Assel Kembay

Santa Cruz, California | akembay.github.io | kembayassel | akembay@ucsc.edu | +1 831 529-8390

OBJECTIVE

PhD student in Brain-Inspired AI/ML specializing in efficient machine learning systems and scalable deep learning architectures. Demonstrated experience in developing novel ML techniques that achieved state-of-the-art results on large-scale datasets (ImageNet-1K). Strong foundation in predictive modeling, knowledge distillation and continual learning. Seeking to leverage my expertise in scalable ML systems and time-series forecasting to tackle real-world challenges in recommendation systems, ranking, and large-scale data analytics.

EDUCATION

University of California, Santa Cruz — **Santa Cruz, CA**
Ph.D. in Electrical and Computer Engineering | GPA: 3.95/4.00 — Sep 2023 - Jun 2028 (expected)
Area of Study: Brain-inspired AI/ML, Neuromorphic Computing
Advisor: Prof. Jason Eshraghian

University of Science and Technology — **Seoul, South Korea**
M.S. in AI - Robotics | GPA: 4.43/4.50
Thesis: "Inversion of Spiking Neural Networks, with application to Knowledge Distillation"

C-DAC's Advanced Computing Training School — **Pune, India**
Postgraduate Diploma in Advanced Computing

L.N. Gumilyov Eurasian National University — **Astana, Kazakhstan**
B.S. in Mathematical and Comp. Modeling (summa cum laude) | GPA: 3.86/4.00

RESEARCH EXPERIENCE

Graduate Student Researcher — **Santa Cruz, CA**
University of California, Santa Cruz — Oct 2023 - Present
- Developed new Knowledge Distillation techniques with top-K guided transfer, achieving +5.44% on CIFAR-100, +3.57% on ImageNet-1K, and surpassing state-of-the-art KD methods by +1.47%.
- Analyzed Quantized Spiking Neural Networks' role in mitigating catastrophic forgetting through sparse activations.
- Designed Adaptive Threshold Integrate-and-Fire neuron in silicon through TinyTapeout 05.

Research Scientist Intern — **Seoul, South Korea**
Korea University Medicine — Apr 2023 - Sep 2023
- Improved wireless brain chip with optimized data transfer algorithms
- Developed signal processing unit and communication module

Research Assistant — **Seoul, South Korea**
Artificial Intelligence Research Group, Korea Institute of Science and Technology (KIST) — Sep 2020 - Mar 2023
- Developed inversion techniques for Spiking Neural Network models to enable data-free knowledge transfer using batch normalization statistics, facilitating efficient training of neuromorphic systems without original datasets.

Research Intern — **Seoul, South Korea**
Computational Science Research Center, KIST — Mar 2020 - Aug 2020
- Developed a thematic web platform for quantum dots that provides functionalities to simulate photo-luminescence, electronic and atomic structures, and chemical stability.
- Designed algorithm for determining dimensions of materials & middle point of vacuum, positional map (LDOS-map) calculation.

Research Scientist Intern — **Astana, Kazakhstan**
India – Kazakhstan Centre of Excellence in Information Communication Technology — Jan 2018 - June 2018
- Formulated strategies and preferences to reduce discrimination against individuals with disabilities in the innovation and education sectors, promoting inclusivity and accessibility.
- Contributed to the creation of the Kazakh Sectoral Qualifications Framework and Professional Standards.

PUBLICATIONS

1. **Kembay A.***, Aguilar K.*, Eshraghian J. (2025). "A Quantitative Analysis of Catastrophic Forgetting in Quantized Spiking Neural Networks." In 2025 IEEE International Symposium on Circuits and Systems **(IEEE ISCAS 2025)**.
2. **Kembay A.**, Zhu R.-J., Zhang Y., Eshraghian J. (2024). "Efficient Knowledge Distillation via Salient Feature Masking." Under Review (submitted to CVPR 2025)

