Zae Myung Kim

Fourth-year CS PhD candidate at University of Minnesota Twin Cities

My research centers on a **"meta-scaffolding paradigm"** for LLMs that injects metacognitive structure across training and inference. This paradigm (1) integrates **discourse-level meta-structures** into training to improve coherence and human-like long-form generation; (2) embeds **metacognitive feedback** into reinforcement learning to stabilize optimization, reduce reward hacking, and minimize manual prompt engineering; and (3) advances **test-time metacognition** for LLM agents, where a universal meta-operation applied recursively builds hierarchies of self-improving layers whose roles (e.g., remediation, routing, specialization) emerge from increased dimensional context, allowing agents to surpass their base performance through the heightened metacognition and insight accumulated across layers.

I have collaborated with researchers at Amazon, Salesforce, Grammarly, Naver, and Samsung.

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Google Scholar | LinkedIn | zaemyung

Education

Sept 2022 – Mar 2027 (expected) **University of Minnesota Twin Cities** Minneapolis, MN
PhD in Computer Science
Thesis: *Meta-Scaffolding for Large Language Models* (tentative)
Advisor: Dongyeop Kang

Sept 2014 – Aug 2016 **Korea Advanced Institute of Science and Technology (KAIST)** Daejeon, Korea
MS in Computer Science
Thesis: *Classifying Travel-Related Intents in Textual Data Using Recurrent Neural Networks*
Advisor: Ho-Jin Choi

Oct 2008 – Aug 2011 **Imperial College London** London, UK
BEng in Computer Science
Group Project: *Intention Recognition in Ambient Homes*
Individual Project: *Computing Fictitious Plays in Graph-Based Games*

Professional Employment

Sept – Dec 2026 **Research Intern – Amazon AWS** Seattle, WA
Developing a metric recommendation system for Amazon EC2 ASG using time-series and heterogeneous data streams.

Jun – Nov 2024 **Research Intern – Amazon AGI** Bellevue, WA
Proposed and developed structural alignment of LLMs for long-form generation.

May – Sept 2023 **Research Intern – Salesforce AI Research** Palo Alto, CA
Implemented a large-scale challenging benchmarking system for scientific-paper retrieval.
Built a co-writing system with large language models for scientific writing.

Apr – Jul 2022 **Research Intern – Grammarly** Remote
Developed a human-in-the-loop iterative text-revision system.
Trained span-based text-revision models with data augmentation.

Oct 2020 – Feb 2022 **ML Researcher – Naver Labs Europe** Meylan, France
Studied language-specific representations in multilingual NMT.
Conducted cross-lingual discourse analysis for document-level NMT.

Mar 2017 – Sept 2020 **ML Researcher – Papago, Naver Corp.** Seongnam, Korea
Developed machine translation models for Thai–Korean and German–Korean pairs.
Implemented tools for NMT: sentence-segmenter, corpus pre-processor, aligner, and crawler.
Created website-translation service using NMT + heuristic attention.
Ranked 1st (doc-level) and 4th (sent-level) at WMT20 quality estimation shared task.

Dec 2016 – Feb 2017 **Invited Researcher – KEAI Lab, KAIST** Daejeon, Korea
Built an adaptive vocabulary learning app using learner interest profiles.
Developed a healthcare app that recommends Pokémon Go events by forecasting users' physical activity patterns using recurrent neural network.

Sept – Nov 2016 **Research Intern – Naver Labs Corp.** Seongnam, Korea
Researched extending named entity recognition for Korean with hierarchical categories.

Apr 2014 – Jul 2016 **Research Assistant – Samsung–KAIST Initiative** Daejeon, Korea
[1st Year] Intent classification for travel-service personalization.
[2nd Year] Modeled long-term activeness using RNNs for wellness prediction.

Dec 2013 – Sept 2014 **Research Intern – KEAI Lab, KAIST** Daejeon, Korea
Surveyed plan and intention recognition.
Researched temporal information extraction for English and Korean.

