

Sagar Maheshwari

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Interests: Computer Vision & Pattern Recognition, High Performance Computing

EDUCATION

Institute of Technology, Nirma University (ITNU)

2017-2021

B. Tech in *Electronics & Communication Engineering* – GPA: **8.47/10**

Minor in *Computer Engineering* – GPA: **8.6/10**

Awarded the **Certificate of Merit** for ranking in the **top 10** of the graduating batch.

PUBLICATIONS

C = Conference, P = Presentation

C.1 Improved Runtime Optimization for Multicore Graph Compiler

[Paper]

Sagar Maheshwari, Abnikant Singh.

4th Annual AMD Global Technical Authors Conference (GTAC), Dec 2023 (Best Paper Award)

P.1 Runtime Optimization for Multicore Graph Compiler

Sagar Maheshwari, Abnikant Singh.

12th AMD Asia Technical Conference (AATC), August 2023 (Honorable Mention)

C.2 Continuous Recognition of 3D Space Handwriting Using Deep Learning

[Paper]

Sagar Maheshwari, Sachin Gajjar.

8th International Conference on Innovations in Computer Science and Engineering, 2020

RESEARCH EXPERIENCE

Runtime Optimization for Multicore Graph Compiler [paper]

Dec 2021 – Sept 2023

Compiler Engineer | Advisor: [Abnikant Singh](#)

Advanced Micro Devices (AMD) India, Hyderabad

- Developed a novel method of **improving kernel node scheduling** for multicore graph compiler.
- Drastically reduced the runtime of their **AI Engine** (a domain-specific architecture for **accelerating AI workloads** on heterogeneous systems) multicore graph compiler (**up to 85%** for large multicore designs such as Resnet – 290 cores and CNN – 98 cores).
- Integrated this in their Vitis 2022.1 Release for their Versal ACAP device.
- The improved research, extending the work to other architectures, was integrated in their Vitis 2023.2 Release.

Continuous Recognition of 3D Space Handwriting Using Deep Learning [paper]

Jun 2019 – Apr 2020

Undergrad Researcher @ Idea Lab | Advisor: [Dr. Sachin Gajjar](#)

Institute of Technology, Nirma University

- Devised and implemented two approaches of continuous recognition of 3D handwriting.
- The handwriting is detected wirelessly using the inertial measurement unit on Arduino 101.
- First approach uses the Pattern Matching Engine of the Intel Curie Module on Arduino 101.
- Second approach models **Support Vector Machines** for the spotting stage and **Recurrent Neural Networks** for the recognition stage. Achieved a word error rate of **2%**.

SELECTED RESEARCH/GRAD PROJECTS

Image Captioning and Instance Level Recognition

Aug 2020 – Nov 2020

Advisor: [Dr. Ruchi Gajjar](#) (Asst. Prof., ECE, ITNU)

Institute of Technology, Nirma University

- Proposed a **PyTorch** model for “Image Captioning” attaining a **BLEU-4** score of **39.6**, not far from the benchmark of 41.7.
- Implemented **deep local and global image feature methods** for **instance level recognition & retrieval** and researched ways to improve them.

Deep Reinforcement Learning for Autonomous Driving [Code]

Jan 2020 – May 2020

Advisor: [Dr. Sachin Gajjar](#) (Assoc. Prof., ECE, ITNU)

Institute of Technology, Nirma University

- Researched and applied **Deep Q Learning** in Autonomous Driving (on “car” actor) using **CARLA simulator**.
- Achieved an accuracy of ~40% for 100 episodes of lane driving task on NVIDIA GTX 1050Ti.

ECG Arrhythmia Classification [Code]

Aug 2019 – Nov 2019

Advisor: [Dr. Priyanka Sharma](#) (Former Prof., CE, ITNU)

Institute of Technology, Nirma University

- Devised a **Deep CNN** model in Python to categorize five distinct types of arrhythmias with an accuracy of ~**98%**.
- Utilized the MIT-BIH Arrhythmia data set to train the model. Assessed the application on my own ECG.

INDUSTRY EXPERIENCE

Advanced Micro Devices (AMD) India, Hyderabad, AI Group

Feb 2022 - Present

Compiler Engineer | Managed by: [Abnikant Singh](#) (Principal Member of Technical Staff)

- Working on single core compiler using LLVM for the **AI Engine** (AIE) on AMD’s state-of-the-art **Versal Adaptive Compute Acceleration Platform (ACAP)**.
- Integrated the single core compiler into the AIE multicore graph compiler.

Xilinx India (acquired by AMD), Hyderabad

Aug 2021 – Feb 2022

Software Engineer | Managed by: [Abnikant Singh](#) (Principal Member of Technical Staff)

- Developed the novel method for runtime optimization of the AIE multicore graph compiler.
- Devised the Executable and Linkable Format (ELF) Analyzer, a custom analysis utility for extracting important performance metrics such as program memory size, stack size and instruction count from the ELF.

Xilinx India (acquired by AMD), Hyderabad

Jan 2021 – Jun 2022

SWE Intern | Managed by: [Vidhumouli Hunsigida](#) (Software Development Director)

- Optimized the power estimation flow for the AIE, reducing the average time of computation by **84.5%**.
- Introduced two new metrics – stall information and loop static count -- for performance analysis.
- Developed a centralized QoR analysis framework from scratch using libraries such as NumPy and Pandas.

Lumeo, San Francisco, California

Jun 2020 – Aug 2020

Computer Vision Intern | Managed by: [Devarshi Shah](#) (CEO & Co-Founder, Lumeo)

- Worked on **TensorFlow** and **PyTorch** to **ONNX/UFF** model conversions and executed the converted models from marketplace through **Deepstream** pipelines and **OpenVino** Toolkit.
- Developed facemask detection model -- for their no-code video analytics platform -- using facial landmarks and executed the model using Deepstream achieving an accuracy of **98.9%** and detection at **31 FPS**.

ACHIEVEMENTS

- Awarded the **Certificate of Merit** for ranking in the top 10 of the graduating batch. (2021)
- **Winner – Campus Round – Smart India Hackathon** – Devised an indoor navigation system. (2020)
- **One of the two teams to be awarded a research grant** from ITNU’s Idea Lab for pursuing research. (2019)

LEADERSHIP AND VOLUNTEER EXPERIENCE

Kriti Foundation, Hyderabad, India

(2021)

- Developed online modules on fundamental computing tools for low-income schools to promote importance of computers and enable efficient learning.

You-need NGO, Ahmedabad, India

(2019)

- Raised funds for young cancer patients and conducted workshops for children with disabilities to encourage their involvement in STEM.

Electronics and Communication Organization, ITNU, Executive Board Member

(2019)

- Coached workshops on Arduino & other hardware boards for 100+ students from various colleges in the city.
- Demonstrated firsthand experiments to students, leading to more subscriptions for later workshops.