CURRICULUM VITAE - MOHAMMED ALSER

Assistant Professor - Gorgia State University
Atlanta, GA, USA mealser@gmail.com https://alserlab.github.io

RESEARCH INTERESTS

- Our research aims to **enable efficient computational genomic analyses by rethinking the complete compute stack**, starting from how we handle input data and algorithms to the underlying hardware architecture. This helps us better understand genetic disorders, improve our health with personalized medicine, and identify pathogens and microbiomes on Earth and in challenging environments such as in outer space. Our primary research incorporates several aspects of **bioinformatics, computer science, and computer engineering** as we develop new data structures, algorithms, software tools, and hardware architectures for efficient data processing. Such a multifaceted approach is necessary to overcome bottlenecks throughout different genomic methods and applications. Looking forward, we would like to take the next major step by developing and enabling **truly intelligent genomic analyses**, where genomic data are processed timely, at a population scale, on-site, in a privacy-preserving way, and with little energy and little or no access to conventional large-scale computing platforms.
- My teaching experiences have a truly international flavor, **with more than 14 years of teaching** at different top universities on different continents.

EDUCATION

Ph.D. in Computer Engineering — Turkey
Bilkent University — [Sept. 2014 - June 2018]

- Advisors: Can Alkan & Onur Mutlu.
- Thesis: *Accelerating the understanding of life's code through better algorithms and hardware design*.
- Received the *Doctoral Dissertation Award* by IEEE Turkey.
- Funding: NIH grant (R01 HG006004), Bilkent Merit Scholarship, HiPEAC Collaboration Grant, and TUBITAK 2215 fellowship.
- Cumulative GPA: A out of A (98%/100%), 8 graduate-level courses. Passed 3-day written qualifying doctoral exam.

Computational Genomics Summer Institute (CGSI) — Los Angeles, United States
University of California Los Angeles (UCLA) — [Summers of 2016 and 2017]

- An NIH-funded research residency and training program in methodology development for genomics.

M.Sc. in Electrical and Electronics Engineering — Malaysia
Universiti Teknologi PETRONAS (UTP) — [Feb. 2011 - March 2013]

- Thesis: *Design and Characterization of Low-Power Low-Noise All-Digital Serial Link for Point-to-point Communication in SoC*.
- Funding: Malaysian Ministry of Higher Education ERGS Grant, UTP URIF Grant, and UTP Graduate Assistantship.

B.Sc. in Computer Engineering — Palestine
Islamic University of Gaza (IUG) — [Sept. 2005 - Feb. 2010]

- Funding: IUG Excellence Scholarship.

AWARDS, HONORS, AND FELLOWSHIPS

- **TUBITAK UBYT Award** 2022 for international collaboration. [May 2022]
- ETH Zürich representative to the **Global Young Scientist Summit (GYSS)** for Nobel laureates, Singapore. [Jan. 2022]
- **ETH Zürich Performance Bonus**, a recognition of exceptional performance. [Sept. 2021]
- **TUBITAK UBYT Award** 2021 for international collaboration. [March 2021]
- **ETH Zürich Performance Bonus**, a recognition of exceptional performance. [Sept. 2020]
- **IEEE Turkey Doctoral Dissertation Award** for 2017-2018. Awarded for outstanding thesis of promising young scientists who have completed a doctorate at a university in Turkey within the last two years. [Feb. 2018]
- **Yasser Arafat Award for Academic Innovation**. Awarded to one top-ranked Palestinian PhD student in Turkey. [Nov. 2017]

- **The Scientific and Technological Research Council of Turkey (TÜBİTAK) 2215 Fellowship** (USD 50,000). Awarded to top 37 doctoral applicants worldwide. [Sept. 2014 - Sept. 2018]
- **Bilkent University Merit Scholarship**. [Sept. 2014 - Sept. 2018]
- UNESCO Chair in Data Privacy Travel Grant. [Oct. 2015]
- Appointed as Student Leader, Postgraduate Student Council (PGSC), Universiti Teknologi PETRONAS, Malaysia. [Jan. 2012 - Dec. 2013]
- Universiti Teknologi PETRONAS Fellowship (USD 10,000). [March 2011 - March 2013]
- Founder of the *Google Developer Group (GDG) Gaza*. [July 2010]
- Selected for the Islamic University of Gaza full-time Teaching Assistantship. Offered to only top-ranked alumni. [Feb. 2010 - Nov. 2010]
- Dean's List and the Islamic University of Gaza excellence scholarship. [Sept. 2005 - Sept. 2007]
- Arab Bank Scholarship for outstanding TAWJIHI students (USD 1000). [Sept. 2005]
- The outstanding TAWJIHI student award from the Governor of khanYounis city. [Sept. 2005]

GRANTS

AMD's Fund for Academic Research (FAR) Program, USD 50,000 (Unrestricted gift)
- Awarded in August 2025.
- Project title: *Efficient metagenomic analysis via modern AMD accelerators and new algorithms*

SNF Project Funding, CHF 500,000
- Awarded in September 2022. Leading the writing and ideas & leading bioinformatics research at ETH Zurich.
- SNF Project Funding, Switzerland.
- Project title: *BioNDP: Near-Data-Processing Architectures and Algorithms for Metagenomic Analysis*.

EIC Pathfinder, Euro 3,000,000
- Awarded in May 2022. Leading bioinformatics research at ETH Zurich.
- EIC Pathfinder, European Union.
- Project title: *BioPIM: Processing-in-memory architectures and programming libraries for bioinformatics algorithms*.

HiPEAC Collaboration Grant (H2020-ICT-2015-687689), USD 6,000
- Awarded in November 2017, **Principal Investigator.**
- The European Network on High-performance Embedded Architecture and Compilation (HiPEAC).
- Awarded to only 14 PhD and Post-Doc researchers worldwide.

Exploratory Research Grants Scheme (ERGS), USD 60,000
- Awarded in May 2013. Contributed to writing and ideas.
- The Malaysian Ministry of Higher Education.
- Project title: *Toward Greener Network on Chip: A Clock-less Communication Approach*

University Internal Research Funding (URIF) (UTP/14/2012), USD 16,000
- Awarded in February 2012. Contributed to writing and ideas.
- Universiti Teknologi PETRONAS (UTP), Malaysia
- Project title: *Design and modeling of low power clockless serial link for data communication systems*

PROFESSIONAL EXPERIENCE

Georgia State University, USA — Atlanta, United States
Tenure-Track Assistant Professor - Computer Science Department — [December 2024 - Present]

University of Southern California, USA — Los Angeles, United States
Visiting Research - School of Pharmacy and Pharmaceutical Sciences — [June 2024 - December 2024]

ETH Zürich Zürich, Switzerland
Senior Researcher and Lecturer - Department of Computer Science & Department of Information Technology and Electrical Engineering, SAFARI Research Group [Sept. 2018 - Sept. 2023]

- Responsibilities: • Advising and mentoring undergraduate, graduate, and guest students. • Teaching courses for undergraduate and graduate students. • Hiring new members. • Hosting the department visitors and collaborators. • Preparing course materials, lectures, exams, homework, and labs. • Conducting research projects. • Managing and preparing research seminars. • Administrating and organizing the department logistics. • Presenting our research in local and international conferences/seminars/meetings. • Writing research papers/grant applications/proposals. • Reviewing research papers for top conferences and Journals in computer architecture and bioinformatics.

Technische Universität (TU) Dresden Dresden, Germany
Guest Researcher - Center for Advancing Electronics Dresden [Oct. 2017 - Jan 2018]

- Project: Massively-Parallel Hardware Design for Fast and Energy-Efficient DNA Read Mapper.
- Responsibilities: • Exploring Speed/Accuracy trade-offs in hardware-accelerated pre-alignment filters. • Designing and implementing MAGNET, a fast and accurate FPGA-based pre-alignment filter.
- Funding: HiPEAC Collaboration Grant.
- Advisor: Akash Kumar

University of California Los Angeles (UCLA) Los Angeles, United States
Staff Research Associate - ZarLab, Computer Science Department [June 2017 - Sept.2017]

- Project: MiCoP: microbial community profiling method for detecting viral and fungal organisms in metagenomic samples
- Responsibilities: • Developing MiCoP visualization tool for microbial community profiling. • Analyzing high throughput sequencing (HTS) data (NCBI RefSeq and EuPathDB). • Building a MiCoP database. • Developing statistical and algorithmic techniques, using Python 3.6 and Unix shell scripting. • Designing a web interface that interprets and presents a user-friendly analysis of collected metagenomic samples within a biological context. • Scripting for UCLA Hoffman2 cluster.
- Advisors: Eleazar Eskin (UCLA), Serghei Mangul (UCLA), and David Koslicki (Oregon State University).