Jan 2012 – Oct 2013 **Military Service – Special Warfare Command, ROK Army** Incheon, Korea
Served as an army interpreter, aviation image analyst, and squad leader.

Honors, Awards, and Accomplishments

2025 **Doctoral Dissertation Fellowship** (University of Minnesota)
2022 **Best Paper Award** (In2Writing workshop at ACL 2022)
2022 **3M Science and Technology Fellowship** (University of Minnesota)
2018 **Runner-Up**, Elice Data Science Challenge (3rd place out of 300 participants)
2016 **Outstanding Teaching Assistant Award** (2016 Elice Data Science Workshop & Challenge)
2016 **Outstanding Graduate Teaching Assistant Award** (KAIST)
2012 **Runner-Up**, Republic of Korea Army Oratorical Contest (ROK Army)
2011 **Winning Team**, Robotics Localization Challenge (Imperial College London)
2009 **Winning Team**, Deutsche Bank Prize for Topics in AI Group Project (Imperial College London)
2008 **Bronze Medal**, Royal College of Science Union Science Challenge (Imperial College London)

Publications

An asterisk (*) marks co-first authors.

2026 **Meta^n: Recursive Self-Improvement through Emergent Depth**
Zae Myung Kim, Young-Jun Lee, Seungyeon Jwa, Dongyeop Kang
NeurIPS 2026.

2026 **Structure Liberates: How Constrained Sensemaking Produces More Novel Research Output**
James Mooney, Zae Myung Kim, Young-Jun Lee, Dongyeop Kang.
Under review.

2026 **The Amazing Agent Race: Strong Tool Users, Weak Navigators**
Zae Myung Kim, Dongseok Lee, Jaehyung Kim, Vipul Raheja, Dongyeop Kang.
Under review.

2026 **Align to Structure: Aligning Large Language Models with Structural Information**
Zae Myung Kim, Anand Ramachandran, Farideh Tavazoee, Joo-Kyung Kim, Oleg Rokhlenko, Dongyeop Kang.
AAAI 2026.

2025 **Toward Evaluative Thinking: Meta Policy Optimization with Evolving Reward Models**
Zae Myung Kim, Chanwoo Park, Vipul Raheja, Dongyeop Kang.
Under review.

2025 **Anchors Aweigh! Sail for Optimal Unified Multi-Modal Representations**
Minoh Jeong*, Zae Myung Kim*, Min Namgung*, Dongyeop Kang, Yao-Yi Chiang, Alfred Hero.
Under review.

2024 **Threads of Subtlety: Detecting Machine-Generated Texts Through Discourse Motifs**
Zae Myung Kim, Kwang Hee Lee, Preston Zhu, Vipul Raheja, Dongyeop Kang.
ACL 2024.

2024 **Benchmarking Cognitive Biases in Large Language Models as Evaluators**
Ryan Koo, Minhwa Lee, Vipul Raheja, Jong Inn Park, Zae Myung Kim, Dongyeop Kang.
Findings of ACL 2024.

2024 **Under the Surface: Tracking the Artifactuality of LLM-Generated Data**
Debarati Das*, Karin de Langis*, Anna Martin-Boyle*, Jaehyung Kim*, Minhwa Lee*, Zae Myung Kim*, Shirley Anugrah Hayati, Risako Owan, Bin Hu, Ritik Sachin Parkar, Ryan Koo, Jong Inn Park, Aahan Tyagi, Libby Ferland, Sanjali Roy, Vincent Liu, Dongyeop Kang.
Under review.

2022 **Improving Iterative Text Revision by Learning Where To Edit From Other Revision Tasks**
Zae Myung Kim, Wanyu Du, Vipul Raheja, Dhruv Kumar, Dongyeop Kang.
EMNLP 2022.

2022 **Read, Revise, Repeat: A System Demonstration for Human-in-the-loop Iterative Text Revision [Best Paper Awarded]**
Wanyu Du*, Zae Myung Kim*, Vipul Raheja, Dhruv Kumar, Dongyeop Kang.
In2Writing at ACL 2022.

