Kaan **Kara**

SYSTEMS ENGINEER · RESEARCHER/PHD STUDENT

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Education

PhD Candidate in Computer Science   ZURICH, SWITZERLAND

Systems Group, ETH Zurich   *Dec. 2015 - Present*

- In my research I focus on making data processing faster and more efficient in terms of resource and power usage. To achieve this, I am designing specialized hardware performing inherently parallel and compute/data intensive tasks that a conventional CPU is not suitable for. I am prototyping my designs on shared memory heterogeneous architectures combining CPUs and FPGAs.
- Advisor: Gustavo Alonso

Master of Science in Electrical Engineering (1.0/1.0)   KARLSRUHE, GERMANY

Karlsruhe Institute of Technology   *Sep. 2012 - Sep. 2015*

- Master Thesis: Design and Implementation of a Framework for Car-to-X Controllers under Real-Time and Safety Critical Constraints

Bachelor of Science in Electrical Engineering (1.1/1.0)   KARLSRUHE, GERMANY

Karlsruhe Institute of Technology   *Sep. 2009 - Sep. 2012*

- Bachelor Thesis: Concept for a Modular Battery-Management-System enabling Charge Transfer between Li-Ion Battery Stacks for Electric Vehicles

Experience

Research Intern   ZURICH, SWITZERLAND

IBM Research   *Jul. 2019 - Sep. 2019 (3 months)*

- Working on enabling FPGA-based acceleration for an in-memory column-store database (MonetDB) over a coherent processor interconnect.

Research Intern   REDMOND, WASHINGTON

Microsoft   *Jul. 2018 - Sep. 2018 (3 months)*

- Worked on SQL Server performance improvements.

Graduate Technical Intern   DUBLIN, IRELAND

Xilinx   *Jul. 2017 - Sep. 2017 (3 months)*

- Worked on low-precision deep neural networks on FPGAs, focusing on exploring efficient implementation of residual layers on FPGA-based architectures. Streamlined the transition of neural networks trained in Tensorflow to their Vivado HLS implementation.

Systems and Electronics Design Intern   PALO ALTO, USA

Bosch North America   *Aug. 2014 - Apr. 2015 (8 months)*

- Developed a computer vision IP testing platform on an all-programmable Xilinx FPGA (Zynq) running embedded Linux, enabling rapid testing and prototyping of various image processing accelerators. Designed digital blocks of an image processing ASIC.

Software Developer Intern   WEISSACH, GERMANY

Porsche Engineering Services   *Mar. 2014 - Jun. 2015 (4 months)*

- Worked on a hardware-in-the-loop platform testing the operation between a smartphone app and a Porsche car. Developed various computer-vision based algorithms to provide valuable feedback during testing.

Trainee   BADEN-DAETWILL, SWITZERLAND

ABB   *Oct. 2013 - Jan. 2014 (4 months)*

- Developed a self-calibration device for Rogowski coil current sensors, based on a patent-pending method increasing their measurement accuracy to well over current industry standard.

Honors & Awards

System Design Contest, 2nd Place by 55th Design Automation Conference *2018*
- Placed 2nd in an international contest for designing an FPGA-based object detection system, delivering the highest frame processing rate. The contest had more than 100 teams participating from both academia and industry. Source: ☐ spooNN

DAAD Scholarship (funded by Bosch) by DAAD *2009 - 2014*
- Awarded a full scholarship for Bachelor's and Master's studies in Germany for a duration of 5 years.

KIT Best Thesis Award by Karlsruhe Institute of Technology *2012*
- Received the KIT Best Thesis Award 2012 in Electrical Engineering for the bachelor thesis.

Skills

Programming | OS	C/C++, VHDL, SystemVerilog, Python, C#, SQL **|** Linux, Windows, Mac OS X, FreeRTOS
Tools	Tensorflow, MonetDB, Xilinx Vivado/HLS, Altera Quartus, ModelSim, MATLAB, MS Office, Latex
Languages	English, German, Turkish

Publications

(Demo) doppioDB 2.0: Hardware Techniques for Improved Integration of Machine Learning into Databases *May. 2019*

Kaan Kara, Zeke Wang, Ce Zhang, Gustavo Alonso
Proceedings of the VLDB Endowment 12 (12) (PVLDB'19)

Accelerating Generalized Linear Models with MLWeaving: A One-Size-Fits-All System for Any-precision Learning *Mar. 2019*

Zeke Wang, Kaan Kara, Hantian Zhang, Gustavo Alonso, Onur Mutlu, and Ce Zhang
Proceedings of the VLDB Endowment 13 (PVLDB'19)

ColumnML: Column-Store Machine Learning with On-The-Fly Data Transformation *Dec. 2018*

Kaan Kara, Ken Eguro, Ce Zhang, Gustavo Alonso
Proceedings of the VLDB Endowment 12 (4) (PVLDB'19)

FPGA-accelerated Dense Linear Machine Learning: A Precision-Convergence Trade-off *Apr. 2017*

Kaan Kara, Dan Alistarh, Gustavo Alonso, Onur Mutlu, Ce Zhang
IEEE 25th Annual International Symposium on Field-Programmable Custom Computing Machines (FCCM'17)

FPGA-based Data Partitioning *May 2017*

Kaan Kara, Jana Giceva, Gustavo Alonso
Proceedings of the 2017 ACM International Conference on Management of Data (SIGMOD'17)

ZipML: Training Linear Models with End-to-End Low Precision, and a Little Bit of Deep Learning *Jul. 2017*

Hantian Zhang, Jerry Li, Kaan Kara, Dan Alistarh, Ji Liu, Ce Zhang
International Conference on Machine Learning (ICML'17)

Centaur: A framework for hybrid CPU-FPGA databases *Apr. 2017*

Muhsen Owaida, David Sidler, Kaan Kara, Gustavo Alonso
IEEE 25th Annual International Symposium on Field-Programmable Custom Computing Machines (FCCM'17)

(Demo) doppioDB: A Hardware Accelerated Database *May 2017*

David Sidler, Zsolt István, Muhsen Owaida, Kaan Kara, Gustavo Alonso
Proceedings of the 2017 ACM International Conference on Management of Data (SIGMOD'17)

(Short Paper) Fast and robust hashing for database operators *Sep. 2016*

Kaan Kara, Gustavo Alonso
26th International Conference on Field Programmable Logic and Applications (FPL'16)