PETRONAS CARIGALI Kuala Lumpur, Malaysia
Systems Development Consultant - Offshore Facilities, Engineering Department [March 2013 - March 2015]

- Project: SEAMOME: Metocean Management System, a smart real-time meteorological and oceanographic data analytics system for PETRONAS.
- Responsibilities: • Analyzing offshore operations and Metocean data (SEA FINE, SEA COARSE, MA KASAR, JAVA, and HYCOM). • Designing and optimization Metocean algorithms (Time Series, Frequency Distribution, Descriptive Statistics, Percentile, and Statistical Forecasting). • Training and mentoring junior programmers.
- Skills: MATLAB, PHP, CSS, MySQL, and interactive charts (Highcharts).
- Advisors: Nasir Abdullah, Nordin Zakaria, Adrian Smith, and Hani Ludin.

Universiti Teknologi PETRONAS (UTP) Perak, Malaysia
Consultant - Nanotechnology Laboratory [Jan. 2014 - Dec. 2014]

- Project: System on Chip (SoC) implementation of PMSM controller for fault-tolerant operation.
- Responsibilities: • Developing, prototyping, and FPGA implementing the PMSM controller. • Training junior engineers.
- Skills: MATLAB, Verilog, HDL Co-simulation.
- Funding: The Prototype Research Grant Scheme (PRGS), PRGS CODE NO. 0153AB-132.
- Advisor: Hisham Hamid.

Islamic University of Gaza Gaza, Palestine
Systems Developer - Information Technology Affairs [Feb. 2010 - Nov. 2010]

- Responsibilities: • Integrating Alfresco content management system with Liferay to meet the requirements of the university. • Providing technical assistance and training to the university staff.

Palestinian Government Computer Centre Gaza, Palestine
Junior Network Security Engineer (Internship) [July 2009 - Sept. 2009]

- Responsibilities: • Writing a security policy and network plan. • Designing DMZ, IDS, and active response using snort and snortsam. • Providing network vulnerability scanning and threat detection using Nessus for both active directory and web server, and updating the whole network using WSUS server.

TEACHING EXPERIENCE

Instructor - Department of Computer Science — Atlanta, United States
Georgia State University — [December 2024 - Present]

- CSC 8210 Advanced Computer Architecture
  - Fall 2025
- CSC 8630 Advanced Bioinformatics, PhD & MSc students.
  - Spring 2025
  - https://www.youtube.com/playlist?list=PLq0KGCI4fRSM2W-qmW_v6XoN9dPsjiVhn

Lecturer - Department of Computer Science — Zurich, Switzerland
ETH Zürich — [Feb. 2019 - Sept. 2023]

- 263-2211-00L Seminar in Computer Architecture, Undergraduate/Graduate.
  - Spring 2019, Fall 2019, Spring 2020, Fall 2020, Spring 2021, Fall 2021, Spring 2022, Fall 2022, Spring 2023.
  - https://safari.ethz.ch/architecture_seminar/spring2022

Lecturer - Department of Information Technology and Electrical Engineering — Zurich, Switzerland
ETH Zürich — [Sept. 2020 - Sept. 2023]

- 227-0085-36L Projects & Seminars: Genome Sequencing on Mobile Devices, Undergraduate.
  - Fall 2020, Spring 2021, Fall 2021, Spring 2022, Fall 2022, Spring 2023.
  - https://safari.ethz.ch/projects_and_seminars/spring2022/doku.php?id=genome_seq_mobile
- 227-0085-33L Projects & Seminars: Accelerating Genome Analysis with FPGAs, GPUs, and New Execution Paradigms, Undergraduate.
  - Fall 2020, Spring 2021, Fall 2021, Spring 2022, Fall 2022, Spring 2023.
  - https://safari.ethz.ch/projects_and_seminars/spring2022/doku.php?id=bioinformatics
- 227-0085-51L Projects & Seminars: Hands-on Acceleration on Heterogeneous Computing Systems, Undergraduate.
  - Spring 2021, Fall 2021, Spring 2022, Fall 2022, Spring 2023.
  - https://safari.ethz.ch/projects_and_seminars/spring2022/doku.php?id=heterogeneous_systems

Head Teaching Assistant - Department of Computer Science — Zurich, Switzerland
ETH Zürich — [Sept. 2018 - Sept. 2023]

- 252-0028-00L Digital Design and Computer Architecture (Springs of 2020, 2021, 2022, 2023), Undergraduate.
- 263-2210-00L Computer Architecture (Falls of 2018, 2019, 2020, 2021, 2022), Graduate.
- 252-0028-00L Design of Digital Circuits (Spring 2019), Undergraduate.
- 252-3300-00L Seminar on Computer Architecture (Fall 2018), Undergraduate.

Teaching Assistant - Computer Engineering Department — Ankara, Turkey
Bilkent University — [Sept. 2014 – June 2018]

- CS223 Digital Design (Fall 2014, Spring 2015, Fall 2016, and Fall 2017), Undergraduate.
- CS461 Artificial Intelligence (Spring 2016), Undergraduate/Graduate.
- CS224 Computer Organization (Fall 2015), Undergraduate.

Teaching Assistant - Electrical and Electronics Engineering Department — Perak, Malaysia
Universiti Teknologi PETRONAS — [Nov. 2010 - May 2014]

- ECB1014 Electronic Circuit Design and Theory (Spring 2011 up to Fall 2012), Undergraduate.
- ECB2133 Digital Electronics II (Spring 2014), Undergraduate.

Teaching Assistant - Computer Engineering Department *(offered to only top-ranked alumni)* — Palestine
Islamic University of Gaza — [Feb. 2010 - Nov. 2010]

- ECOM3324 Software Engineering (Spring 2010), Undergraduate.
- ECOM2114 Computer Programming I Lab (Fall 2010), Undergraduate.
- EELE2115 Computer Programming Lab (Fall 2010), Undergraduate.

