data flow for key use cases to identify novel power optimization solutions.
- Enhanced CPU DCVS and scheduling mechanisms, achieving significant power and performance enhancements.
- · Explored and developed machine learning-based solutions for improving the power and performance of Snapdragon chipsets.

**Qualcomm** Hyderabad, India

SOFTWARE ENGINEERING INTERN

May'14 – July'14

- Developed a fully automated Testing Framework (JTF) for Qualcomm-powered Android devices, streamlining the testing process for efficiency and simplicity.
- Automated NFC Testing using a robotic arm and integrated it into the JTF.

## **Projects** \_

#### **Evaluation of Transformer Neural Network Models**

Qualcomm

2019

DEEP LEARNING

- Evaluated Transformer based models for sequence to sequence learning and comparison with the existing state of the art RNN Models.
- Scoped out the Tensorflow Layers Implementation to support the model in SNPE.

#### **Active Noise Cancellation using Recurrent Neural Networks**

Oualcomm

DEEP LEARNING

2018

- Implementation of a Recurrent Neural Network for audio noise suppression based on RnnNoise project by Mozilla.
- Developed an Android application which uses Tensorflow Mobile for execution of the neural networks.

#### Power Waveform Analyzer for Energy Residency analysis

Qualcomm

POWER SYSTEMS

2018

- Development of a tool for analysis of power waveforms collected on mobile chipsets.
- Improved the methodology of use-case power analysis based on the energy consumption patterns across the available frequency levels for CPU, GPU, Memory, Modem, and, other cores.

JUNE 26, 2024 GAUTAM KUMAR · CURRICULUM VITAE

#### **Temperature Prediction using Recurrent Neural Network**

Qualcomm

DEEP LEARNING

• Developed a Hierarchical Bi-directional Recurrent Neural Network Architecture to predict the future temperatures of the most thermally-

- sensitive cores inside a Snapdragon Processor, for pro-active thermal mitigation to allow the device to run near the thermal limit.

  Inputs to the network comprised of a sequence of SoC states over the past few seconds, where each state is defined by 44 features consisting of
- low-level CPU parameters and readings from temperature sensors.

   Improved the robustness of the model by Ensemble Averaging and K-Fold Cross Validation.

#### **Facial Keypoints Detection using Convolutional Neural Network**

Kaggle

DEEP LEARNING

2017

- Implemented a Deep Convolutional Neural Network for prediction of keypoints positions on the human face which could be used for various applications such as Facial Recognition.
- Input consists of thousands of B/W images of 96x96 pixels.

#### **Rainfall Estimation using Recurrent Neural Network**

Kaggle

DEEP LEARNING

2010

- Implemented a Recurrent Neural Network for prediction of Hourly Rainfall gauge levels recorded over a few months in 2014 over the US midwestern corn-growing state.
- Inputs consisted of a sequence of multiple polarimetric weather radar observations over the course of an hour, where each measurement consisted of 22 features.
- Employed Ensemble Averaging and K-Fold Cross Validation to improve the prediction accuracy.

#### **Workload Classification using Supervised Learning**

Qualcomm

MACHINE LEARNING

6.....

- Developed a novel approach for classification of CPU workloads into two disparate classes for improving CPU Governor Algorithm.
- Used k-Nearest Neighbours Algorithm for classifying new workloads.

#### **Lowlevel CPU stats Logger for ARM CPU**

IIT Roorkee

CPU ARCHITECTURE

201

 Developed a logging mechanism for periodically collecting lowlevel CPU stats like Instructions Executed, Cache Accesses, DDR Accesses and Activity in real time on Snapdragon Chipsets having ARM-based Apps Processor.

#### Implementation of Backpropagation Algorithm in VHDL

IIT Roorkee

HARDWARE PROGRAMMING | MACHINE LEARNING

2015

- The project envisages the performance of FPGA (Field Programmable Gate Array) for applications in machine learning by implementing Back-propagation Algorithm and compare the execution time with the software implementation in python.
- Implemented the Backpropagation algorithm in VHDL. Constructed different modules for the hidden nodes and output nodes which give the flexibility to constructing any network.
- Verified the accuracy and correctness of our implementation by simulating the XOR problem as a small dataset problem and Fisher Iris problem as a large dataset problem.

#### **Letter Image Recognition using Neural Network**

Qualcomm

2014

MACHINE LEARNING

The project involved the development of an artificially intelligent method to recognize the hand-written English alphabets.

• In the development process, 20000+ Character images were used, based on 20+ different fonts and each letter was randomly distorted to produce a file of 20,000+ unique stimuli, each having 15+ primitive numerical attributes which were used to train the neural network.

### Coursework

Undergraduate

IIT Roorkee

Machine Learning | Artificial Neural Networks | Computer Systems & Programming | Data Structures | Advanced

 ${\sf System} \; {\sf Engineering} \; | \; {\sf Control} \; {\sf System} \;$ 

#### Independent

DEEP LEARNING | OPERATING SYSTEMS | COMPUTER ARCHITECTURE | ALGORITHMS | INTRODUCTION TO COMPUTER SCIENCE AND

PROGRAMMING

### **Skills**

#### **Programming & Machine Learning**

C++ | C | PYTHON | MATLAB | TENSORFLOW | CAFFE | KERAS | ONNX | GIT | GDB

#### **Platforms and Build System**

LINUX | OPENEMBEDDED LINUX | ANDROID | CMAKE | NINJA | DOCKER

# Scholarships & Achievements \_\_\_\_\_

2019	Patent: US 10331195, Power and Performance Aware Memory-Controller Voting Mechanism.	Qualcomm
2019	<b>IEEE: 2018 19th ISQED</b> , Power and Performance Aware Memory-Controller Voting Mechanism.	Qualcomm
2014-16	<b>Recipient</b> , Multiple Qualstar Hall of Fame for exceptional contributions as an Engineer and Intern.	Qualcomm
2011-15	<b>Recipient</b> , Merit-Cum-Means Scholarship for undergraduate studies (INR 25000/year)	IIT Roorkee