

Assel Kembay

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EDUCATION

University of California, Santa Cruz

Ph.D. in Electrical and Computer Engineering | GPA: 3.95/4.00

Area of Study: Brain-inspired AI/ML, safe Small Language Models (SLMs)

Advisor: Prof. Jason Eshraghian

Santa Cruz, CA, USA

Jun 2027 (expected)

University of Science and Technology

M.S. in AI - Robotics | GPA: 4.43/4.50

Thesis: "Inversion of Spiking Neural Networks, with application to Knowledge Distillation"

Seoul, South Korea

C-DAC's Advanced Computing Training School

Postgraduate Diploma in Advanced Computing

Pune, India

L.N. Gumilyov Eurasian National University

B.S. in Mathematical and Comp. Modeling (summa cum laude) | GPA: 3.86/4.00

Astana, Kazakhstan

AWARDS & HONORS

2025 DAC 2025 Young Fellow, Design Automation Conference, San Francisco, USA

Selected from a highly competitive international applicant pool to join the DAC Young Fellow Program at the premier conference for electronic design automation. Award includes full conference registration and a \$250 travel grant.

2025 IEEE WIE Student Scholarship, International Leadership Conference 2025, San Jose, USA

Selected to attend the 2025 Women in Engineering International Leadership Conference with full registration support. Recognized for demonstrated leadership in advancing diversity and innovation in STEM fields.

2025 DEI Research and Travel Award, UC Santa Cruz, USA

Award supporting graduate students' research and travel expenses in recognition of contributions to DEI (\$500)

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)

2018 Merit-Based Scholarship, ENU, Kazakhstan

Awarded 7 times to top-performing students in the Department of Mechanics and Mathematics

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"

PUBLICATIONS

Under Review [I]

[I1] Zhu R.-J.*, Peng T.*, Cheng T.*, Qu X.*, ..., **Kembay A.**, ..., Eshraghian J. (2025). "A Survey on Latent Reasoning." Under review.

[I2] Tian Y., **Kembay A.**, Truong N.D., Eshraghian J.K., Kavehei O. (2025). "Beyond Pairwise Plasticity: Group-Level Spike Synchrony Facilitates Efficient Learning in Spiking Neural Networks." Under review.

[I3] Gunasekaran S., **Kembay A.**, et al. (2024). "Future-Guided Learning: A Predictive Approach to Enhance Time-Series Forecasting." Under major revision at *Nature Communications*.

Conference and Workshop Papers [C]

[C1] **Kembay A.**, Eshraghian J. (2025). “Quantized Spiking Neural Networks for Energy-Efficient Continual Learning.” Poster, Young Fellows Program, 62nd ACM/IEEE Design Automation Conference (**DAC 2025**).

[C2] **Kembay A.***, Aguilar K.*, Eshraghian J. (2025). “A Quantitative Analysis of Catastrophic Forgetting in Quantized Spiking Neural Networks.” IEEE International Symposium on Circuits and Systems (**ISCAS 2025**).

[C3] **Kembay A.**, Zhu R.-J., Kuipers N., Eshraghian J., Josephson C. (2024). “Leveraging Spiking Neural Networks for Solar Energy Prediction in Agriculture.” Bay Area Machine Learning Symposium (**BayLearn 2024**).

[C4] 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.” International Workshop on Computational Nanotechnology (**IWCN 2021**), Oral.

[C5] Kim Sch., Kim D., **Kembay A.**, Kim S., Yun K., et al. (2021). “Web Platforms for Conventional Simulations of Matters.” Korean Physical Society Spring Meeting (**KPS**), Oral.

[C6] Kim S., **Kembay A.**, Lee J., et al. (2021). “A Simulation Web Platform for Analyzing Electronic Structures of Semiconductors.” Korean Physical Society Spring Meeting (**KPS**).

[C7] **Kembay A.**, Mukanova B. (2020). “The Study of the Properties of the Reflected Signals According to the GPR ZOND-12e.” International Scientific Conference on Theoretical and Applied Questions of Mathematics, Mechanics and Computer Science. **Best Presentation Award**.

Journal Articles [J]

[J1] **Kembay A.**, Kim S. (2022). “Frameworks that Integrate Spiking Neural Networks: A Review.” *The Journal of Korean Institute of Next Generation Computing*, vol. 18, no. 6, pp. 93–105.

[J2] Mukanova B., Iskakov K., **Kembay A.**, Boranbaev S. (2020). “Inverse Source Identification Problem for the Wave Equation: An Application for Interpreting GPR Data.” *Eurasian Journal of Mathematical and Computer Applications*, pp. 78–91.

PATENTS

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

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.

TEACHING EXPERIENCE

Teaching Assistant, ECE 173: High-Speed Digital Design **UC Santa Cruz**
Spring 2025

- Assisted in delivering course content on signal integrity, transmission lines, and digital system design.
- Led lab sections, supported student projects, and graded assignments.

PROFESSIONAL SERVICES

Reviewer for the following venues:

2024	NeuroAI @ Neural Information Processing System (NeurIPS)
2024/25	APL Machine Learning
2024/25	IEEE International Symposium on Circuits and Systems (ISCAS)
2025	IEEE Transactions on Cognitive and Developmental Systems (TCDS)

MENTORSHIP

Mentored 2 undergraduate research students at UCSC.

Mentored Kazakh/Central Asian students (15+) by raising awareness and providing information about grad school in the US /Europe. Mentees have successfully secured prestigious multi-year awards, such as the Graduate Presidential Fellowship (4yr) and the DAAD Scholarship, and gained admission to fully-funded Ph.D. programs at institutions such as Columbia University.

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)