SEONUK KIM

Machine Learning Scientist,   seonukkima@gmail.com
Thingsflow   https://seonukkim.github.io

EDUCATION

2020.03 – Present	**Ulsan National Institute of Science and Technology (UNIST)**	Ulsan, Korea
	Undergraduate student. Double majoring in *Industrial Engineering* and *Design*	

EMPLOYMENT

Thingsflow   Seoul, Korea

2023.09 – Present   *Machine Learning Scientist – Alternative Military Service*
2023.05 – 2023.08   *Machine Learning Scientist Intern*
Mentors: Joonhee Kim, Jooyeon Kim, Jeff Oh

2021.12 – 2024.03   **Expressive Computing Laboratory, UNIST**   Ulsan, Korea
Research Assistant
Advisor: Professor Kyungho Lee

2020.11 – 2021.12   **Service Engineering and Knowledge Discovery Laboratory, UNIST**   Ulsan, Korea
Artificial Intelligence Graduate School (AIGS) Creative Independent Project Researcher
Advisor: Professor Chiehyeon Lim

HONORS AND AWARDS

2024   **Gold Prize, 3rd POSTECH-UNIST-KAIST Data Science Competition**
3rd place. $1,500 as awards
Predictive modeling and decision-making based on datasets provided by LG Electronics

2023   **Presidential Science Scholarship**, Korea Student Aid Foundation
Selected as one of 60 scholarship recipients for outstanding academic excellence and potential
to contribute to STEM area. $5,500 awarded every semester for full tuition and living expenses
for 2 years by government of South Korea. Awarded scholarship certificate in president's name

7th Ambassador Certificate, Consulate-General of Japan in Busan
Assisted events as volunteer and created official social media content and Vlog

JENESYS 2022 Certificate, Consulate-General of Japan in Busan
Invitation from the Ministry of Foreign Affairs of Japan. Visited Tokyo, Miyagi and Iwate for
7 days on the theme of *Disaster Management Tourism*. Selected as an outstanding visit review
and published on official website of Consulate General of Japan in Busan

Gold Prize, 2nd KAIST-POSTECH-UNIST Data Science Competition
2nd place out of 43 teams. $1,500 and MakinaRocks internship opportunity as awards
Predictive modeling and decision-making based on datasets provided by Hana Bank

2022   **Best Student Paper Honorable Mention, Korea Society of Design Science**
KSDS 2022; among the top 39% of all 54 submissions [d.1]

Excellence Prize, 9th IEEE Quiz Contest for undergraduates
Quiz competition based on literature search and analysis organized by IEEE and KITIS

Silver Prize, 1st UNIST-POSTECH-KAIST Data Science Competition
4th place out of 38 teams. $800 as awards
Predictive modeling and decision-making based on datasets provided by Korea National Oil
Corporation (KNOC)

2021 **Gold Prize, Lee Soo-hyun 20th Memorial Book Review Essay Contest**
2nd place out of 32 undergraduate participants. Invited by the Japanese Ministry of Foreign
Affairs for a 10 Days Visit to Japan as awards, but canceled visits due to the COVID-19 omi-
cron variant virus pandemic
Commemorating the righteous Lee Soo-hyun and proposing measures for the advancement of
Korea-Japan relations

2020 **Excellence Prize (Samsung Electronics Vice Chairman Prize), Campus Patent Universiade**
2nd place out of topic. $2,300 as awards
Samsung Electronics Assigned Topic: Developing Refrigerator for User Health Management

Academic Performance Scholarship, UNIST
Merit-based full scholarship for 2 years, including monthly academic stipend. After being
selected as Presidential Science Scholar, 20% of original scholarship funds were allocated for
academic stipend each semester

PUBLICATIONS   * denotes equal contributions

PEER-REVIEWED CONFERENCE AND JOURNAL PAPERS

[c.1] **Designing Interfaces for Text-To-Image Prompt Engineering with Stable Diffusion Mod-
els: A Human-AI Interaction**
Seonuk Kim, Taeyoung Ko, Yousang Kwon, Kyungho Lee
IASDR 2023: Congress of the International Association of Societies of Design Research

PEER-REVIEWED POSTERS AND WORKSHOP PAPERS

[p.1] **Representing the Timbre of Traditional Musical Instruments Based On Contemporary
Instrumental Samples Using DDSP**
Yousang Kwon, Seonuk Kim, Taeyoung Ko, Juhyeok Yoon, Kyungho Lee
UIST 2023 Poster: ACM Symposium on User Interface Software and Technology

PEER-REVIEWED DOMESTIC CONFERENCE AND JOURNAL PAPERS (in Korean)