3. Gunasekaran S., **Kembay A.**, et al. (2024). "Future-Guided Learning: A Predictive Approach To Enhance Time-Series Forecasting." arXiv preprint arXiv:2410.15217. (submitted to Nature Machine Intelligence)
4. **Kembay A.**, Zhu R.-J., Kuipers N., Eshraghian J., and Josephson C. (2024). "Leveraging Spiking Neural Networks for Solar Energy Prediction in Agriculture." Bay Area Machine Learning Symposium **(BayLearn 2024)**.
5. **Kembay A.**, Kim S. (2022). "Frameworks that Integrate Spiking Neural Networks: A Review." The Journal of KINGComputing, vol. 18, no. 6, pp. 93-105.
6. Kim Sch., Lee Ch., Lee B., Seol D., Kim D., **Kembay A.**, Yun K., Jang S., Lee J. (2021). "Simulation Web Platform for the Electro-Chemical Oxygen Reduction Reaction." The International Workshop on Computational Nanotechnology **(IWCN 2021), Oral**.
7. Kim Sch., Kim D., **Kembay A.**, Kim S., Yun K., et al. (2021). "Web Platforms for Conventional Simulations of Matters." 2021 Korean Physical Society Spring Meeting Conference, **Oral**.
8. Kim S., **Kembay A.**, Lee J., et al. (2021). "A Simulation Web Platform for Analyzing Electronic Structures of Semiconductors." 2021 Korean Physical Society Spring Meeting Conference.
9. Mukanova B., Iskakov K., **Kembay A.**, Boranbaev S. (2020). "Inverse Source Identification Problem for the Wave Equation: An Application for Interpreting GPR Data." Scopus Indexed: Eurasian Journal of Mathematical and Computer Applications, pp. 78-91.
10. **Kembay A.**, Mukanova B. (2020). "The Study of the Properties of the Reflected Signals according to the GPR ZOND-12e." Materials of the International Scientific Conference "Theoretical and Applied Questions of Mathematics, Mechanics and Computer Science," pp. 135-136. **Best Presentation Award**

PATENTS

The electronic structure calculation web-program Kim Sch., **Kembay A.**, Kim S. share 20%, applied, Link to the Project.

AWARDS & HONORS

2023 **Divisional MIP Fellowship, UC Santa Cruz, USA**
Merit-based fellowship awarded to first-year doctoral students ($18,800)

2023 **POSCO Asia Fellowship, South Korea**
Next Generation Global Leaders program fostering Asian-Korean STEM initiatives (Full funding)

2021 **KIST-KT&G Global Scholarship Foundation, South Korea**
Recognition for excellence in advancing global science and technology research (1M KRW)

2020 **II Place, XV International Scientific Conference for Students and Young Scientists**
Awarded for presenting the paper in applied mathematics and computational methods

2019 **Sur–Place Konrad Adenauer Foundation Scholarship, Germany**
Awarded to promising future leaders in academic excellence with societal impact (∼800 EUR)

2018 **ITEC Programme Scholarship, Government of India**
Selected for bilateral partnership program fostering India-Kazakhstan technical exchange (Full funding)

2017 **Foundation of the First President of Kazakhstan Scholarship**
Awarded for academic excellence and leadership in research/community activities

2017 **Award of High-quality Performance, NU, Kazakhstan**
Summer School on "Mathematical Methods in Science and Technology"

2014 - 2018 **Merit-Based Scholarship, ENU, Kazakhstan**
Awarded 7 times to top-performing students in the Department of Mechanics and Mathematics

PROFESSIONAL SERVICES

Reviewer for the following venues:

2024 NeuroAI @ Neural Information Processing System (NeurIPS)
2024 APL Machine Learning
2023, 2024 IEEE International Symposium on Circuits and Systems (ISCAS)

MENTORSHIP

Mentored 2 undergraduate research students to date at UCSC.

Mentored Kazakh students (15+) by raising awareness and providing information about grad school in the US.

SKILLS

Programming Python, Matlab, SQL (MongoDB), Maple, JavaScript, HTML, PyTorch, scikit-learn, pandas, numpy, etc.
Frameworks snnTorch, SpikingJelly, Norse, Brian2
Languages Kazakh (native), English (fluent), Russian (advanced), Korean (TOPIK-II)