PUBLICATIONS

For a full list of publications, visit my Google Scholar page**.**

Refereed and Invited Journal Publications

1. Mohammed Alser, Julien Eudine, Onur Mutlu, “Taming Large-Scale Genomic Analyses via Sparsified Genomics”, **Nature Communications**, 2025. https://www.nature.com/articles/s41467-024-55762-1
2. Shaopeng Liu, Judith S Rodriguez, Viorel Munteanu, Cynthia Ronkowski, Nitesh Kumar Sharma, Mohammed Alser, Francesco Andreace, Ran Blekhman, Dagmara Błaszczyk, Rayan Chikhi, Keith A Crandall, Katja Della Libera, Dallace Francis, Alina Frolova, Abigail Shahar Gancz, Naomi E Huntley, Pooja Jaiswal, Tomasz Kosciolek, Pawel P Łabaj, Wojciech Łabaj, Tu Luan, Christopher Mason, Ahmed M Moustafa, Harihara Subrahmaniam Muralidharan, Onur Mutlu, Nika Mansouri Ghiasi, Ali Rahnavard, Fengzhu Sun, Shuchang Tian, Braden T Tierney, Emily Van Syoc, Riccardo Vicedomini, Joseph P Zackular, Alex Zelikovsky, Kinga Zielińska, Erika Ganda, Emily R Davenport, Mihai Pop, David Koslicki, Serghei Mangul, "Analysis of metagenomic data", **Nature Reviews Methods Primers**, 2025. https://drive.google.com/file/d/1N49l6NFGABmhu4uXdQ5lQLZCWwQXZKA0/view
3. William Andrew Simon, Irem Boybat, Riselda Kodra, Elena Ferro, Gagandeep Singh, Mohammed Alser, Shubham Jain, Hsinyu Tsai, Geoffrey W Burr, Onur Mutlu, Abu Sebastian, "CiMBA: accelerating genome sequencing through on-device basecalling via compute-in-memory", **IEEE Transactions on Parallel and Distributed Systems**, 2025. https://arxiv.org/pdf/2504.07298
4. Joël Lindegger, Can Firtina, Nika Mansouri Ghiasi, Mohammad Sadrosadati, Mohammed Alser, Onur Mutlu, "Rawalign: Accurate, fast, and scalable raw nanopore signal mapping via combining seeding and alignment", **IEEE Access**, 2024. https://arxiv.org/pdf/2310.05037
5. Meryem Banu Cavlak, Gagandeep Singh, Mohammed Alser, Can Firtina, Joël Lindegger, Mohammad Sadrosadati, Nika Mansouri Ghiasi, Can Alkan, Onur Mutlu, “TargetCall: Eliminating the wasted computation in basecalling via pre-basecalling filtering”, **Frontiers in Genetics**, 2024. https://www.frontiersin.org/journals/genetics/articles/10.3389/fgene.2024.1429306/full
6. Jeremie S Kim, Can Firtina, Damla Senol Cali, Nastaran Hajinazar, Mohammed Alser, Can Alkan, Onur Mutlu, “AirLift: A Fast and Comprehensive Technique for Translating Alignments between Reference Genomes”, **IEEE/ACM Transactions on Computational Biology and Bioinformatics**, 2024. https://arxiv.org/pdf/1912.08735
7. Mohammed Alser, Brendan Lawlor, Richard J Abdill, Sharon Waymost, Ram Ayyala, Neha Rajkumar, Nathan LaPierre, Jaqueline Brito, André M Ribeiro-dos-Santos, Nour Almadhoun, Varuni Sarwal, Can Firtina, Tomasz Osinski, Eleazar Eskin, Qiyang Hu, Derek Strong, Byoung-Do Kim, Malak S Abedalthagafi, Onur Mutlu, Serghei Mangul, “Packaging and Containerization of Computational Methods", **Nature Protocols**, 2024. https://arxiv.org/pdf/2203.16261.pdf
8. Gagandeep Singh, Mohammed Alser, Kristof Denolf, Can Firtina, Alireza Khodamoradi, Meryem Banu Cavlak, Henk Corporaal, Onur Mutlu, “RUBICON: a framework for designing efficient deep learning-based genomic basecallers”, **Genome Biology**, 2024 https://www.biorxiv.org/content/10.1101/2022.11.20.517297v3.abstract
9. Can Firtina, Kamlesh Pillai, Gurpreet S Kalsi, Bharathwaj Suresh, Damla Senol Cali, Jeremie S Kim, Taha Shahroodi, Meryem Banu Cavlak, Joël Lindegger, Mohammed Alser, Juan Gómez Luna, Sreenivas Subramoney, Onur Mutlu, “ApHMM: Accelerating profile hidden markov models for fast and energy-efficient genome analysis”, **Journal ACM Transactions on Architecture and Code Optimization**, 2024. https://arxiv.org/abs/2207.09765
10. Zülal Bingöl, Mohammed Alser, Onur Mutlu, Ozcan Ozturk, and Can Alkan, "GateKeeper-GPU: Fast and Accurate Pre-Alignment Filtering in Short Read Mapping", **IEEE Transactions on Computers**, 2024. https://arxiv.org/pdf/2103.14978.pdf
11. Joël Lindegger, Damla Senol Cali, Mohammed Alser, Juan Gómez-Luna, Nika Mansouri Ghiasi, and Onur Mutlu, “Scrooge: A Fast and Memory-Frugal Genomic Sequence Aligner for CPUs, GPUs, and ASICs”, **Bioinformatics**, 2023 https://arxiv.org/abs/2208.09985
12. Can Firtina, Jisung Park, Mohammed Alser, Jeremie S. Kim, Damla Senol Cali, Taha Shahroodi, Nika Mansouri Ghiasi, Gagandeep Singh, Konstantinos Kanellopoulos, Can Alkan, Onur Mutlu, "BLEND: A Fast, Memory-Efficient, and Accurate Mechanism to Find Fuzzy Seed Matches", **NAR Genomics and Bioinformatics**, 2023. https://arxiv.org/pdf/2112.08687.pdf
13. Safaa Diab, Amir Nassereldine, Mohammed Alser, Juan Gómez-Luna, Onur Mutlu, Izzat El Hajj, "A framework for high-throughput sequence alignment using real processing-in-memory systems”, **Bioinformatics**, 2023 https://arxiv.org/abs/2208.01243

14. F. Meyer, A. Fritz, Z.-L. Deng, D. Koslicki, A. Gurevich, G. Robertson, Mohammed Alser, D. Antipov, F. Beghini, D. Bertrand, J. J. Brito, C.T. Brown, J. Buchmann, A. Buluç, B. Chen, R. Chikhi, P. T. Clausen, A. Cristian, P. W. Dabrowski, A. E. Darling, R. Egan, E. Eskin, E. Georganas, E. Goltsman, M. A. Gray, L. H. Hansen, S. Hofmeyr, P. Huang, L. Irber, H. Jia, T. S. Jørgensen, S. D. Kieser, T. Klemetsen, A. Kola, M. Kolmogorov, A. Korobeynikov, J. Kwan, N. LaPierre, C. Lemaitre, C. Li, A. Limasset, F. Malcher-Miranda, S. Mangul, V. R. Marcelino, C. Marchet, P. Marijon, D. Meleshko, D. R. Mende, A. Milanese, N. Nagarajan, J. Nissen, S. Nurk, L. Oliker, L. Paoli, P. Peterlongo, V. C. Piro, J. S. Porter, S. Rasmussen, E. R. Rees, K. Reinert, B. Renard, E. M. Robertsen, G. L. Rosen, H.-J. Ruscheweyh, V. Sarwal, N. Segata, E. Seiler, L. Shi, F. Sun, S. Sunagawa, S. J. Sørensen, A. Thomas, C. Tong, M. Trajkovski, J. Tremblay, G. Uritskiy, R. Vicedomini, Zi. Wang, Zhe. Wang, Zho. Wang, A. Warren, N. P. Willassen, K. Yelick, R. You, G. Zeller, Z. Zhao, S. Zhu, J. Zhu, R. Garrido-Oter, P. Gastmeier, S. Hacquard, S. Häußler, A. Khaledi, F. Maechler, F. Mesny, S. Radutoiu, P. Schulze-Lefert, N. Smit, T. Strowig, A. Bremges, A. Sczyrba, A. C. McHardy, "Critical Assessment of Metagenome Interpretation - the second round of challenges", **Nature Methods**, 2022. https://www.nature.com/articles/s41592-022-01431-4 https://www.biorxiv.org/content/10.1101/2021.07.12.451567v1
15. Mohammed Alser, Joel Lindegger, Can Firtina, Nour Almadhoun, Haiyu Mao, Gagandeep Singh, Juan Gomez-Luna, Onur Mutlu, “From Molecules to Genomic Variations: Accelerating Genome Analysis via Intelligent Algorithms and Architectures”, **Computational and Structural Biotechnology Journal**, September 2022. https://www.sciencedirect.com/science/article/pii/S2001037022003531
16. Taha Shahroodi, Mahdi Zahedi, Can Firtina, Mohammed Alser, Stephan Wong, Onur Mutlu, Said Hamdioui, “Demeter: A Fast and Energy-Efficient Food Profiler using Hyperdimensional Computing in Memory”, **IEEE Access**, August 2022. https://ieeexplore.ieee.org/document/9847238
17. Mohammed Alser, Jeremie S. Kim, Nour Almadhoun Alserr, Stefan W. Tell, and Onur Mutlu, "COVIDHunter: An Accurate, Flexible, and Environment-Aware Open-Source COVID-19 Outbreak Simulation Model", **Frontiers in Public Health**, June 2022. https://www.frontiersin.org/articles/10.3389/fpubh.2022.877621/full
18. Mohammed Alser, Jeremy Rotman, Kodi Taraszka, Huwenbo Shi, Pelin Icer Baykal, Harry Taegyun Yang, Victor Xue, Sergey Knyazev, Benjamin D Singer, Brunilda Balliu, David Koslicki, Pavel Skums, Alex Zelikovsky, Can Alkan, Onur Mutlu, Serghei Mangul, “Technology dictates algorithms: Recent developments in read alignment”, **Genome Biology**, 2021 https://arxiv.org/pdf/2003.00110
19. Gagandeep Singh, Mohammed Alser, Damla Senol Cali, Dionysios Diamantopoulos, Juan Gomez-Luna, Henk Corporaal, Onur Mutlu, "FPGA-based Near-Memory Acceleration of Modern Data-Intensive Applications", **IEEE Micro**, July 2021.
20. Mohammed Alser, Taha Shahroodi, Juan Gomez-Luna, Can Alkan, Onur Mutlu, “SneakySnake: A Fast and Accurate Universal Genome Pre-Alignment Filter for CPUs, GPUs, and FPGAs”, **Bioinformatics**, 2020. https://arxiv.org/pdf/1910.09020
21. Mohammed Alser, Zülal Bingöl, Damla Senol Cali, Jeremie Kim, Saugata Ghose, Can Alkan, Onur Mutlu, “Accelerating Genome Analysis: A Primer on an Ongoing Journey”, **IEEE Micro**, August 2020. [Invited Paper] https://doi.ieeecomputersociety.org/10.1109/MM.2020.3013728
22. Nathan LaPierre, Mohammed Alser, Eleazar Eskin, David Koslicki, Serghei Mangul, “Metalign: Efficient alignment-based metagenomic profiling via containment min hash”, **Genome Biology**, 10 September 2020. https://www.biorxiv.org/content/biorxiv/early/2020/01/18/2020.01.17.910521.full.pdf
23. Can Firtina, Jeremie S. Kim, Mohammed Alser, Damla Senol Cali, A. Ercument Cicek, Can Alkan, Onur Mutlu. "Apollo: a sequencing-technology-independent, scalable and accurate assembly polishing algorithm", **Bioinformatics**, 15 June 2020. https://doi.org/10.1093/bioinformatics/btaa179
24. Nathan LaPierre, Serghei Mangul, Mohammed Alser, Igor Mandric, Nicholas C Wu, David Koslicki, Eleazar Eskin, " MiCoP: microbial community profiling method for detecting viral and fungal organisms in metagenomic samples", **BMC Bioinformatics**, 6 June 2019. https://doi.org/10.1186/s12864-019-5699-9
25. Mohammed Alser, Hasan Hassan, Akash Kumar, Onur Mutlu, Can Alkan, "Shouji: a fast and efficient pre-alignment filter for sequence alignment", **Bioinformatics**, 28 March 2019, https://doi.org/10.1093/bioinformatics/btz234
26. Mohammed Alser, Hasan Hassan, Hongyi Xin, Oğuz Ergin, Onur Mutlu, Can Alkan, "GateKeeper: A New Hardware Architecture for Accelerating Pre-Alignment in DNA Short Read Mapping", **Bioinformatics**, 31 May 2017. [Ranked 1st in LabWorm.com]. https://doi.org/10.1093/bioinformatics/btx342
27. Kim, Jeremie S., Damla Senol Cali, Hongyi Xin, Donghyuk Lee, Saugata Ghose, Mohammed Alser, Hasan Hassan, Oguz Ergin, Can Alkan, Onur Mutlu. "GRIM-Filter: Fast seed location filtering in DNA read mapping using processing-in-memory technologies”, **BMC Genomics**, 9 May 2018. https://doi.org/10.1186/s12864-018-4460-0
28. Mohammed Alser, Onur Mutlu, Can Alkan, "MAGNET: Understanding and improving the accuracy of genome pre-alignment filtering", **IPSI Transactions of Internet Research**, vol. 13, pp. 33-42, July 2017, http://ipsitransactions.org/journals/papers/tir/2017july/p5.pdf.

