# Koyilbek Valiev

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## Summary

Hello! I'm Koyilbek from Uzbekistan, a passionate AI engineer dedicated to building intelligent systems and leveraging cutting-edge technologies to solve real-world problems. With over three years of experience in diverse, hands-on projects, I bring a proven ability to tackle challenges and drive impactful solutions. I am deeply committed to continuous learning and growth, currently expanding my expertise in multimodal AI, including Large Language Models (LLMs) and Large Vision Models (LVMs). I thrive on creating innovative solutions that contribute to societal progress.

## Experiences

**AI Research Intern**    *Recs Innovation Ltd, Naju, South Korea*
*July 2024 – Present*

**Optimal Bidding Prediction:**

- Engineered an ML-based bidding optimization system for energy projects integrating supervised learning and time series analysis:

  - Built comprehensive data pipeline with automated cleaning, anomaly detection, and feature engineering.

  - Achieved 0.0017 % prediction error rate through Hybrid ML algorithms based on data distribution.

- Increased bid winning probability by 15x .

**Solar Power Generation Prediction Project:**

- Developed an end-to-end solar power forecasting system achieving 6-8% forecast error rate through hyper parameter tuning and weather forecast data integration.

- Designed and implemented a comprehensive prediction framework utilizing:

  - Advanced neural networks: Custom LSTM-CNN hybrid architecture, GRU with attention mechanisms, and transformer-based models.

  - Classical ML models: Optimized implementations of Linear Regression, XGBoost, and Random Forest algorithms.

  - Reinforcement learning: Developed custom OpenAI Gym environments to implement reinforcement learning algorithms (PPO, A2C, DDPG) with PyTorch and Stable-Baselines3 for power prediction.

- Successfully integrated the optimized prediction model into Sun-Q Energy Management System (EMS), enabling real-time power generation forecasting capabilities.

**AI Lead Intern**    *Recs Innovation Ltd, Naju, South Korea*
*March 2024 – July 2024 (5 months)*

- Led development of an advanced unsupervised anomaly detection system for photovoltaic sensors, successfully integrated into Sun-Q Energy Management System (EMS).

- Implemented state-of-the-art deep learning architectures (LSTM Autoencoder, LSTM-VAE, TranAD) while overseeing team development of GNN and USAD models.

- Built automated data pipeline processing 1.3M+ daily sensor readings, reducing preprocessing time from 3 hours to 15 minutes.

- Established MLflow experimentation framework for systematic model evaluation and optimization, tracking key performance metrics (recall, precision, F1-score) across multiple architectures.

- Managed comprehensive technical documentation efforts, creating detailed guides for model architecture, data workflows, and deployment procedures.
- Led small AI team using Notion/ClickUp, maintaining regular communication about project updates with executives and coordinating international stakeholder meetings with Uzbek Energy.
- Orchestrated end-to-end development of deep learning solutions while ensuring quality standards and meeting project deadlines.

**AI Intern**                                                                                     *Recs Innovation Ltd, Naju, South Korea*
*Feb 2024 – March 2024 (one month)*

- Collaborated with CTO and Department Head to analyze photovoltaic plant anomaly detection requirements, maintaining detailed project documentation in Notion.
- Developed and implemented standard Autoencoder and Variational Autoencoder models for solar panel sensor data, achieving 65% F1-score on synthetic test data.

**AI Research Intern**                                                                    *Capstone Project, Woosong University*
*Sep 2023 - Dec 2023 (4 months)*

Developed AI-Powered Trash Bag Optimization System:

- Coordinated team of 4 engineers to create computer vision system for NetVision optimizing trash bag collection routes and processes.
- Utilized YOLOv8 architecture to AI system detecting, classifying, segmenting, tracking, and size-estimating trash bags from video in real-time.
- Participated with this project in Woosong University's 2023 Capstone Competition with permission from NetVision, winning 1st place award.

**AI Research & Computer Vision Intern**                                      *Sequus PTY LTD,  Australia (Remote)*
*Jun 2023 -  Aug 2023 (2 months)*

Utilized advanced image annotation techniques to enhance the accuracy of architectural models:

- Annotated hundreds of architecture drawings and labeled key components like one and multiple regions on constructional floor plans using LabelImg.
- Wrote scripts to transform output bounding boxes from model to various formats including YOLO, Pascal VOC.

