

CONTACT INFORMATION	UNIVERSITY OF CALIFORNIA, SANTA CRUZ, USA E-MAIL: akembay@ucsc.edu LINKS: HOMEPAGE , GOOGLE SCHOLAR , LINKEDIN	
RESEARCH INTERESTS	Brain-Inspired AI, Spiking Neural Networks, Computer Vision, Continual Learning, Knowledge Distillation, Neural Network Interpretability	
EDUCATION	University of California , Santa Cruz, USA Ph.D., Electrical and Computer Engineering Sep 2023 - expected grad. Jun 2027 Advisor: Prof. Jason Eshraghian Current GPA: 3.95/4.00 University of Science and Technology , Seoul, South Korea M.S., AI - Robotics Thesis: <i>"Inversion of Spiking Neural Networks, with application to Knowledge Distillation"</i> Advisor: Prof. Suhyun Kim GPA: 4.43/4.50 C-DAC's Advanced Computing Training School , Pune, India Postgraduate Diploma in Advanced Computing L.N. Gumilyov Eurasian National University (ENU), Astana, Kazakhstan B.S. (summa cum laude), Mathematical and Computer Modeling GPA: 3.86/4.00	
RESEARCH EXPERIENCE	Graduate Student Researcher Oct 2023 - Present University of California, Santa Cruz, USA Member of the Neuromorphic Computing Group Research directions: Spiking Neural Networks, Knowledge Distillation, Continual Learning Advisor: Prof. Jason Eshraghian <ul style="list-style-type: none"> 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 how Quantized Spiking Neural Networks (QSNNs) mitigate catastrophic forgetting through sparse activations, improving model stability in continual learning tasks. Designed and implemented an Adaptive Threshold Integrate-and-Fire (ATIF) neuron in silicon through TinyTapeout 05, achieving dynamic threshold mechanisms for enhanced biological realism in neuromorphic hardware. 	Research Scientist Intern Apr 2023 - Sep 2023 Korea University Medicine, Seoul, South Korea Research topic: Wireless Brain Chip for Brain Computer Interface Advisor: Prof. Il-Joo Cho <ul style="list-style-type: none"> Improved a wireless brain chip with a signal processing unit and communication module by implementing an algorithm to optimize data transfer.
	Research Assistant Sep 2020 - Mar 2023 Artificial Intelligence Research Group, Korea Institute of Science and Technology (KIST) Research topic: Inversion of Spiking Neural Networks Advisor: Prof. Suhyun Kim <ul style="list-style-type: none"> 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

Mar 2020 - Aug 2020

Computational Science Research Center, KIST

Advisor: [Prof. Seungchul Kim](#)

- Designed algorithms for material dimension determination and LDOS-map calculation, enhancing quantum dot characterization capabilities.

Research Assistant

Dec 2019 - Jan 2020

Department of Mathematics, Nazarbayev University (NU), Astana, Kazakhstan

Project: Imaging in Seismic Exploration

Advisor: [Durvudkhan Suragan, PhD](#)

PUBLICATIONS

*: equal contribution

[P11] *A Quantitative Analysis of Catastrophic Forgetting in Quantized Spiking Neural Networks*

[Kembay A.*](#), Aguilar K.*, and Eshraghian J., 2024, Under Review

[P10] *Efficient Knowledge Distillation via Salient Feature Masking*

[Kembay A.](#), Zhu R.-J., and Eshraghian J., 2024, Under Review

[P9] *Future-Guided Learning: A Predictive Approach To Enhance Time-Series Forecasting*

Gunasekaran S., [Kembay, A.](#), Ladret H., Zhu R.-J., Kavehei O., and Eshraghian J., 2024, Under Review.

[P8] *Leveraging Spiking Neural Networks for Solar Energy Prediction in Agriculture*

[Kembay A.](#), Zhu R.-J., Kuipers N., Eshraghian J., and Josephson C.

Bay Area Machine Learning Symposium ([BayLearn 2024](#))

[P7] *Frameworks that integrate Spiking Neural Networks: A Review*

[Kembay A.](#), Kim S.

The Journal of KINGComputing, 2022, vol. 18, no. 6, pp. 93 - 105

[P6] *Simulation web platform for the electro-chemical oxygen reduction reaction*

Kim Sch., Lee Ch., Lee B., Seol D., Kim D., [Kembay A.](#), Yun K., Jang S., Lee J.

The International Workshop on Computational Nanotechnology ([IWCN 2021](#)), [Oral](#).

[P5] *Web platforms for conventional simulations of matters*

Kim Sch., Kim D., [Kembay A.](#), Kim S., Yun K., et al.

2021 KPS Spring Meeting Conference, [Oral](#).

[P4] *A Simulation Web Platform for Analyzing Electronic Structures of Semiconductors*

Kim S., [Kembay A.](#), Lee J., et al.

2021 KPS Spring Meeting Conference, Poster

[P3] *Inverse source identification problem for the wave equation: an application for interpreting GPR data*

Mukanova B., Iskakov K., [Kembay A.](#), Boranbaev S.

Scopus indexed: Eurasian Journal of Mathematical and Computer Applications, 2020, pp. 78-91.

[P2] *Mathematical modeling of the source and response of environment for the equation of geoelectric*

Iskakov K., Mukanova B., Berdyshev A., [Kembay A.](#), Tokseit D.

Web of Science indexed: Bulletin of the Karaganda University, 2019, pp. 129-141.

[P1] *The study of the properties of the reflected signals according to the GPR ZOND-12e*

[Kembay A.](#), Mukanova B.

Materials of the International scientific conference "Theoretical and applied questions of Mathematics, Mechanics and Computer Science," 2019, pp. 135-136.

PATENTS (US ONLY)	<i>The electronic structure calculation web-program</i> Kim Sch., Kembay A. , Kim S. share 20%, applied, Link	
AWARDS & HONORS	Divisional MIP Fellowship	Mar 2024
	Baskin Engineering School, UC Santa Cruz (\$18800)	
	2023 POSCO Asia Fellowship	Jan 2023
	POSCO TJ Park Foundation, S. Korea (3 years of tuition and a monthly stipend of 1 mln KRW)	
	KIST-KT&G Scholarship Foundation's Global Scholarship	Dec 2021
	KT&G Scholarship Foundation, S. Korea (1 mln KRW)	
	Sur – Place Konrad Adenauer Foundation Scholarship	Apr 2019
	Konrad Adenauer Foundation, Germany (academic scholarship ~800 EUR)	
	Scholarship ITEC programme	Aug 2018
	Ministry of External Affairs, Government of India (including all costs and monthly stipend)	
	Merit-Based Scholarship	Mar 2018
	Dept. Mechanics and Mathematics, ENU (awarded to top students of the department, 7 times)	
	Presidential Scholarship	Mar 2017
	Foundation of the First President of the Republic of Kazakhstan	
	Award of High-quality Performance	Jun 2017
	Summer School on “Mathematical Methods in Science and Technology”, NU	
PROFESSIONAL SERVICES	Reviewer 2024 <i>NeuroAI @ Neural Information Processing System (NeurIPS)</i> 2024 <i>APL Machine Learning</i> 2024 <i>IEEE International Symposium on Circuits and Systems (ISCAS)</i>	
TECHNICAL SKILLS	Computer proficiency: Linux user, competent at Python, SQL (MongoDB), Maple, Advanced Web Programming and Database Technologies, JavaScript, HTML, PyTorch. SNN-related frameworks: snnTorch, SpikingJelly, Norse, Brian2.	
LANGUAGES	Kazakh (native), English (fluent), Russian (advanced), Korean (TOPIK-II)	