[d.2] **#taggenerator: How an Online Community Designs an Interface for Text Prompt Inputs
Using a NovelAI's Diffusion Model**
Seonuk Kim, Yousang Kwon, Kyungho Lee
HCIK 2023: HCI KOREA Conference

[d.1] **A Study on the Use of AI as Creative Support Tool for Line Drawing in Manga Production**
Seonuk Kim, Kyungho Lee
KSDS 2022: 2022 Korea Society of Design Science Conference
Student Paper Honorable Mention Award (top 39%)

BOOK CHAPTERS (in Korean)

[b.1] **Swings and Blossoms**
Seonuk Kim
In **The Moment when the Star is Born**. egowriting. 2021. pp.133-166.
Short stories written by different people including the disabled

EXPERIENCES

Thingsflow   Seoul, Korea

2023.09 – Present   *Machine Learning Scientist – Alternative Military Service*
2023.05 – 2023.08   *Machine Learning Scientist Intern*

Pet AI Profile Image Generator

- Co-developed and launched **Hellobot Pet AI Profile** generator as two-person team, releasing it both domestically and globally. Oversaw the entire development of **Pet AI Profile 3: National Athlete Edition** and **Pet AI Profile 4: Job Edition**, which generates anthropomorphized images of pets. Significantly contributed to profit

Web Novel Episode 1 Generator: Character Traits Fixed via LoRA Fine-Tuning

- Improved on LoRA fine-tuning in AWS EC2 and Azure environments
- Demonstrated web novel generator at AIGS Symposium Thingsflow booth, which produces covers and illustrations

Movie-to-Webtoon Project

- Created movie prologue webtoon based on Barbie trailer using ControlNet and LoRA. Demonstrated at AIGS Symposium Thingsflow booth

AI QR Image Generator

- Generated QR codes that fuse celebrity or character images using ControlNet and LoRA. QR image is natural and can be scanned with QR reader app to reveal hidden QR codes

2021.12 – 2024.03   **Expressive Computing Laboratory, UNIST**   Ulsan, Korea
                    Research Assistant (Advisor: Professor Kyungho Lee)

Developed Ball Jointed Doll Tangible User Interface (TUI) based on Stable Diffusion

- Developed TUI that ControlNet-based generates images with desired poses and compositions by manipulating ball jointed dolls in reality and capturing them using webcam
- Planned and wrote research grant proposal was selected UNIST AI Challenge Program (AICP) with grant of $3,000 after school screening

Suggested Image Generative AI Service Interface Design Improvement Guidelines

- Conducted case studies and thematic analyses on posts with more than 10 recommendations in Arcalive AI Art channel, right after emergence of NovelAI Image Generation
- Defined Stable Diffusion Web UI user behavior patterns, provided UX/UI, external service usability evaluations, and suggested guidelines through qualitative analysis [d.2]
- Evaluated UX/UI, extensions, external services, and usability and improved guidelines as follow-up studies based on quantitative analysis [c.1]

Developed Creativity Support Tool for Line Drawing in Manga Production

- Implemented pipeline that turns analog sketches or rough digital sketches into images with pencil texture line art and shading using state-of-the-art (SOTA) models [d.1]

Print.ly: Applied Style-Transfer in LG Household & Health Care's Mini Tattoo Printer

- Industry-academia Joint Research with LG Household & Health Care
- Bulit pipeline that generates artist style-transferred image with YOLACT segmentation
- Set up `conda` virtual environments, attempted built Docker container and image, and wrote README. Composed and delivered manual for operating the entire pipeline

bbb Korea: Multilingual Voice Data Text Conversion App

- Industry-academia Joint Research with bbb Korea
- Implemented pipeline that converts dialogue voice files in 20 languages into text using AWS S3 and transcribe

2020.11 – 2021.12   **Service Engineering and Knowledge Discovery Laboratory, UNIST**   Ulsan, Korea
AIGS Creative Independent Project Researcher (Advisor: Professor Chiehyeon Lim)

Developed Cat Arthritis Predictive Model Based on Behavioral Data

- Planned and wrote research grant proposal was selected AIGS Creative Independent Project Research with grant of $3,800 after school screening
- Proposed research topics and designed controlled experiments. Developed cat movement measurement device using 9-axis IMU sensor. Collected and preprocessed time-series data of position, acceleration, and angular velocity based on cat behaviors

PROJECTS

2023.10 – 2024.01   **3rd POSTECH-UNIST-KAIST Data Science Competition**
Team OpsIEdian Leader. Finalist Presenter