**Computer Vision & IoT Intern**                                               *The Sparks Foundation, India (Remote)*
*May 2023 - June 2023 (one month)*

Architected Real-Time Face Mask Detection System:

- Developed end-to-end deep learning pipeline using PyTorch, OpenCV, and MTCNN enabling 97% accurate identification of mask wearing from live video.
- Fine-tuned ResNet50 pre-trained model through transfer learning, retraining final layers to categorize mask wearing from real-time feed.
- Mastered data preprocessing and model training.

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

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- ***Multimodal Effective Video Search and Interaction with RAG:*** Developed a Multimodal Retrieval-Augmented Generation (RAG) system designed to enable intelligent querying and interaction with video content. Engineered a robust pipeline leveraging multimodal AI techniques, including video frame extraction, transcription, multimodal embedding, and retrieval. Implemented video preprocessing scripts to handle three video input types (video with transcript, video with audio but no transcript, and video with no audio or transcript), extracting frames and generating transcriptions using OpenAI's Whisper and LLaVA models. Optimized data ingestion into the LanceDB vector store using BridgeTower embeddings, enhancing retrieval quality through transcript augmentation. Designed and implemented a LangChain-powered RAG system,

enabling video-based querying via both text-based and web interfaces using Python and Gradio. The project effectively integrated state-of-the-art retrieval techniques to enhance user interaction with video content. More details in: ***Project Link***

- **LLaMA Customer Support Assistant***: Built an advanced customer service AI system by fine-tuning LLaMA 3.2 model with Unsloth optimization, implementing LoRA fine-tuning for 2x faster training speed while maintaining efficiency on M1 architecture. Engineered custom data processing pipeline for 27K customer support conversations, optimizing memory usage through gradient checkpointing and efficient batching. Achieved natural language response generation for order-related queries while keeping memory usage under 8GB RAM. Developed comprehensive testing suite and performance visualization tools using PyTorch, Transformers, Python 3.10, and Apple M1 MPS backend. More details in:  ***Project Link***

## *Education*

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**Woosong University**                                                                                *Sep 2021 - June 2025*
*Bachelors, Major in AI & Big Data*

**Fergana High School No: 13**                                                           *Sep 2020 - June 2021*
*GPA:5/5, Achieved 4A*s in Physics and Mathematics*

## *Skills*

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Python, PyTorch, TensorFlow, Hugging Face Transformers, OpenCV, FastAPI, Ollama,  Unsloth, Git, Langchain, MLflow, Optuna, Docker, Project Management, Public Speaking, Problem-Solving, Critical Thinking, Adaptability, Teamwork.

## *Awards*

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| **Merit-Based 100% Scholarship Award** | Woosong University, Sep 2023 - Dec 2023 |
| **Woosong University President's Award** | Woosong University, Dec 2023 |
| **IoT Class Learning Concert  Winner** | Woosong University, Dec 2023 |
| **2nd place in ML Class Concert Competition** | Woosong University, Dec 2023 |
| **2nd Place in District English Language Competition** | Fergana District Olympiad, 2019 |
| **1st Position in Inter-School Olympiad** | Fergana District Olympiad, 2015 |
| **Top Performer in Chess Competition** | Fergana Chess Competition, 2013 |

## *Other  Experiences*

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- *Busan Dive 2024 Hackathon (Oct 2024):* Built a LLM Tour Recommendation System with a multi-agent architecture using LangChain, Ollama, and LLaMA 3.2 open-source model . The system optimized daily itineraries and provided contextual travel recommendations in Busan.

- *Volunteer Experience ( Jul 2023 - Nov 2023):* Served as a Sol-Green Police Volunteer at Woosong University, leading campus environmental initiatives to maintain cleanliness and promote sustainability.

- *Teaching Experience ( Oct 2021- Dec 2021):* Taught a foundational Python programming course to freshmen at Woosong University, delivering lectures and hands-on tutorials via Zoom.

- *Book Translation Project (2021):* Led a team to translate and publish three books, managing copyright acquisition, translation processes, and final publication, successfully expanding access to literature in Uzbek language.