29. M. Assaad, Mohammed Alser, Amine Bermak, "Design and Characterization of Low Power and Low Noise Truly All-Digital Clock and Data Recovery Circuit for SERDES Devices", **Journal of Low Power Electronics**, vol. 9, no. 1, April 2013. DOI: 10.1166/jolpe.2013.1241.
30. Mohammed Alser, M. Assaad, Fawnizu Hussin, "A Wide-Range Programmable Frequency Synthesizer Based on a Finite State Machine Filter", **International Journal of Electronics**, pp. 1-11, December 29th 2012 DOI:10.1080/00207217.2012.751322.
31. M. Assaad and Mohammed Alser, "Design of an All-Digital Synchronized Frequency Multiplier Based on a Dual-Loop (D/FLL) Architecture", **VLSI Design**, vol. 2012, Article ID 546212, 7 pages, 2012. DOI: 10.1155/2012/546212.
32. M. Assaad and Mohammed Alser, "An FPGA-Based Design and Implementation of an All-Digital Serializer for Inter Module Communication in SoC", **IEICE Electronics Express**, vol. 8, no. 23, pp. 2017-2023, 2011. DOI: 10.1587/elex.8.2017.

Refereed and Invited Conference Publications

33. Nika Mansouri Ghiasi, Mohammad Sadrosadati, Harun Mustafa, Arvid Gollwitzer, Can Firtina, Julien Eudine, Haiyu Mao, Joël Lindegger, Meryem Banu Cavlak, Mohammed Alser, Jisung Park, Onur Mutlu, "Megis: High-performance, energy-efficient, and low-cost metagenomic analysis with in-storage processing", **ACM/IEEE Annual International Symposium on Computer Architecture (ISCA)**, Buenos Aires, Argentina, 2024. https://arxiv.org/pdf/2406.19113
34. Julian Pavon, Ivan Vargas Valdivieso, Carlos Rojas, Cesar Hernandez, Mehmet Aslan, Roger Figueras, Yichao Yuan, Joël Lindegger, Mohammed Alser, Francesc Moll, Santiago Marco-Sola, Oguz Ergin, Nishil Talati, Onur Mutlu, Osman Unsal, Mateo Valero, Adrian Cristal, "QUETZAL: Vector acceleration framework for modern genome sequence analysis algorithms", **ACM/IEEE Annual International Symposium on Computer Architecture (ISCA),** Buenos Aires, Argentina, 2024 https://people.inf.ethz.ch/omutlu/pub/QUETZAL_isca24.pdf
35. João Dinis Ferreira, Gabriel Falcao, Juan Gomez-Luna, Mohammed Alser, Lois Orosa, Mohammad Sadrosadati, Taha Shahroodi, Anant Nori, Onur Mutlu, "pLUTo: Enabling Massively Parallel Computation In DRAM via Lookup Tables" Accepted in **IEEE/ACM International Symposium on Microarchitecture (MICRO 2022)**, Chicago, 1-5 October 2022 https://www.microarch.org/micro55, https://arxiv.org/abs/2104.07699
36. Haiyu Mao, Mohammed Alser, Can Firtina, Akanksha Baranwal, Damla Senol Cali, Aditya Manglik, Nour Almadhoun Alserr, Onur Mutlu, "GenPIP: In-Memory Genome Analysis using Progressive Basecalling and Selective Mapping", Accepted in **IEEE/ACM International Symposium on Microarchitecture (MICRO 2022)**, Chicago, 1-5 October 2022 https://www.microarch.org/micro55
37. Fernandez, Ivan, Ricardo Quislant, Christina Giannoula, Mohammed Alser, Juan Gómez-Luna, Eladio Gutiérrez, Oscar Plata, and Onur Mutlu. "Exploiting Near-Data Processing to Accelerate Time Series Analysis", **IEEE Computer Society Annual Symposium on VLSI (ISVLSI)** 2022, 4 July 2022. https://arxiv.org/abs/2206.00938
38. Damla Senol Cali, Konstantinos Kanellopoulos, Joel Lindegger, Zülal Bingöl, Gurpreet S Kalsi, Can Firtina, Gagandeep Singh, Nika Mansouri Ghiasi, Jeremie Kim, Ziyi Zuo, Meryem Banu Cavlak, Juan Gómez Luna, Nour Almadhoun, Mohammed Alser, Sreenivas Subramoney, Can Alkan, Saugata Ghose, Onur Mutlu, "SeGraM: Accelerating Genomic Sequence-to-Graph Mapping via Algorithm/Hardware Co-Design", **ACM/IEEE International Symposium on Computer Architecture (ISCA), 2022.**
39. Nika Mansouri Ghiasi, Jisung Park, Harun Mustafa, Jeremie Kim, Ataberk Olgun, Arvid Gollwitzer, Damla Senol Cali, Can Firtina, Haiyu Mao, Nour Almadhoun Alserr, Rachata Ausavarungnirun, Nandita Vijaykumar, Mohammed Alser, Onur Mutlu, "GenStore: A High-Performance and Energy-Efficient In-Storage Computing System for Genome Sequence Analysis", **International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)**, Switzerland, March 2022. https://arxiv.org/abs/2202.10400
40. Joël Lindegger, Damla Senol Cali, Mohammed Alser, Juan Gómez-Luna, Onur Mutlu "Algorithmic Improvement and GPU Acceleration of the GenASM Algorithm", to appear in **IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)**, 2022. https://arxiv.org/pdf/2203.15561.pdf
41. Safaa Diab, Amir Nassereldine, Mohammed Alser, Juan Gómez Luna, Onur Mutlu, Izzat El Hajj, "High-throughput Pairwise Alignment with the Wavefront Algorithm using Processing-in-Memory", to appear in **IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)**, 2022. https://arxiv.org/pdf/2204.02085.pdf
42. Jawad Haj-Yahya, Jeremie Kim, Ivan Puddu, Giray Yaglikci, Mohammed Alser, Lois Orosa, Juan Gómez Luna, Onur Mutlu, "IChannels: Exploiting Current Management Mechanisms to Create Covert Channels in Modern Processors", **International Symposium on Computer Architecture (ISCA)**, Virtual, June 2021. https://arxiv.org/pdf/2106.05050.pdf
43. Nastaran Hajinazar, Geraldo Francisco de Oliveira Junior, Sven Gregorio, João Ferreira, Mansouri Ghiasi, Minesh Patel, Mohammed Alser, Saugata Ghose, Juan Gómez Luna, Onur Mutlu, "SIMDRAM: A Framework for Bit-Serial SIMD Processing using DRAM", **International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)**, Virtual, March-April 2021.