- **3rd Place (Gold Prize)**
- Topic: Parts Demand Forecasting and Cost Optimization using LG Electronics Data
- Task 1: Product parts demand forecasting using decision tree-based ensemble models
- Task 2: Cost-considered product parts demand forecasting, solving inventory management problem with Auto ARIMA and heuristic decision-making
- Presentation: Wrote and delivered 58-page report discussing strengths and weaknesses of attempted techniques, suggestions for improvements in terms of data, model, interface, and evaluation metrics

2022.10 – 2023.01   **2nd KAIST-POSTECH-UNIST Data Science Competition**
Team The Quick Brown Fox Jumps Over The Lazy Dog Leader. Finalist Presenter

- **2nd Place out of 43 Teams (Gold Prize)**
- **In MakinaRocks Internship Application, Passing Document Screening as Awards**
- Topic: Business Prediction and Advertising Decision-Making using Hana Bank Data
- Task 1: Binary classification. Predicted probability whether self-employed or not using CNN-based ensemble model
- Task 2: Decision-making. Maximized expected revenue using simulated annealing
- Task 3: Combined decision-making based on time-series data for access probability. Maximized expected revenue from advertising decisions using bounce rate
- Presentation: Proposed advancements in data, model, and service aspects

| 2021.10 – 2022.01 | **1st UNIST-POSTECH-KAIST Data Science Competition** |
| | *Team JORDY Leader. Presentation Q&A Answerer* |

- **4th Place out of 38 Teams** (Silver Prize)
- Topic: Shale Gas Production Prediction and Well Purchase Decision-Making Based on Korea National Oil Corporation (KNOC) Data
- Task 1: Binary classification. Predicted production using AutoML library PyCaret
- Task 2: Decision-making. Maximized expected well purchase profits using binary integer programming
- Presentation: Suggested adding Reynolds number as shale gas-related feature to structured data, introduced environmental scores in context of ESG management

| 2021.04 – 2021.10 | **2021 Campus Patent Universiade (Patent Commercialization Sector)** |
| | *Team 721 Leader. First Round Presenter (Advisor: Professor Chiehyeon Lim)* |

- Topic: Method and System for Motion Based on Interactive Service
- Patent KR10-171148 (US2016-0216770) provided by Electronics and Telecommunications Research Institute (ETRI)
- Proposed industrial accident prevention and response solutions based on ○ ataset construction methods for hazard and accident recognition model training
- Market research based on market analysis reports and product analysis
- Analyzed industrial accident reports focusing on rates and death per thousand
- Examined market impact of Serious Accident Punishment Act and government policies
- Designed automatic object and motion information extraction and labeling system using CCTV and patrol robots
- Constructed Technology Tree and OS matrix. Analysed patents focused on applicants, years, and countries. Proposed patent avoidance designs
- Searched patents using IPC classification codes in WIPSON
- Analyzed by using methods such as personas, PESTEL, 3C/FAW, SWOT, 4P, and business model canvas. Established technology transfer and marketing strategies based on policy compliance
- Proposed business expansion areas based on expected growth rates and total profits
- Interviewed and consulted with professors, companies, institutions, factory officials, and patent attorneys

| 2020.04 – 2020.11 | **2020 Campus Patent Universiade (Patent Commercialization Sector)** |
| | *Team 77 Leader. First Round Presenter (Advisor: Professor Chiehyeon Lim)* |

- Topic: Refrigerator for User Healthcare
- Patent KR10-2023081 provided by Samsung Electronics
- Proposed smart healthcare refrigerator providing platform service for trainer communication and health score competition among users
- Conducted market research in healthcare industry and contactless medical platforms
- Patent avoidance design based on OS matrix, prior art survey
- Searched patents using IPC classification codes in KIPRIS
- Analyzed by using methods such as personas, PEST, 3C, SWOT, STP, 4P, and business model canvas

EXTRACURRICULAR ACTIVITIES

2020.09 – Present	**HeXA (Hacker's eXciting Academy)** Only programming development and information security club at UNIST, established in 2011
2022.08 – 2023.07	*President*
2021.03 – Present	*Executive Board Member*

- Planned, emceed, budgeted, and designed posters for NEXUS 2023: Computer Science and Engineering Major Alumni Homecoming event and lectures
- Secured sponsorship from Hyundai Mobis as outstanding SW club, and received $800
- Designed and ordered HeXA sweatshirts, t-shirts, and caps
- Project managed and designed HeXA website renewal project
- Directed promotional video, winning award in UNIST Club Promotional Video Contest
- Led study and projects on developing personal website based on GitHub Pages
- Led style transfer study
- Participated in basic Linux & Git study, and computer vision study
- Organized teams for data science competitions, and won three consecutive prizes
- Organized volunteer teams. Taught local youth in Ulju The Dream Campus Program at UNIST, and NAVER CONNECT Foundation's 1784 School Revolution Program

