

Bakshree Mishra

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EDUCATION

PhD in Computer Science University of Illinois, Urbana-Champaign ADVISOR: Prof. Sarita Adve AREA OF INTEREST: Machine Learning and Computer Architecture, MLSys GPA: 3.83/4	2021-Present
M.Tech in Computer Science National Institute Of Technology, Rourkela ADVISORS: Prof. Bansidhar Majhi (NIT Rourkela), Mr. Tarjinder Singh (Intel) GPA: 9.69/10	2015-2017
B.Tech in Computer Science and Engineering College Of Engineering and Technology, Bhubaneswar GPA: 8.85/10	2010-2014

PUBLICATIONS

Mishra, B. and Chakraborty, D. and Makkadayil, S. and Patil, S. D. and Nallani, B. *Hardware Acceleration of Computer Vision and Deep Learning Algorithms on the Edge using OpenCL*, appeared in the Proceedings of EAI Endorsed Transactions on Cloud Systems, 2019 [\[Paper\]](#)

PATENT APPLICATIONS

Singh, T., Sridhar, S. R., Sumiran, R., Mishra, B., Makkadayil, S., Thyagarajan, V., and Baireddy, V., Intel Corp, 2022. *Graph Reordering and Tiling Techniques*. U.S. Patent Application No. [17/533,976](#)

Makkadayil, S., Paul, S., Saifee, S., Mishra, B., Thyagarajan, V., Velayudha, M., Khellah, M. and Udofia, A., Intel Corp, 2021. *Parallel pruning and batch sorting for similarity search accelerators*. U.S. Patent Application [17/358,495](#)

Boschi, G., Makkadayil, S., Manjunath, R., Mishra, B. and Campinoti, A., Intel Corp, 2021. *Register fault detector*. U.S. Patent Application [17/353,848](#)

RESEARCH

Evaluation of Spandex Coherence Protocol • Advised by Prof. Sarita Adve • Converted Mini-Era workload to baremetal for evaluation on Xilinx FPGA using ESP workflow • Implemented sensor-simulation in cpu tiles • Collected performance numbers from multiple iterations of design optimization • Currently working on evaluating performance on workloads having tiled data movement	August 2021 – Present
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PROJECTS

Real-Time Barcode Localization and Detection on Edge Devices • Industrial problem which required decoding barcode on fast moving objects from camera feed • Created custom accelerator for the algorithm bottleneck, Barcode localization, using OpenCL HLS • Highly pipelined architecture leveraging data redundancy in algorithm • Improved performance from 19 FPS to 104 FPS on 2MP video to satisfy industrial constraints • Paper accepted at Intel Design and Test Technology Conference (DTTC), 2019	
Real-Time Optical Character Recognition on Edge Devices • Created CNN topology and trained on in-house character image dataset • Created OpenCL based FPGA accelerator having parallel convolution engines and buffered partial results • Accelerator improved performance from detected 250 characters at 10 FPS to 50 FPS from 2MP video • Presented live demo at Intel DTTC, Portland, OR, 2019 • Paper presented at IEEE WinTechCon, Bangalore, India, 2019	

Hardware Design for Functional Safety IP

- Learnt traditional HW design using RTL to implement Fault Detector module for Functional Safety (FuSa)
- Went through High Level as well as Micro Architecture Specifications for designing hardware
- The IP achieved ISO26262 certification for Functional Safety
- Paper on our work was accepted at Intel DTTC 2019

System on Chip (SoC) for CV/ML Acceleration

- Modelled SoC on Hybrid-FPGA platform after reviewing internal and third party architecture specifications
- Booted OS on H-FPGA platform successfully and enabled early FW and SW development
- Found critical bug in bootloader code impacting secure boot
- Co-architected an accelerator IP to handle similarity search workloads in the SOC for machine learning

Real-Time Pedestrian Detection System Using OpenCL-Based FPGA Acceleration

- Created a custom architecture for computer vision based Pedestrian Detection system for Master's research
- Deep-dived into FPGA OpenCL compiler optimization issues and found impactful solutions
- Independently improved initial design to give 3x performance while reducing area by 10x

Context-Aware Voice Assistant

- Created an always on, context-aware NLP agent to offer recommendations instead of executing commands
- Trained Bi-LSTM based SLU algorithm to understand context over conversations and multiple sentences
- Used Mycroft framework to create end-to-end Voice Assistant as proof of concept

SELECT AWARDS AND HONORS

• Best Paper in Track Award, Intel HSPE TechCon 2021	2021
• Multiple Intel Division and Department Recognition Awards (2017-2021)	2021
• 2 nd Runners' Up in Intel India WIN Hackathon	2017
• 2 nd rank holder in CS Department (out of ~110 students) at NIT Rourkela	2017
• CET Merit Scholarship (Undergrad scholarship 2010-2014)	2010
• Selected for National Talent Search Examination Scholarship	2008
• Rajiv Gandhi Chhatra Prativa Award for securing 8 th rank in State, X th CBSE Boards	2008

WORK EXPERIENCE

Graduate Research Assistant	May 2022 – Present
Workload analysis on heterogeneous platforms	<i>University of Illinois, Urbana Champaign</i>
Graduate Teaching Assistant	August 2021 – May 2022
CS 233 Computer Architecture, CS 225 Data Structures	<i>University of Illinois, Urbana Champaign</i>
Design Engineer	June 2017 – August 2021
Analysis and acceleration of Machine Learning Algorithms	<i>Intel Corporation, Bangalore</i>
Graduate Technical Intern	May 2016 – May 2017
Acceleration of Pedestrian Detection and other ADAS Algorithms	<i>Intel Corporation, Bangalore</i>
Assistant System Engineer	June 2014 – July 2015
Development of E-Municipality portal	<i>Tata Consultancy Services, Bhubaneswar</i>
Summer Intern	June 2013 – August 2013
Prototype modules for E-Municipality portal	<i>Tata Consultancy Services, Bhubaneswar</i>

TECHNICAL SKILLS

• Programming/Scripting Languages	C/C++, Python, Shell Scripting, Java, C#, MATLAB, OpenCL
• Tools	Quartus, Design Compiler, Eclipse
• Databases	Oracle 10g, SQL Server

EXTRA CURRICULAR INTERESTS AND ACTIVITIES

Volunteering

• Named one of Top 50 Volunteers in Intel India	2020
• Regularly volunteer to conduct music therapy at a Cancer Hospice , Karunashraya	2018 - 2021
• Won an Intel Seed Grant and oversaw renovation of nurses' dining hall at Karunashraya	2019
• During undergrad, co-founded the student e-zine CET Rising , and served as Chief Editor	2013 - 2014

Creative Writing, Music

- I blog, review the occasional book and publish some of my poems at bakshree.wordpress.com
- My poem was published in the peer-reviewed anthology **Anthargatha** by Bangalore Poetry Circle, 2020