2022 **Understanding Iterative Revision from Human-Written Text**
Wanyu Du, Vipul Raheja, Dhruv Kumar, Zae Myung Kim, Melissa Lopez, Dongyeop Kang.
ACL 2022.

2021 **Visualizing Cross-Lingual Discourse Relations in Multilingual TED Corpora**
Zae Myung Kim, Vassilina Nikoulina, Dongyeop Kang, Didier Schwab, Laurent Besacier.
CODI 2021 at EMNLP 2021.

2021 **Do Multilingual Neural Machine Translation Models Contain Language Pair Specific Attention Heads?**
Zae Myung Kim, Laurent Besacier, Vassilina Nikoulina, Didier Schwab.
Findings of ACL 2021.

2020 **A Multilingual Neural Machine Translation Model for Biomedical Data**
Alexandre Bérard, Zae Myung Kim, Vassilina Nikoulina, Eunjeong Park, Matthias Gallé.
NLP-COVID19 at EMNLP 2020.

2020 **PATQUEST: Papago Translation Quality Estimation**
Yujin Baek*, Zae Myung Kim*, Jihyung Moon, Hyunjoong Kim, Eunjeong Park.
WMT 2020.

2017 **An Adaptive Vocabulary Learning Application through Modeling Learner's Linguistic Proficiency and Interests**
Zae Myung Kim, Suin Kim, Alice Oh, Ho-Jin Choi.
International Conference on Big Data and Smart Computing.

2016 **TIMEX3 and Event Extraction Using Recurrent Neural Networks**
Zae Myung Kim, Young-Seob Jeong, Ho-Jin Choi.
International Conference on Big Data and Smart Computing.

2016 **An Approach to Spam Comment Detection Through Domain-Independent Features**
Jong Myoung Kim, Zae Myung Kim, Kwangjo Kim.
International Conference on Big Data and Smart Computing.

2015 **Temporal Information Extraction from Korean Texts**
Young-Seob Jeong, Zae Myung Kim, Hyun-Woo Do, Chae-Gyun Lim, Ho-Jin Choi.
CoNLL 2015.

2017 **Modeling Long-Term Human Activeness Using Recurrent Neural Networks for Biometric Data**
Zae Myung Kim, Hyungrai Oh, Han-Gyu Kim, Chae-Gyun Lim, Kyo-Joong Oh, Ho-Jin Choi.
BMC Medical Informatics and Decision Making [SCIE, IF: 2.042].

2016 **Investigating the Impact of Possession-Way of a Smartphone on Action Recognition**
Zae Myung Kim*, Young-Seob Jeong*, Kyo-Joong Oh, Hyung-Rai Oh, Youssef Iraqi, Ho-Jin Choi.
Sensors 16(6) [SCIE, IF: 2.437].

Patent

2019 **Terminal, server and event suggesting methods thereof**
Hyungrai Oh, Ho-Jin Choi, Zae Myung Kim, Kyo-Joong Oh, Chae-Gyun Lim.
US Patent US10353975B2.

Teaching Experience

Spring 2025 **Lecturer** – Natural Language Processing (CSCI 5541), University of Minnesota
[Apr 1, 2025] Lecture titled, *LLMs as Agents.*

Fall 2024 **Head TA** – Intro. to Computer Programming in Java (CSCI 1103), University of Minnesota

Fall 2024 **Lecturer** – Natural Language Processing (CSCI 5541), University of Minnesota
[Oct 31, 2024] Lecture titled, *LLMs as Agents.*

Spring 2024 **TA, Lecturer** – Natural Language Processing (CSCI 5541), University of Minnesota
[Apr 2, 2024] Lecture titled, *Instructing and Augmenting LLMs.*

Fall 2023 **TA, Lecturer** – Natural Language Processing (CSCI 5541), University of Minnesota
[Nov 21, 2023] Lecture titled, *Advanced Topics: Instructing and Augmenting LLMs.*

