

BHAGATH SINGH CHEELA

Philadelphia, PA 19104 | (267) 403-6176 | cheelabhagath@gmail.com | bhagathcheela.com | [LinkedIn](https://www.linkedin.com/in/bhagathcheela)

EDUCATION

University of Pennsylvania , School of Engineering and Applied Science Philadelphia, PA <i>Master of Science in Electrical & Systems Engineering (ESE)</i> Selected courses: GPGPU Architecture & Programming, Computer Organization and Design, Hardware Software Co-design for Machine Learning, Applied Machine Learning, System On Chip, IoT and Edge Computing	12/22 GPA: 3.68/4.00
Manipal University , Manipal Institute of Technology Manipal, India <i>Bachelor of Technology in Electronics & Communication Engineering</i>	06/13 – 06/17 GPA: 3.63/4.00

SKILLS

C, C++, Python, CUDA, OpenCL, HLS, HPC, FPGA, CPU micro-architecture, GPU Architecture, Open MPI, Verilog, Linux, Github, VS Code, LaTeX, PCB Design, RTL, Power Management, DVFS, Oscilloscope, Embedded Programming, Radio Frequency

PROFESSIONAL EXPERIENCE

Varex Imaging Corporation , <i>R&D Software & FPGA Intern</i> Salt Lake City, UT • Developed the software flow to integrate HLS and RTL code using Vitis HLS to speed up the design process by 3x • Automated the build and verification test with a commit push to git repository using Jenkins and Python scripting	05/22 – 08/22
University of Pennsylvania , <i>Graduate Research Assistant</i> Philadelphia, PA • Demonstrated hardware acceleration of Economic computations using Vitis HLS on AWS F1 instance • Performed multi-axes design space exploration and achieved x120 speedup compared to single core CPU and • Constructed a modular host code that can make use of up to 8 FPGAs on AWS F1.16x instance using OpenCL API	05/21 – 05/22
University of Pennsylvania , <i>Graduate Lab Leader</i> Philadelphia, PA • Drafted the lab course using Node MCU and Raspberry Pi for an undergraduate class of 80 students - "Silicon Garage" • Perfected the lab course curriculum for several undergraduate courses with more than 200 students • Taught 6 lectures to a class of 29 students for ESE292 – Electromechanical Prototyping	01/21 – 04/22
Bharat Electronics Limited , <i>Deputy Engineer</i> Bangalore, India • Spearheaded the hardware design team to develop customized tablets for Indian government • Designed high speed PCBs consisting of HDMI, USB communication lines and performed signal integrity analysis. • Co-ordinated with the Mechanical, Marketing and external customers to realize the product within 8 months • Set up manufacturing test process using ATE's to speed up the testing process and reduced the testing time by 2x	10/17 – 12/20

PROJECTS

Optimizing Gaussian Blur using GPU • Optimized a CUDA kernel that uses a gaussian blur filter to blur a Hi-Res image and achieve an acceleration of 38x • Improved the kernel design using the shared memory and analyzed the performance using Nsight profiling tools	09/22 – Present
LC4 Processor Design using Xilinx Zynq -7000 SoC • Implemented a 5 staged pipelined, superscalar LC4 processor using Verilog in Xilinx Zynq 7000 SoC • Performed bypassing to handle the data hazards, optimized the pipelines to close the timing requirement at 66 MHz	01/22 – 05/22
Deduplication and Compression using Xilinx Zynq MPSoC • Developed a compressor to receive data in real time and compress into memory using deduplication and compression • Implemented a 5-stage pipeline for deduplication to run on the multiple ARM CPU cores using NEON intrinsics • Accelerated the compression algorithm and achieved a throughput of 48 Mbps using on-chip FPGA	09/21 – 12/21
Hardware Accelerator for Machine Learning using FPGAs • Devised an FPGA-accelerated convolutional layer for accelerating DCNN using AWS F1 instance • Integrated the kernel into Pytorch using C++ extensions and built the host code using OpenCL API • Explored the design space using multiple kernels and out of order queue techniques to achieve comparable speed with CPU	01/21 – 05/21
Automated Optical Inspection for PCB's using Machine Learning • Developed a method to identify missing components on a PCB using Machine Learning and accomplished an accuracy of 86% • Fine-tuned the features and evaluated the performance on various CNNs including ResNet, VGG and Inceptionv3	01/21 – 05/21

RESEARCH PUBLICATIONS

- Presented "*Programming FPGAs for Economics: An Introduction to Electrical Engineering Economics*" at National Bureau of Economic Research: Big Data & HPC Computing 2022
- Young presenter for presenting "*A robust low power communications architecture for nano-satellites*" at IEEE Aerospace Conference, Big Sky, 2016

ACHIEVEMENTS

- Recipient of SEAS Departmental grant for ESE *Graduate Lab Leader* with 50% tuition support
- Co-president of Penn Technograds which is multi-disciplinary student organization at UPenn for the 2022 academic year
- Organized key social events and hackathons by coordination with different student bodies to invite hundreds of students