

# Enbiya Çabuk

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Control and Automation Engineering student at ITU building machine learning systems at the intersection of control theory and deep learning. Designed a multi-headed CNN architecture fusing time-series and image modalities for control system identification. Built a deep learning framework from scratch with custom autograd, convolutional layers, and transformer blocks. Current work includes viewpoint-invariant object detection using LoRA-adapted vision transformers with 3D-consistent synthetic data.

## Education

### Istanbul Technical University

Control & Automation Engineering | Expected Graduation: June 2027

- Ranked 4883rd out of 3 million people in the exam. (Top 0.16%)

Istanbul, Turkey

Sep 2023 - Current

## Work Experience

### Backend Developer

Coverse

- Worked on the backend infrastructure for a film-focused social platform incubated at ITU Çekirdek.
- Designed robust RESTful APIs and optimized SQL database schemas to handle user interactions.

Istanbul, Turkey

Feb 2025 - Oct 2025

## Projects

### Viewpoint-Invariant Object Detection via 3D-Consistent Synthetic Adaptation

[GitHub](#)

A LoRA fine-tuning pipeline comparing 3D-synthetic vs 2D-augmented training for single-image object detection.

Mar 2026 - Current

- Designed an A/B experimental framework comparing LoRA adapters trained on Zero123++-generated 3D-consistent views against 2D-augmented data from a single reference image.
- Built a detection pipeline using frozen DINOv2 backbone with LoRA (rank 16) on Q/V projections, SAM region proposals, and cosine similarity scoring against object prototypes.
- Demonstrated that 3D-consistent synthetic views outperform 2D augmentation across all viewpoint bins on Google Scanned Objects evaluation.

### Multimodal System Identification CNN

[GitHub](#)

A dual-stream deep learning framework in PyTorch for classifying control system dynamics.

Feb 2026 - Current

- Engineered a multi-headed CNN architecture fusing 1D time-series signals with 2D step-response image processing to classify 6 control system types.
- Resolved unstable generalization and high-variance training through targeted network capacity reduction, AdamW optimization, and gradient clipping.
- Developed an Explainable AI (XAI) evaluation pipeline using Grad-CAM to validate morphological feature extraction and interpret network attention.

### forgeNN: A Modern Deep Learning Framework from Scratch

[PyPI](#) | [GitHub](#)

Sole author of a DL framework, developed in Python. The framework is open source and published on PyPI.

Aug 2025 - Current

- Engineered a dynamic computation graph with vectorized tensor operators, achieving 3.2x speedup over PyTorch on MNIST.
- Developed core modules from scratch, including transformer blocks with multi-head self-attention, reaching >97% test accuracy.

### rigidRL: A 2D Rigid Body Physics Engine for Deep Reinforcement Learning

[GitHub](#)

Developing a 2D rigid body physics engine, optimized for deep reinforcement learning integration.

Oct 2025 - Current

- Developing a high-performance 2D rigid body physics engine in C++ and SDL2, optimized for deep reinforcement learning integration.
- Architecting a flexible Entity-Component System (ECS) to enable user-defined robot morphologies and dynamic environmental constraints.

## University Teams

### IT Coordinator

ITU OTOKON

- Modernized IT operations by completely redeveloping the OTOKON and ITURO websites.
- Replaced legacy systems with a new high-performance architecture and a MongoDB registration database.

Istanbul, Turkey

Sep 2024 - Current

### Software Team Member

ITU GAMMA

- Researched UAV subsystem dynamics including airspeed sensors and autonomous landing algorithms to inform control design.
- Developed a responsive Flight Interface GUI using PyQt for real-time telemetry tracking and mission monitoring.

Istanbul, Turkey

Feb 2024 - Dec 2024

## Skills

### Programming Languages

Python, C++, MySQL, JavaScript, HTML/CSS, MATLAB

### AI & ML Frameworks

NumPy, TensorFlow, PyTorch, OpenCV, SciPy, Pandas

### Tools & Libraries

Git, CMake, SDL2, PyQt, Eigen, PyBind11, MongoDB

### Core Competencies

Deep Learning, Reinforcement Learning, Computer Vision, Control Theory, Automatic Differentiation

### Languages

English (Professional), German (Intermediate), Turkish (Native)