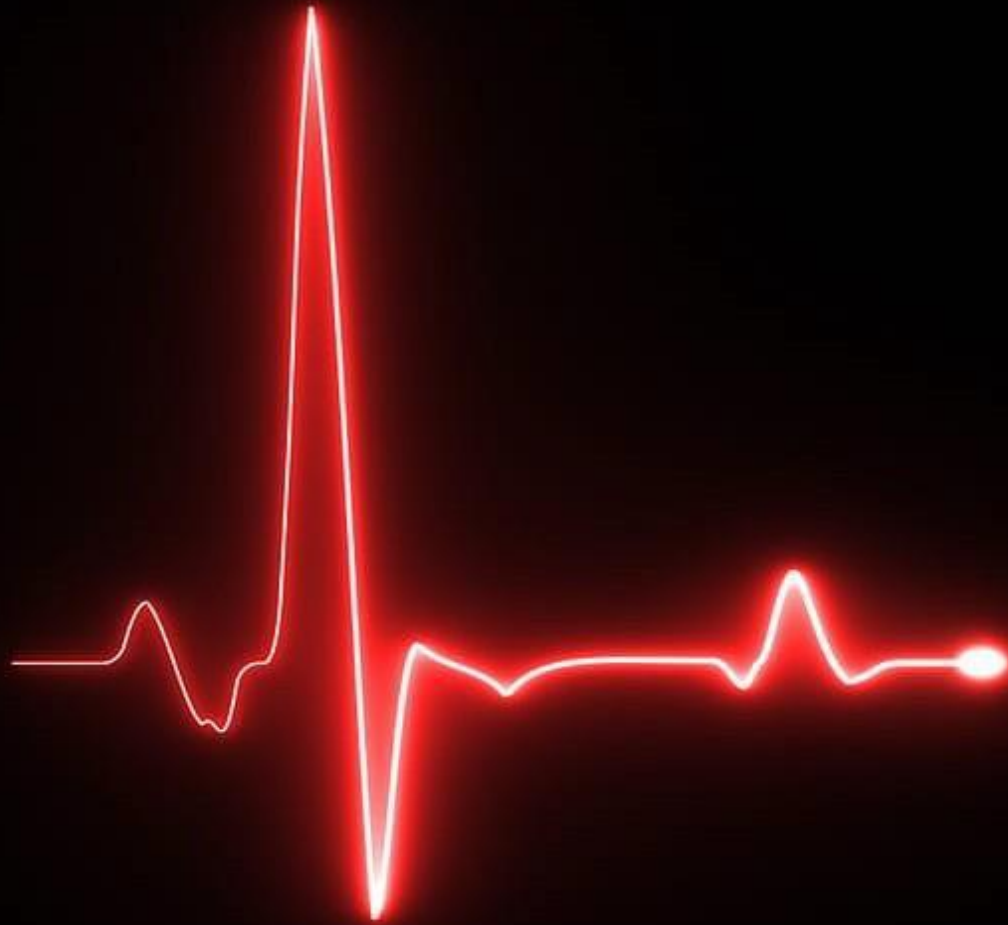


THE PULSE

NEWSLETTER
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



Vision

To emerge as a centre of academic excellence in the field of Electronics & Communication Engineering to address the dynamic needs of the industry upholding moral values.

Mission

- Impart in-depth knowledge in Electronics & Communication Engineering to achieve academic excellence.
- Develop an environment of research to meet the demands of evolving technology.
- Inculcate ethical values to promote team work and leadership qualities befitting societal requirements
- Provide adaptability skills for sustaining in the dynamic environment

FACULTY CONNECT

Do AI applications really need FPGAs?

Artificial intelligence (AI) is evolving rapidly, with new neural network models, techniques, and use cases emerging regularly. While there is no single architecture that works best for all machine and deep learning applications, FPGAs can offer distinct advantages over GPUs and other types of hardware in certain use cases. The reprogrammable nature of an FPGA ensures the flexibility required by the constantly evolving structure of artificial neural networks. FPGAs also provide the custom parallelism and high-bandwidth memory required for real-time inferencing of a model.

GPU vs FPGA for Machine Learning

When deciding between GPUs and FPGAs we need to understand how the two compares. Below are some of the biggest differences between GPU and FPGA for machine and deep learning.

Compute power

According to research by Xilinx, FPGAs can produce roughly the same or greater compute power as comparable GPUs. FPGAs also have better on-chip memory, resulting in higher compute capability. This memory reduces bottlenecks caused by external memory access and reduces the cost and power required for high memory bandwidth solutions.

In computations, FPGAs can support a full range of data types, including FTP32, INT8, binary, and custom types. With FPGAs you can make modifications as needed while GPUs require vendors to adapt architectures to provide compatibility. This may mean pausing projects while vendors make changes.

Efficiency and power

According to research by Microsoft, FPGAs can perform almost 10x better than GPUs in terms of power consumption. The reason for this is that GPUs require complex compute resources to enable software programmability, which consumes more power.

This doesn't mean that all GPUs are less efficient. The NVIDIA V100 has been found to provide efficiency comparable to Xilinx FPGAs for deep learning tasks. This is due to its hardened Tensor Cores. However, for general purpose workloads this GPU isn't comparable. Learn more in our article about NVIDIA deep learning GPU.

Functional safety

GPUs were designed for high-performance computing systems and graphics workloads. Safety concerns were not relevant. However, GPUs have been used in applications, like ADAS, where functional safety is a concern. In these cases, GPUs must be designed to meet safety requirements, which can be time-consuming for vendors.

In contrast, the programmability of FPGAs enables one to design them in a way that meets whatever safety requirements you face. These circuits have

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been successfully used in automation, avionics, and defense without custom manufacturing requirements.

What Are the Pros and Cons of Using FPGA for Deep Learning?

We can use FPGAs to accelerate deep learning workloads and gain significant benefit over GPUs. However, these circuits aren't perfect and come with some cons we should be aware of. Understanding both the positives and negatives of FPGAs can help us ensure that we implement the technology carefully and with the greatest ROI.

-Prof. Arunraja A

Assistant Professor
ECE department

EVENTS

Highlights of the Month

- Prof. Shashikumar D successfully defended the PhD thesis on 06-05-2023.
- Dr. Naveen Kumar visited EEE department, University of Mauritius on 22-05-2023 and had a discussion on collaboration in future.
- Dr. Harimurthy and Dr. Shashikumar D granted a copyright for “Wall mounted bathroom mirror with built-in defogger, clock and automatic alarm systems and a capacitive touch button”.
- Dr. Kishorekumar R, Dr. Hari Murthy and Dr. Chidambaram S granted a copyright for “Low Cost Automatic Stamping Machine for Government Offices, Post Offices and Universities”.
- Dr. Harimurthy participated in a faculty development program organized by department of Chemistry, BMS College of Engineering, Bangalore on 25-05-2023.
- Dr. Jesuwanth Sugesh R G chaired an International Conference on Advances in Computing, Communication and Applied Informatics organized by St. Joseph College of Engineering, Chennai on 25-05-2023.

Department Newsletter Team

Faculty in-charge

Dr. Syam Chandran K – syam.chandran@christuniversity.in

Design, content and editing

Segu Sai Nikhitha- segu.sai@btech.christuniversity.in

Kamalesh Kumar- kamalesh.kumar@btech.christuniversity.in

**Kindly share your thoughts and research experiences via e-mail to
our team, and be featured in next month's is**