Sept 2022 **Lecturer** – Elice Digital Transformation Training, Samsung Electronics

Winter 2022 **TA** – Advanced Language Processing Winter School 2022

Winter 2021 **TA** – Advanced Language Processing Winter School 2021

Fall 2021 **Mentor** – Academic-Industrial Collaboration Project, Chungbuk National University

Summer 2021 **Lecturer** – Three seminars on NLP trends and practical sessions, Rye & Catchers

Fall 2016 **TA** – Elice AI & Data Science Course, Daejeon Creative Economy Innovation Center

Fall 2015 **TA, Lecturer** – Introduction to AI (CS470), KAIST
[Sept 2, 2015] Lecture on extracting travel-related intents from textual review data.

Summer 2015 **TA** – Machine Learning Summer Camp 2015 (Online), KAIST

Spring 2015 **TA** – Programming Practice (CS109), KAIST

Mentorship

Summer 2026 – Present **Shady Ali** (BS in Computer Science, University of Minnesota)

Summer 2025 – Spring 2026 **Yuxin Chen** (BS in Computer Science, University of Minnesota)

Spring 2025 **Yangfan He** (BS in Computer Science, University of Minnesota)

Spring 2024 – Spring 2025 **Robert Jia** (BS in Computer Science, University of Minnesota)

Summer 2024 – Spring 2025 **Bin Hu** (BS in Computer Science, University of Minnesota)

Spring 2024 – Spring 2025 **Ryan Koo** (MS in Computer Science, University of Minnesota)

Fall 2023 – Spring 2024 **Preston Zhu** (BS in Computer Science, University of Minnesota)

Spring 2022 **Josh Spitzer-Resnick** (MS in Computer Science, University of Minnesota)

Invited Talks

Nov 4, 2026 **Seminar Talk** – Social Reinforcement Learning Lab, University of Washington
"Metacognition for Self-Improving Agents: Who Judges the Judge, Who Improves the Improver"

Sept 21, 2026 **Seminar Talk** – Dept. of Artificial Intelligence, Sungkyunkwan University
"Metacognition for Self-Improving Agents: Who Judges the Judge, Who Improves the Improver"

Jul 28, 2022 **Seminar Talk** – Dept. of Computer Engineering, Chungbuk Nat'l Univ.
Presented research on iterative text revision, machine translation, and discourse relations.

Dec 2, 2021 **Colloquium Talk** – Graduate School of Software, KAIST
"Cross-Lingual Discourse Analysis and Its Application"

Oct 12, 2018 **Conference Talk** – DEVIEW 2018
"Papago Internals: Model Analysis and Development with Applied Technology"

Nov 11, 2016 **Seminar Talk** – Rye & Catchers
Talked about how textual data can be processed and utilized by *Bibly*, the company's book recommendation service.

Academic Services

2027 **AAAI** 2027 (PC), **ICLR** 2027 (Reviewer), **WWW** 2027 (Reviewer)

2026 **ICML** 2026 (Gold Reviewer), **ICLR** 2026 (Reviewer), **COLM** 2026 (Reviewer)
NeurIPS 2026 (Reviewer), **EMNLP** 2026 (Reviewer), **PLOS One** (Reviewer)
Expert Systems with Applications (Reviewer)

2025 **AAAI** 2026 (PC), **ACL** 2025 (Reviewer), **NeurIPS** 2025 (Reviewer)

2024 **AAAI** 2024 (PC), 7th **IWDS** (PC), **Knowledge-Based Systems** (Reviewer),
NAACL 2024 (Reviewer)

2023 **EMNLP** 2023 (Reviewer), 6th **IWDS** (PC)

2022 5th **IWDS** (PC)

2021 4th **IWDS** (PC)

2020 **IEEE Access** (Reviewer), **NLP-COVID19 Workshop** at EMNLP 2020 (Reviewer)

2019 2nd **International Workshop on Dialog Systems (IWDS)** (PC)