44. Zülal Bingöl, Mohammed Alser, Onur Mutlu, Ozcan Ozturk, and Can Alkan, "GateKeeper-GPU: Fast and Accurate Pre-Alignment Filtering in Short Read Mapping", IEEE International Parallel and Distributed Processing Symposium Workshops (**IPDPSW**), 2021. https://ieeexplore.ieee.org/document/9460690
45. Damla Senol Cali, Gurpreet S. Kalsi, Zülal Bingöl, Lavanya Subramanian, Can Firtina, Jeremie Kim, Rachata Ausavarungnirun, Mohammed Alser, Anant Nori, Juan Gómez Luna, Amirali Boroumand, Allison Scibisz, Sreenivas Subramoney, Can Alkan, Saugata Ghose, Onur Mutlu, "GenASM: A Low-Power, Memory-Efficient Approximate String Matching Acceleration Framework for Genome Sequence Analysis", **IEEE/ACM International Symposium on Microarchitecture (MICRO 2020)**, Athen, Greece, October 2020. https://www.microarch.org/micro53/
46. Jawad Haj-Yihia, Mohammed Alser, Lois Orosa, Jeremie Kim, Efraim Rotem, Avi Mendelson, Anupam Chattopadhyay, Onur Mutlu, "FlexWatts: A power- and workload-aware hybrid power delivery network for energy-efficient high-end client processors", **IEEE/ACM International Symposium on Microarchitecture (MICRO 2020)**, Athens, Greece, October 2020. https://www.microarch.org/micro53/
47. Ivan Fernandez, Ricardo Quislant, Christina Giannoula, Mohammed Alser, Juan Gómez-Luna, Eladio Gutiérrez, Oscar Plata, Onur Mutlu, "NATSA: A Near-Data Processing Accelerator for Time Series Analysis", **IEEE International Conference on Computer Design (ICCD)**, Hartford, Connecticut, USA, 18 - 21 October 2020. https://www.iccd-conf.com/Home.html
48. Jawad Haj-Yahya, Mohammed Alser, Jeremie Kim, A Giray Yaglıkçı, Nandita Vijaykumar, Efraim Rotem, Onur Mutlu, "SysScale: Exploiting Multi-domain Dynamic Voltage and Frequency Scaling for Energy Efficient Mobile Processors", **ACM/IEEE 47th Annual International Symposium on Computer Architecture (ISCA)**, Valencia, Spain, 30 May 2020 – 3 June 2020. https://doi.ieeecomputersociety.org/10.1109/ISCA45697.2020.00029
49. Jawad Haj-Yahya, Yanos Sazeides, Mohammed Alser, Efraim Rotem, Onur Mutlu, "Techniques for Reducing the Connected-Standby Energy Consumption of Mobile Devices", **IEEE International Symposium on High Performance Computer Architecture (HPCA)**, San Diego, USA, 22-26 Feb. 2020. https://doi.org/10.1109/HPCA47549.2020.00057
50. Serghei Mangul, Nathan Lapierre, Mohammed Alser, Igor Mandric, Lana Martin, Eleazar Eskin, David Koslicki "Ultra-sensitive profiling of eukaryotic and viral communities of 1736 built environments across the US metropolitan areas", **IEEE International Conference on Computational Advances in Bio and Medical Sciences (ICCABS)**, October 19-21, 2017, Best Western Lake Buena Vista Resort Hotel, Orlando, FL, USA [Invited Paper].
51. Jeremie Kim, Damla Senol, Hongyi Xin, Donghyuk Lee, Saugata Ghose, Mohammed Alser, Hasan Hassan, Oguz Ergin, Can Alkan, Onur Mutlu, "Genome Read In-Memory (GRIM) Filter: Fast Location Filtering in DNA Read Mapping using Emerging Memory Technologies", **The Sixteenth Asia Pacific Bioinformatics Conference (APBC 2018)**, Yokohama, Japan, 15-17 January 2018.
52. Mohammed Alser, Nour Almadhoun, Azita Nouri, Can Alkan, Erman Ayday**,** "Can you really anonymize the donors of genomic data in today's digital world?", **International Workshop on Data Privacy Management (DPM 2015)**, September 21-22, 2015, Vienna, Austria. [Awarded UNESCO Chair in Data Privacy Travel Grant] http://link.springer.com/chapter/10.1007%2F978-3-319-29883-2_16.
53. Mohammed Alser, M. Assaad, Fawnizu Hussin, Israel Bayou, "Design and FPGA implementation of PLL-based quarter-rate clock and data recovery circuit", **IEEE International Conference on Intelligent and Advanced Systems (ICIAS), Kuala Lumpur, Malaysia**, vol. 2, pp. 825,830, June 12th -14th 2012. DOI: 10.1109/ICIAS.2012.6306128.
54. Mohammed Alser and M. Assaad, "Design and Modeling of Low-Power Clockless Serial Link for Data Communication Systems", **IEEE National Postgraduate Conference (NPC)**, Universiti Teknologi PETRONAS, pp.1-5, September 19th-20th 2011. DOI: 10.1109/NatPC.2011.6136441.

Keynote Talks, Invited Talks, and Invited Lectures

55. "Sparsified Genomics: Rethinking Large-Scale Genomic Analyses", **Invited Talk** at BIO-Arch workshop, April 2023, Istanbul Technical University, Turkey. https://www.youtube.com/watch?v=2rCsb4-nLmg&t=6624s
56. "Filter Before You Parse: Accelerating Any Sequence Aligner", **Invited Talk** at BIO-Arch workshop, April 2023, Istanbul Technical University, Turkey. https://www.youtube.com/watch?v=2rCsb4-nLmg&t=26020s
57. "Genome-on-Diet: Taming Large-Scale Genomic Analyses via Sparsified Genomics", **Talk Presentation** at the workshop of Data Structures in Bioinformatics (DSB) 2023, March 2023, TU Delft, Netherlands. https://drive.google.com/file/d/1ryI5LodN_0hVQFWQujb4_yjIY5I818yo/view?usp=drive_link
58. "Rethinking Genomic Analyses: Preparing Computer Science Students for the Future of Public Health & Medicine", **Invited Talk** by Arab-German Young Academy of sciences and humanities, at Tunisian Pasteur Institute, Tunisia, 20-23 November 2022.
59. "Intelligent Genome Analysis via Intelligent Algorithms and Architectures", **Talk Presentation** at International Genome Graph Symposium (IGGSy) 2022, Monte Verita, Ascona, July 2022. https://iggsy.org/program