2021.01 – Present	**brAIns (brew AI neo scientist)** Artificial Intelligence Research Club under UNIST AIGS, started in 2021
2022.03 – 2023.08	*Co-president*

- Wrote articles on style transfer for the brAIns blog
- Conducted study on Stable Diffusion, and basic AI
- Participated in paper review study and Python programming for generating MNIST images with GAN
- Conducted Kaggle study in preprocessing, analysis, prediction, and visualization using Titanic dataset
- Participated in hands-on machine learning study and reinforcement learning study

2022.08 – 2023.02	**Consulate-General of Japan in Busan** Korean undergraduate ambassadors from Busan, Daegu, Ulsan, and Gyeongsangbuk-do, supported by Ministry of Public Affairs and Culture of Consulate General of Japan in Busan
2022.08 – 2023.02	7th Ambassador
2023.01	JENESYS 2022 (Japan-East Asia Network of Exchange for Students and Youths)

- Created contents for official social media of Consulate-General of Japan in Busan
- Invited by the Japanese Ministry of Foreign Affairs, participated as delegate in the JENESYS 2022, focusing on 'Disaster Management Tourism' from January 13th to 19th
- Selected for outstanding visit Vlog and outstanding visit essay and published officially
- Posted visit essay in UNIST College of Information and Biotechnology newsletter

UNIST Undergraduate Student Council

2023.03 – 2023.06   *Policy Team Member*, UNIST Undergraduate Student Council Emergency Committee
- Managed human rights tasks, produced card news on campus bus information, and served as clerk for 2nd quarter UNIST Undergraduate Student Council Convention

2023.02 – 2023.03   *Chair*, UNIST Club Union Election Commission
- Oversaw Club Union Election work. Proposed establishment of Election Research Committee at UNIST Club Union Convention

2021.09 – 2021.12   *Legal Support TF Member*, WE:TH U, 11th UNIST Undergraduate Student Council
- Created labor law summary materials for student rights enhancement. Investigated guidelines for the Student Rights Charter. Produced card news for wise part-time work life and public institution information disclosure systems

SKILLS

Image Generation	Diffusers, Stable Diffusion web UI (Automatic1111) and extensions, ComfyUI, kohya_ss
Machine Learning	TensorFlow, Keras, PyTorch, PyCaret, KerasTuner, AutoKeras, Optuna
Visual Design	Clip Studio, Photoshop, Illustrator, InDesign, Figma, Premiere Pro
Product Design	Fusion 360, SolidWorks, Ansys, Zortrax

TEACHING

TEACHING ASSISTANT

2023.03 – 2023.06   **Teaching Assistant – ITP10702: Introduction to AI Programming I**
School of New UNISTars, UNIST (Instructor: Michael Burrell)

TUTOR

2022.12 – 2023.02   **Tutor [HeXA] – NAVER CONNECT 1784 School Revolution Program**
Teaching AI, SW, and Autonomous Vehicles to Local Elementary Students as Volunteering

2022.05 – 2022.12   **Head Tutor [HeXA] – 2022 Ulju The Dream Campus Program**
Teaching Python, Algorithms, and Development Skills to Local Middle School Students

2021.09 – 2021.12   **Head Tutor [UNITS] – 2021년 Ulju The Dream Campus Program**
Teaching 3D Printing and Arduino to Local Middle School Students as Volunteering

PERSONAL INFORMATION

2019.06 – 2020.01   **Baron Academy of Manga and Webtoon**   Busan, Korea
Academy that professional webtoonists teach to create manga, webtoon, and illustration

Cross-registration
2021.12 – 2022.01	Korea Advanced Institute of Science and Technology (KAIST)	Daejeon, Korea
2020.12 – 2021.01	Seoul National University	Seoul, Korea

REFERENCES

Kyungho Lee, Assistant Professor at Department of Design, UNIST
Advisor during undergraduate research assistant
`kyungho@unist.ac.kr` | `+82 52-217-3034`

Chiehyeon Lim, Associate Professor at Department of Industrial Engineering, UNIST
Advisor during projects
`chlim@unist.ac.kr` | `+82 52-217-3112`

Jooyeon Kim, Assistant Professor at Graduate School of Artificial Intelligence, UNIST
Advisor during academic and industrial experiences
`jooyeon.kim@unist.ac.kr` | `+82 52-217-3459`