Kalind Karia Ph.D. (2024-), M.Tech. EE (2021-24), B.E. EXTC (2013-17)
Computer Science Engineering Gender: Male
Indian Institute of Technology Bombay karia.kalind@gmail.com

AREAS OF INTEREST

Computer Architecture and Microarchitecture, Operating Systems, Embedded Systems Design, VLSI Design

WORK EXPERIENCE

Project Engineer | *Prof. Kavi Arya* | *e-Yantra, IIT Bombay* *(Aug 2017 - Jul 2024)*

- **Designed** eYFi-Mega development board. **Manufactured and beta-tested** over **500 boards**
- **Reduced verification time** of sensors & controllers to **1/10th** by designing a portable **Automated TestBench**
- **Designed** themes based on **CPU Design, FPGA, Embedded Systems, Control Systems, Machine Learning** and **mentored** students for e-Yantra's international Robotics Competition (eYRC)
- **Designed** tools for automation of lab tasks to reduce manual times by **1/4th**
- **Designed** and **mentored** courses for **Embedded Systems** and **Software Foundation** on MOOC platform
- **Designed** and conducted sessions on **Linux, Git, FPGAs, Embedded Systems, IoT, Python, Image Processing** for faculties and students of engineering colleges

KEY PROJECTS

Microarchitecture analysis for SAT | *Prof. Biswa, Prof. Supratik* | *Master's thesis & Ph.D.* *(Jan 2023 -)*

- **Characterised modern SAT solvers' performance** using the **perf** tool and performed detailed **profiling** with **Intel VTune** to identify bottlenecks in CPU pipeline stages
- **Generated trace files** using **Valgrind**, **SimPoint**, and **Intel Pin**, and analysed the potential improvements at memory hierarchy from advanced **prefetching** mechanisms and **cache replacement** policies using the **ChampSim** simulator
- **Assessed the impact of hardware prefetchers** across different cache levels and explored the need for **software prefetching**, addressing key questions around "what to prefetch", "where to prefetch", and "how far to prefetch"

GPU-based VDI and graphics acceleration | *Prof. Purushottam Kulkarni* *(Jan 2024 - Apr 2024)*

- Improved the avg. **AMD Radeon** GPU utilization by up to **60%** in a **graphics-enabled VDI** setup supporting up to **4 VMs** using QEMU, incorporating **GPU multiplexing** and **paravirtualization** techniques to enhance remote client performance
- Evaluated GPU performance vs cost trade-offs across varying VM counts and configurations using standard benchmark **glmark2**
- Identified and documented limitations of current VDI implementations, proposing future work for improved **GPU multiplexing**

Load Balancer Implementation | *Prof. Purushottam Kulkarni* | *Project: VnCC** *(Jan 2024 - Apr 2024)*

- Implemented an **HTTP load balancer** and improved throughput by **5.7x** using round-robin and **4.3x** using least response time policies to manage **max 25** concurrent users. Latency was decreased by **6x** for round-robin and **5x** for least response time.
- Developed a Python script to create containers across two machines using **Docker** Context and policy-based load management
- Utilised **FastAPI** and **Flask** to create an HTTP server and backend service within a Dockerized development environment
- Conducted performance analysis on the load balancer, measuring **throughput**, **latency** for various configurations and policies

Automated Test-bench for Sensors and Micro-controllers | *e-Yantra, IIT Bombay (May 2019 - Jul 2022)*

- Designed **Universal Bus** to test **25 Sensors** and **3 Micro-controllers** with small design footprint for portability
- Provided **on-board 5.5 inch graphical Human-Machine Interface (HMI)** for better user experience
- **IoT enabled** data logging for monitoring the quality of batch under test

eYFi-Mega Development Board | *e-Yantra, IIT Bombay* *(Mar 2019 - Oct 2021)*

- **Development board platform** for IoT, Robotics & Embedded system projects based on **ESP32 & ATmega2560**
- **Features**: **Over-the-Air (OTA) firmware update**, **On-board buck converter**, Multiple on-board radios, **On-board 700 KB** of SPI-Flash File System (SPIFFS) & **Embedded Workbench** suite for seamless development

PATENT & RESEARCH PUBLICATIONS

- K. Namoju, K. Karia, S. Chakraborty, B. Panda. "Kissat-INCSP: Introducing High Performing Software Prefetching Conscious Kissat-INC", Proceedings of SAT Competition 2023, ISSN: 1458-4786
- P. Trimukhe, K. Karia, S. Jena, K. Arya (2021). "An apparatus having at least dual micro-controllers on a printed circuit board", Indian Patent Application No: 202121023159
- K. Arya, S. Shandilya, P. Chheda, N. Cherupally, K. Karia, Y. Mali, U. Sharma (2018). "A System for Determining Physical Properties of a Commodity and Method Thereof", Indian Patent Application No: 201821028570
- K. Joshi, K. Karia, J. Patel and S. Desai, "Library Stock Verification System using Artificial Neural Networks", 2018 International Conference on Smart City and Emerging Technology (ICSCET), doi: 10.1109/ICSCET.2018.8537289

TECHNICAL SKILLS

Programming Languages	Bash, Python, AWK, Sed, Assembly, VHDL, Verilog HDL, C, Embedded C
Tools & Technologies	Linux, Git, Docker, Make, Vim, Latex, Doxygen, Sphinx, Intel VTune, Intel Pin, SimPoint, ChampSim, Quartus, Modelsim, Eagle, Ngspice, FreeRTOS, Atmel Studio, Autodesk Fusion
Hardware	Altera DE2i-150 board, De0-Nano board, Raspberry Pi, AVR family, ESP32, TivaC

POSITIONS OF RESPONSIBILITY

Artifact Evaluation Committee member | *ISCA 2025* *Mar 2025 - Apr 2025*

- Evaluated the artifacts of the **ISCA 2025** conference submissions for **ACM** Reproducibility Badges

Teaching Assistant | *Prof. Biswabandan Panda* | *Course: Advanced Computer Architecture* *Aug 2023 - Nov 2023*

- Assisted professor with **lecture preparation**, students with **assignment queries**, **auto-grading**, and conducted voluntary **help sessions** regarding the course
- Received the **Excellence in Teaching Assistantship** award from the Computer Science Department

Lead Developer | *Prof. Rajesh Zele* | *Women in Science and Engineering (WiSE)* *(Apr 2023 - May 2023*

- Lead a team to provide rural area girls with invaluable exposure to **STEM field**, including electronics, robotics and drones, etc.
- Designed and developed the **hardware and software** for the smooth functioning of the sessions

*VnCC: Virtualization and Cloud Computing