60. “Technology dictates algorithms: Recent developments in read alignment”, **Presentation** at the Intelligent Systems for Molecular Biology (ISMB) 2022, July 2022.
61. “Analyzing Genomes via Intelligent Algorithms & Architectures”, **Invited Talk** at EFCL/CSNOW to attract women into the fields of computer science and computer engineering at ETH Zurich, May 2022. https://csnow.inf.ethz.ch
62. “Analyzing Genomes via Efficient HW/SW Co-Design”, **Invited talk** at SoCC Speaker Series, Khalifa University, February 2022. https://www.youtube.com/watch?v=lFNKcPzSROE
63. “Computer Architecture - Lecture 10: Intelligent Genome Analysis”, Lecture 10, Computer Architecture Course, **ETH Zurich**, 29 October 2021. https://www.youtube.com/watch?v=tm-IRYa14qs
64. “Modern Genomics in Palestine: Revolutionary Dream or Dystopian Nightmare?”, **Keynote talk** at the 6th National Forum: A Transition to Innovation, October 2021. https://www.facebook.com/hcieps/videos/888060575231360
65. “Architecting for the Pandemic Rethinking Genome Analysis at Population Scale”, **Keynote talk** at the 9th International Conference on Computer, Control, Informatics and its Applications (IC3INA), October 2021. https://www.youtube.com/watch?v=DYirH5mr9Js
66. “Accelerating Genome Analysis: A Primer on an Ongoing Journey”, **Highlight talk** at the 25th International Conference on Research in Computational Molecular Biology (RECOMB), August 2021. https://www.youtube.com/watch?v=ShU2Aj-iHY4 https://www.youtube.com/watch?v=RzurItt3nNA
67. “Seminar in Computer Architecture Meeting 4: GateKeeper” Lecture 4, Seminar in Computer Architecture Course, **ETH Zurich**, 18 March 2021. http://www.youtube.com/watch?v=i9dCUOpgMms
68. “Intelligent Genome Analysis”, Lecture 8, Computer Architecture Course, **ETH Zürich**, 15 October 2020. https://www.youtube.com/watch?v=ygmQpdDTL7o
69. “Enabling Intelligent Data Analysis” **Keynote talk** at the First International Conference on Information Technology and Business (ICITB2020), Gaza, Palestine, 13 - 14 July 2020. https://www.facebook.com/ICITB/videos/994773584311555
70. “A Roadmap for Fast and Efficient Genome Analysis”, the Institute of Medical Science, **the University of Tokyo**, 20 December 2019. https://www.youtube.com/watch?v=aF3a-bV7MgM
71. “A Roadmap for Fast and Efficient Genome Analysis”, Computer Science Department, **the University of Tokyo**, 19 December 2019. https://www.youtube.com/watch?v=3QcPswLpJos
72. “Accelerating Genome Analysis Using New Algorithms and Hardware Designs”, Department of Computational Biology and Bioinformatics, **the University of Tokyo**, 18 December 2019. https://www.youtube.com/watch?v=DTfNzcYIgOI
73. “Accelerating Genome Analysis Using New Algorithms and Hardware Designs”, RIKEN Center for Computational Science, Kobe, 17 December 2019. Slides (PDF): https://safari.ethz.ch/safari_public_wp/wp-content/uploads/2020/01/MohammedAlser-JapanVisit-Dec17.pdf
74. “Accelerating Genome Analysis Using New Algorithms and Hardware Designs”, **Preferred Networks**, Tokyo, 16 December 2019. Slides (PDF): https://safari.ethz.ch/safari_public_wp/wp-content/uploads/2020/01/MohammedAlser-JapanVisit-Dec16.pdf
75. “Accelerating Genome Analysis”, Lecture 5, Computer Architecture Course, **ETH Zürich**, 3 October 2019. http://www.youtube.com/watch?v=8MsRlPnh0HU
76. “Understanding and Reducing Data Movement Bottlenecks in Modern Workloads” **Microsoft Swiss Joint Research Center Workshop** 2019, Zürich, Switzerland, 31 Jan. - 1 Feb. 2019. https://www.microsoft.com/en-us/research/event/swiss-jrc-workshop-2019/
77. “Accelerating Genome Analysis”, Lecture 8, Computer Architecture Course, **ETH Zürich**, 11 October 2018. http://www.youtube.com/watch?v=TvKBjhxvNro.
78. "Exploring Speed/Accuracy Trade-offs in Hardware Accelerated Pre-Alignment in Genome Analysis”, **HPCA2018 Workshop on Accelerator Architecture in Computational Biology and Bioinformatics (AACBB)**, Vienna, Austria, 24 February, 2018. https://aacbb-workshop.github.io/ Slides (PPTX): https://aacbb-workshop.github.io/slides/2018/MAGNET_AACBB_Vienna2018.pptx
79. "Hardware Acceleration of Read Mapping in Genome Analysis”, **Chair for Processor Design (Prof. Akash Kumar), CFAED**, TU Dresden, Dresden, Germany, 6 November 2017.
80. "Towards Fast and Accurate FPGA-based Pre-alignment Filtering”, **VAST research group (Prof. Jason Cong)**, 4750 Boelter Hall, University of California Los Angeles (UCLA), California, United States, 21 July 2017.
81. "Accelerating the understanding of life’s code through better algorithms and hardware design", Flash Talk, **Computational Genomics Summer Institute (CGSI2017)**, Best Western Big Bear Chateau, California, United States, 6 July 2017. https://www.dropbox.com/s/7mz2pgjx1zj33np/2017%20CGSI%20Retreat%20Program.pdf?dl=0.
82. "Enabling fast read alignment in genome analysis", **Computational Genomics Summer Institute (CGSI2016)**, University of California Los Angeles (UCLA), California, United States, 27 July 2016. https://www.youtube.com/watch?v=uIolltnMtE8.

Posters and Workshops

83. Mohammed Alser, Jeremy Rotman, Kodi Taraszka, Huwenbo Shi, Pelin Icer Baykal, Harry Taegyun Yang, Victor Xue, Sergey Knyazev, Benjamin D Singer, Brunilda Balliu, David Koslicki, Pavel Skums, Alex Zelikovsky, Can Alkan, Onur Mutlu, Serghei Mangul, "Technology dictates algorithms: Recent developments in read alignment", **30th Conference on Intelligent Systems for Molecular Biology (ISMB 2022), USA**, https://www.iscb.org/ismb2022
84. Damla Senol Cali, Gurpreet S. Kalsi, Zülal Bingöl, Lavanya Subramanian, Can Firtina, Jeremie Kim, Rachata Ausavarungnirun, Mohammed Alser, Anant Nori, Juan Gómez Luna, Amirali Boroumand, Allison Scibisz, Sreenivas Subramoney, Can Alkan, Saugata Ghose, Onur Mutlu, "GenASM: A Low-Power, Memory-Efficient Approximate String Matching Acceleration Framework for Genome Sequence Analysis", **30th Conference on Intelligent Systems for Molecular Biology (ISMB 2022), USA**, https://www.iscb.org/ismb2022
85. Mohammed Alser, Taha Shahroodi, Juan Gomez-Luna, Can Alkan, Onur Mutlu, "SneakySnake: A Fast and Accurate Universal Genome Pre-Alignment Filter for CPUs, GPUs, and FPGAs", **RECOMB 2022**, 22-25 May 2022. https://recomb2022.net
86. Mohammed Alser, Jeremie S. Kim, Nour Almadhoun Alserr, Stefan W. Tell, and Onur Mutlu, "COVIDHunter: An Accurate, Flexible, and Environment-Aware Open-Source COVID-19 Outbreak Simulation Model", **ISMB/ECCB 2021**, Virtual, 25-30 July 2021. https://www.iscb.org/cms_addon/conferences/ismbeccb2021/posters.php?track=COVID-19&session=E
87. Zülal Bingöl, Mohammed Alser, Onur Mutlu, Ozcan Ozturk, and Can Alkan, "GateKeeper-GPU: Fast and Accurate Pre-Alignment Filtering in Short Read Mapping", **20th IEEE International Workshop on High Performance Computational Biology (HiCOMB 2021)**, Virtual Workshop, May 17, 2021, http://www.hicomb.org/slides/HiCOMB21_Bingol_etal.pdf
88. Mohammed Alser, Can Alkan, Onur Mutlu, "SneakySnake: A New Fast and Highly Accurate Pre-Alignment Filter on CPU and FPGA for Accelerating Sequence Alignment", **Swiss Genomics Forum**, Geneva, Switzerland, 27 Sept 2019. https://www.health2030genome.ch/2019/09/27/swiss-genomics-forum-2019
89. Can Firtina, Jeremie Kim, Mohammed Alser, Damla Senol Cali, A. Ercument Cicek, Can Alkan, Onur Mutlu, "Apollo: A Sequencing-Technology-Independent, Scalable, and Accurate Assembly Polishing Algorithm", **Swiss Genomics Forum**, Geneva, Switzerland, 27 Sept 2019. https://www.health2030genome.ch/2019/09/27/swiss-genomics-forum-2019
90. Damla Senol Cali, Gurpreet S. Kalsi, Zülal Bingöl, Lavanya Subramanian, Can Firtina, Jeremie Kim, Rachata Ausavarungnirun, Mohammed Alser, Anant Nori, Juan Gómez Luna, Amirali Boroumand, Allison Scibisz, Sreenivas Subramoney, Can Alkan, Saugata Ghose, Onur Mutlu, "BitMAC: An In-Memory Accelerator for Bitvector-Based Sequence Alignment of Both Short and Long Genomic Reads**",** **ISMB/ECCB 2019**, Basel, Switzerland, 21-25 July 2019. https://www.iscb.org/cms_addon/conferences/ismbeccb2019/posters.php?track=HitSeq%20COSI
91. Mohammed Alser, Can Alkan, Onur Mutlu, "SneakySnake: A New Fast and Highly Accurate Pre-Alignment Filter on CPU and FPGA for Accelerating Sequence Alignment", **ISMB/ECCB 2019**, Basel, Switzerland, 21-25 July 2019. https://www.iscb.org/cms_addon/conferences/ismbeccb2019/posters.php?track=HitSeq%20COSI
92. Mohammed Alser, Hasan Hassan, Hongyi Xin, Oğuz Ergin, Onur Mutlu, Can Alkan, "GateKeeper: A New Hardware Architecture for Accelerating Pre-Alignment in DNA Short Read Mapping", **Pacific Symposium on Biocomputing (PSB) 2018**, the Big Island of Hawaii, January 3-7, 2018. https://psb.stanford.edu/
93. Jeremie Kim, Damla Senol, Hongyi Xin, Donghyuk Lee, Mohammed Alser, Hasan Hassan, Oguz Ergin, Can Alkan, Onur Mutlu, "Genome Read In-Memory (Grim) Filter: Fast Location Filtering in DNA Read Mapping Using Emerging Memory Technologies", **Pacific Symposium on Biocomputing (PSB) 2017**, the Big Island of Hawaii, January 3-7, 2017. https://psb.stanford.edu/
94. Jeremie Kim, Damla Senol, Donghyuk Lee, Mohammed Alser, Hasan Hassan, Oguz Ergin, Can Alkan, Onur Mutlu, "Genome Read In-Memory Mapper (GRIMM): Fast Location Filtering with 3D Stacked Memory Technologies", **the 20th Annual International Conference on Research in Computational Molecular Biology (RECOMB 2016)**, Los Angeles, CA, April 17-21 2016. https://users.ece.cmu.edu/~omutlu/pub/GRIM-genome-read-in-memory-filter_recomb-seq16_flashtalk.pdf.
95. Mohammed Alser, Nour Almadhoun, Azita Nouri, Can Alkan, Erman Ayday, "Identifying Anonymous Donors of Genetic Information", **Privacy-aware computational genomics 2015 (PRIVAGEN 2015)**, September 8th 2015. Tokyo, Japan. aistcrypt.github.io/Privacy-Aware-Computational-Genomics/.

