

# Koyilbek Valiev



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## Summary

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AI Engineer with 2+ years of hands-on experience building vision-language systems and machine learning pipelines. Proven track record in video anomaly detection, time series forecasting, and multimodal retrieval using VLMs. Actively exploring VLM/LLM-based methods, retrieval-augmented generation, and Vision-Language-Action (VLA) models, with a growing interest in real-world robotics applications.

## Experiences

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### Multimodal AI Engineer Intern

*Pia Space, Seoul, South Korea*

*March 2025 - mid June 2025*

#### AI Video Anomaly Detection & Multimodal Retrieval

- Collected and annotated diverse anomaly video datasets (e.g., violence, falls) using CVAT and proprietary annotation tools.
- Optimized lightweight VLMs (<1B params) for video anomaly classification with dynamic sampling and prompt engineering in few-/zero-shot settings.
- Co-developed **MACS 3.0**, a prompt-driven multimodal system for CCTV anomaly detection, improving accuracy by **~24%**.
- Built a benchmark dataset with manually captioned videos for video-text and video-video retrieval.
- Developed and evaluated cross-modal retrieval models (video-to-text, text-to-video, video-to-video) to enhance scalable multimodal video understanding.
- Implemented and adapted a research paper's method on **multimodal explanation maps for VLMs**, generating visualizations that highlight key words in text prompts and corresponding video regions to improve model interpretability and alignment.

### AI Engineer | Lead Intern

*Recs Innovation Ltd, Naju, South Korea*

*Feb 2024 – March 2025*

- Bidding Amount Prediction: Built an ML pipeline (cleaning, anomaly detection, feature engineering, data clustering) that reduced prediction error to **0.0017%** and increased bid win rate by **15×**
- Solar Power Forecasting: Developed a full-stack 48-hour ahead forecast using LSTM-CNN, GRU, Transformer, and classical models; **achieved 6% error** and deployed in the Sun-Q EMS.
- Photovoltaic Sensor Anomaly Detection: Led development of an unsupervised AI solution (LSTM Autoencoder, LSTM-VAE, TranAD, VAE), **achieved >70% F1-score on real-world data**, and deployed the system into the Sun-Q EMS.
- Documentation & Team Leadership: Wrote **comprehensive technical documentation on architecture, data workflows**, and managed a small AI team using Notion and ClickUp to coordinate project planning, task assignment, and deliverable tracking.

### AI Research Intern

*Capstone Project, Woosong University*

*Sep 2023 - Dec 2023*

- Coordinated team of 4 engineers to develop a real-time trash-bag optimization system for NetVision.

- Deployed YOLOv8 to **detect, classify, segment, track & size-estimate bags** in video.
- Participated with this project in Woosong University's 2023 Capstone Competition with permission from NetVision, winning 1st place award.

#### AI Intern

*Sequus PTY LTD, Australia (Remote)*

*Jun 2023 - Aug 2023.*

- Automated conversion of bounding-box outputs into YOLO, Pascal VOC, and custom formats.
- Annotated hundreds of architectural drawings (LabelImg) to improve model accuracy.

**Projects:** *Refer portfolio koyilbek for more details and other projects*

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- **Multimodal Effective Video Search and Interaction with RAG:** Retrieval-augmented video Q&A using Whisper, LLaVA, BridgeTower, LanceDB, LangChain & Gradio. The project effectively integrated state-of-the-art retrieval techniques to enhance user interaction with video content. More details in: [Project Link](#)
- **Neural Conversational Chatbot:** Built a seq2seq chatbot in PyTorch with a bidirectional GRU encoder and GRU decoder enhanced by Luong's global attention, trained on 220K+ Cornell Movie-Dialogs pairs. Optimized batching and hyperparameters (500 hidden units, 2 layers, 0.1 dropout) for efficient training, and added attention-weight visualization and a modular codebase. More details: [Project Link](#)

#### Education

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##### Woosong University

*Sep 2021 - June 2025*

*Bachelors, Major in AI & Big Data*

**Key courses:** Data Visualization, Artificial Intelligence, Machine Learning Theory & Lab, Computer Vision, Statistics, Linear Algebra, Discrete Mathematics, Capstone Project

#### Skills

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Python, PyTorch, Hugging Face Transformers, LangChain, LlamaIndex, FastAPI, OpenCV, Ollama, Unsloth, MLflow, Optuna, Git, NumPy, Pandas, scikit-learn, Matplotlib, Docker

#### Awards

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- 1st Place, Woosong University Capstone Competition (Dec 2023)
- 100% Merit Scholarship, Woosong University (Sep 2023 – Dec 2023)
- President's Award, Woosong University (Dec 2023)