Under Submission and Preprints

96. Pelin Icer Baykal, Mike Simonov, Dhrithi Deshpande, Ful Belin Korukoglu, Jaden Moore, Karishma Chhugani, Cecilia Liu, Varuni Sarwal, Neha Rajkumar, Mohammed Alser, Niko Beerenwinkel, Serghei Mangul, "Assessing genomic reproducibility of read alignment tools", **arXiv**, 2025. https://www.biorxiv.org/content/10.1101/2025.05.08.652934v1.full.pdf
97. William Andrew Simon, Leonid Yavits, Konstantina Koliogeorgi, Yann Falevoz, Yoshihiro Shibuya, Dominique Lavenier, Irem Boybat, Klea Zambaku, Berkan Şahin, Mohammad Sadrosadati, Onur Mutlu, Abu Sebastian, Rayan Chikhi, Can Alkan, BioPIM Consortium, "Processing-in-memory for genomics workloads", **arXiv**, 2025. https://arxiv.org/pdf/2506.00597

98. Mohammed Alser, Arvid E Gollwitzer, Joel Bergtholdt, Joel Lindegger, Maximilian-David Rumpf, Serghei Mangul, Onur Mutlu, "MetaFast: Enabling Fast Metagenomic Classification via Seed Counting and Edit Distance Approximation", **arXiv**, 2023. https://arxiv.org/pdf/2311.02029
99. Maximilian-David Rumpf, Mohammed Alser, Arvid E Gollwitzer, Joël Lindegger, Nour Almadhoun, Can Firtina, Serghei Mangul, Onur Mutlu, "SequenceLab: A Comprehensive Benchmark of Computational Methods for Comparing Genomic Sequences", **arXiv**, 2023. https://arxiv.org/pdf/2310.16908
100. Julien Eudine, Mohammed Alser, Gagandeep Singh, Can Alkan, Onur Mutlu, "GateSeeder: Near-memory CPU-FPGA Acceleration of Short and Long Read Mapping", **arXiv**, 2023. https://arxiv.org/pdf/2309.17063

MENTORING

Postdoctoral Researchers

- **Jawad Haj-Yahya** [Sept. 2019 - Sept. 2020]
  Postdoctoral training, ETH Zürich.
- **Gagandeep Singh** [Sept. 2021 - Sept. 2023]
  Postdoctoral training, ETH Zürich.
- **Haiyu Mo** [Jan. 2021 - Sept. 2023]
  Postdoctoral training, ETH Zürich.

Doctoral Students

- **Damla Senol Cali** [Sept. 2018 - Jan. 2022]
  Ph.D. research, Carnegie Mellon University. *GenASM: In-memory pairwise sequence alignment* [MICRO 2020].
- **Can Firtina** [Sept. 2018 - Sept. 2023]
  Ph.D. research, ETH Zürich. *Apollo: A universal assembly polishing algorithm* [Bioinformatics 2019].
- **Nika Mansouri** [Jan. 2020 - April 2022]
  Ph.D. research, ETH Zürich. *GenStore: In-storage read mapper* [ASPLOS 2022].

ADVISING

Doctoral Students

- **Jeremie Kim** (*co-advised* with Onur Mutlu) [May 2017 - Sept. 2023]
  Ph.D. research, ETH Zürich. *GRIM-Filter: In-memory pre-alignment filter* [BMC Genomics 2018]; *AirLift: Upgrading mapping results for new genomes without re-mapping*.
- **Joel Lindegger** (*co-advised* with Onur Mutlu) [Jan. 2022 - Sept. 2023]
  Ph.D. research, ETH Zürich. *Scrooge: a fast and memory-frugal genomic sequence aligner for CPUs, GPUs, and ASICs* [Bioinformatics 2023]; *RawAlign: Accurate, Fast, and Scalable Raw Nanopore Signal Mapping via Combining Seeding and Alignment* [arXiv 2023].

Master's Students

- **Zulal Bingol** (*co-advised* with Can Alkan) [Jan. 2018 - Aug. 2020]
  Master's research, Bilkent University. *GateKeeper-GPU: GPU-based pre-alignment filter* [master's thesis].
- **João Dinis Sanches Ferreira** (*co-advised* with Onur Mutlu and Juan Gomez Luna) [Jan. 2019 - Jan. 2021]
  Master's research, ETH Zürich. *pLUTo: In-DRAM Lookup Tables to Enable General-Purpose Massively Parallel Computation.*
- **Taha Shahroodi** (*co-advised* with Onur Mutlu) [Jan. 2019 - Sept. 2020]
  Master's research, ETH Zürich. *Snake-on-GPU: GPU-based pre-alignment filter* [Bioinformatics 2020] and *MetaHD: Hyperdimensional metagenomic profiling* [master's thesis].
- **Joel Lindegger** (*co-advised* with Onur Mutlu and Damla Senol Cali) [March 2021 - Sept. 2021]
  Master's research, ETH Zürich. *A Practical and Efficient Implementation of GenASM on GPUs* [master's thesis].
- **Akanksha Baranwal** (*co-advised* with Onur Mutlu and Manuel Le Gallo (IBM Research, Zurich)) [Jan. 2021 - Sept. 2021]
  Master's research, ETH Zürich. *Accelerating Nanopore Genome Basecalling with Computational Phase-Change Memory* [Practical work].
- **Banu Cavlak** (*co-advised* with Onur Mutlu) [Sept. 2021 - Sept. 2023]
  Master's research, ETH Zürich. Accelerating Nanopore Genome Basecalling

- **Maximilian-David Rumpf** *(advisor)* [June 2021 - Sept. 2023]
  Master's research, ETH Zürich. *Benchmarking pre-alignment filtering.*
- **Arvid Gollwitzer** *(advisor)* [June 2021 - Sept. 2023]
  Master's research, ETH Zürich. *Metagenomic profiling using minimal computation*.
- **Safaa Diab** (*co-advised* with Izzat El Hajj American University of Beirut) [June 2021 - Sept. 2023]
  Master's research, AUB. *High-throughput Pairwise Alignment with the Wavefront Algorithm using Processing-in-Memory*
- **Jan Schappi** *(advisor)* [June 2021 - March 2022]
  Master's research, ETH Zürich. *Finding Fingerprints for Metagenomic Analysis*
- **Julien Eudine** *(advisor)* [Sept. 2021 - Sept. 2023]
  Master's research, ETH Zürich. *FPGA-based Near-Memory Read Mapping*
- **Luca Blum** *(advisor)* [March 2022 - Sept. 2023]
  Master's research, ETH Zürich. Learned *Indexing for Metagenomic Analysis*

Bachelor Students

- **Sven Gregorio** (*co-advised* with Onur Mutlu and Juan Gomez Luna) [Jan. 2019 - Oct. 2019]
  Bachelor research, ETH Zürich. *SIMDRAM: A Framework for Bit-Serial SIMD Processing using DRAM*.
- **Nicolas Filliol** *(advisor)* [Sept. 2020 - Jan. 2021]
  Bachelor research, ETH Zürich. *Sequence alignment on GPUs*.
- **Arvid Gollwitzer** *(advisor)* [Sept. 2020 - June 2021]
  Bachelor research, ETH Zürich. *Metagenomic profiling using minimal computation*.
- **Linus Joos** *(advisor)* [Sept. 2020 - Jan. 2021]
  Bachelor research, ETH Zürich. *GPU-based GenASM for short and long reads*.
- **Nicolas Menet** *(advisor)* [Sept. 2020 - Jan. 2021]
  Bachelor research, ETH Zürich. *GPU-based SneakySnake for short and long sequence filtering*.
- **Fabian Baldenweg** *(advisor)* [Jan. 2021 - July 2021]
  Bachelor research, ETH Zürich. *Sequence alignment on GPUs*.
- **Tobias Senti** *(advisor)* [Jan. 2021 - July 2021]
  Bachelor research, ETH Zürich. *GPU-based SneakySnake for short and long sequence filtering*.
- **Florian Christen** *(advisor)* [Sept. 2021 - March 2022]
  Bachelor research, ETH Zürich. *Genome-on-Diet*
- **Nadja Temporin** *(advisor)* [Feb. 2022 - June 2022]
  Bachelor research, ETH Zürich. *RNA-Seq Abundance Quantification*
- **Andrin Schneider** *(advisor)* [Feb. 2022 - June 2022]
  Bachelor research, ETH Zürich. *Improving Metagenomics Analysis*

Interns

- **Steven Yu** *(advisor)* [July 2021 - June 2022]
  Research Internship at ETH Zürich. High school junior at Hackley School, New York.
  Building IOS App for COVIDHunter.
- **Samuel Cheung** *(advisor)* [Nov.2020 - Aug. 2021]
  Research Internship at ETH Zürich. Undergraduate student at the University of Illinois Urbana-Champaign. *Accelerating genome analysis by changing the algorithms.*
- **Ilknur Baş** *(advisor)* [June 2021 - Aug. 2021]
  Bachelor research, Bilkent University. *SneakySnake and Sequence Alignment*
- **Suat Enes Koç** *(advisor)* [June 2021 - Aug. 2021]
  Bachelor research, ETH Zürich. *Sketching for Metagenomic Analysis*
- **Maximilian-David Rumpf** *(advisor)* [March 2020 - June 2021]
  Research Internship at ETH Zürich. Undergraduate student at ETH Zürich. *Benchmarking pre-alignment filtering.*
- **Ivan Fernandez-Vega** (*co-advised* with Juan Gomez Luna) [April 2019 - Sept. 2021]
  Research Internship at ETH Zürich. Ph.D. student at the University of Malaga. *NATSA: A near-data processing accelerator for time series analysis* [ICCD 2020].
- **Mohamed Hasan** *(advisor)* [June 2019 - July 2019]
  Research Internship at ETH Zürich (D-INFK Summer Research Fellow). *Hyperdimensional metagenomic profiling*.
- **Hassan Raza** *(advisor)* [June 2020 - Dec. 2020]

Undergraduate Internship at Bilkent University. *Accelerating genome indexing using SIMD instructions.*

- **Mustafa Hakan Kara** *(advisor)* [June 2020 - Dec. 2020]
  Undergraduate Internship at Bilkent University. *Accelerating genome indexing using SIMD instructions.*
- **Batuhan Tömekçe** *(advisor)* [Dec. 2018 - June 2019]
  Undergraduate Internship at ETH Zürich. Undergraduate student at ETH Zürich. *Genome analysis pipeline profiling.*
- **Ege Karaismailoglu** *(advisor)* [Dec. 2018 - June 2019]
  Undergraduate Internship at ETH Zürich. Undergraduate student at ETH Zürich. *Genome analysis pipeline profiling.*
- **Burak Alp Kaya** *(advisor)* [Dec. 2018 - June 2019]
  Undergraduate Internship at ETH Zürich. Undergraduate student at ETH Zürich. *Genome analysis pipeline profiling.*

SERVICES

Grant Proposal Reviewer

- Research Partnership Grants for ZHAW, the Leading House for research collaboration, Switzerland.

External PhD Examiner

- Barcelona Supercomputing center, Spain
- School of Engineering, Newcastle University, UK

Conference Organizing Committee

- RECOMB 2025 - Industry Chair, https://recomb.org/recomb2025
- ICCABS 2025 - Web Chair, https://iccabs.engr.uconn.edu
- CAMERA Workshop at ICCABS 2025 - Co-organizer, https://iccabs.engr.uconn.edu
- RECOMB 2023 - Session Chair, http://recomb2023.bilkent.edu.tr/program.html
- RECOMB 2023 to discuss hardware acceleration for omics analyses, Istanbul Marriott Hotel Sisli, Turkey

Conference Program Committee

- RECOMB 2025, https://recomb.org/recomb2025
- ISCA 2025, https://iscaconf.org/isca2025
- ISMB/ECCB 2025, https://www.iscb.org/ismbeccb2023
- HiCOMB 2025, http://hicomb.org
- RECOMB 2023, http://recomb2023.bilkent.edu.tr
- ISMB/ECCB 2023, https://www.iscb.org/ismbeccb2023
- HiCOMB 2023, http://hicomb.org
- 23rd IEEE/ACM CCGRID 2023, https://ccgrid2023.iisc.ac.in
- ISMB 2022, https://www.iscb.org/ismb2022
- HiCOMB 2022, http://hicomb.org/
- 7th High Performance Computing Conference (BASARİM) 2022, https://basarim.org.tr/2022
- ISMB/ECCB 2021, https://www.iscb.org/ismbeccb2021
- HiCOMB 2021, http://hicomb.org/

Academic and Industrial Collaboration

- Bilkent University, Can Alkan
- University of Southern California, Serghei Mangul
- IBM Zurich, Abu Sebastian
- Intel Labs - Bangalore, Sreenivas Subramoney and Gurpreet Singh Kalsi
- Barcelona Supercomputing Center, Osman Unsal
- UCLA, Eleazar Eskin
- American University of Beirut, Izzat El Hajj
- University of Tokyo, Reiji Suda and Soramichi Akiyama
- Khalifa University, Baker Mohammad
- National Technical University of Athens, Dimitrios Soudris
- RIKEN Kobe, Kentaro Sano

Academic and Industrial Consultation

- PETRONAS, Nor Hisham Bin Hamid (consultation services).
- PETRONAS, Nordin Bin Zakaria (consultation services).

Reviewer for Academic Conferences/Journals in Bioinformatics

- Advanced Bioinformatics 2025. • Journal of Computational Biology 2025. • Bioinformatics 2025. • Bioinformatics 2024. • ISMB/ECCB 2023. • RECOMB 2023. • HiCOMB 2023. • Bioinformatics 2023. • Nature Methods 2022. • ISMB 2022. • HiCOMB 2022. • BASARIM 2022. • Bioinformatics 2022. • ISMB/ECCB 2021. • HiCOMB 2021. • RECOMB 2020, 2021. • ISMB 2020. • Bioinformatics 2019. • BMC Bioinformatics 2019, 2020, 2021. • ISBRA 2019, 2020. • IEEE/ACM TCBB 2019, 2020. • ACM BCB 2017, 2019, 2021. • BCB 2017.

Reviewer for Academic Conferences/Journals in Computer Architecture

- ACM's TODAES journal 2025. • MICRO 2019, 2020, 2021. • ISCA 2019. • VLDB 2019. • MSST 2019. • FAST 2019. • DSN 2019. • TVLSI 2014, 2015. • VLSI Design. • International Journal of Electronics 2012-2015. • The Euromicro DSD 2016. • ICIAS 2012. • 35th CCD.

Volunteer / Assistant for:

- 30th International Conference on Supercomputing (ICS) 2016, Istanbul, Turkey. • 20th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS) 2015, Istanbul, Turkey. • The Annual Postgraduate Conference (APC 2013), Malaysia. • The 4th International Conference on Intelligent and Advanced Systems (ICIAS 2012), Kuala Lumpur, Malaysia. • National Postgraduate Conference (NPC 2011), Malaysia. • National Graduate Symposium (NGS 2011), Malaysia. • 3rd IUG Engineering Days 2009.