

Toygar Tanyel

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Profile

I like understanding things, and I am curious about what a mind is doing when it understands, which carries me to biological and philosophical questions alike. I trained in computer science, so the artificial version was always in front of me, and how much carries over is still what I want to know. Explanation is the problem I keep returning to. Whether what is explained is a model or a person, the reasons for what it did have to be recoverable for the account to mean anything. Where the machine case falls short it falls short on means rather than in kind, because what an explanation has to satisfy is a person. Of the accounts on offer, counterfactual reasoning convinces me most, and it is older than the methods that now carry its name. The work spans medical imaging, biosignals and language models, and has had to hold up in production. I am the architect of the agent stack at Promake, and earlier built the breast-cancer detection stack in hBreastMMG, part of the first radiology AI suite from Türkiye to be CE marked under the MDR.

Research Interests

Interpretability and explainability · Theory and philosophy of explanation, counterfactual reasoning in particular · Evaluation of explanations · Perception, language and learning · Trustworthy ML across modalities (medical imaging, biosignals, language models) · Bridging ML research with real-world deployment.

Education

M.Sc., Biomedical Engineering

2023 – 2025

Istanbul Technical University, Department of Electronics & Communication Engineering · 120 ECTS · GPA 3.83/4.00

Thesis: [Early Diagnosis of Acute Myocardial Infarction Using ECG Signals with Explainable Artificial Intelligence](#) (supervised by Assoc. Prof. [İlkay Oksuz](#); supervisor and examining committee both from Computer Engineering). The degree says biomedical; the work in it was computer science.

B.Sc., Computer Engineering

2018 – 2023

Yildiz Technical University · 240 ECTS · GPA 3.37/4.00

Two graduation projects: [Deep Learning Approaches For Alzheimer's Disease Diagnosis](#) and [Classification of Disaster-Related Tweets](#).

Research Experience

Research collaborations carried alongside graduate study and full-time industry roles.

University of Southern Denmark, Visiting Researcher

Nov 2024 – Present

Interpretable machine learning & language models; group of Assoc. Prof. [Serkan Ayvaz](#), Centre for Industrial Software

Istanbul Technical University, Graduate Researcher

Jul 2023 – Jul 2025

Explainable AI for medical imaging & biosignals: counterfactual explanation for ECG and MRI, and evaluation of saliency-based explanation in mammography; group of Assoc. Prof. [İlkay Öksüz](#), Predictive Intelligence and Medical Imaging (PIMI) Lab

Bogazici University, Research Intern

Aug 2022 – Nov 2022

Functional stimulation system for rehabilitation of gait and driving neural plasticity after spinal cord injury using graphene-based nerve electrodes, group of Prof. [Burak Güçlü](#), Tactile Research Lab

Yildiz Technical University, Undergraduate Researcher

2021 – Jul 2023

Natural language processing in the COSMOS group of Prof. [M. Fatih Amasyalı](#), on a TÜBİTAK-funded project, [optimising the order of training examples](#); then language work with Assoc. Prof. Serkan Ayvaz, begun for a course of his and published as my first paper; then machine learning for medical imaging with Dr. Bilgin Keserci, Biomedical Engineering Lab

Yildiz Technical University, Undergraduate Researcher

Nov 2020 – 2021

[Yıldız Rover](#): the vision system for the team's first vehicle, on *Autonomous rover design for extraterrestrial life trace research*, a project approved under the university's [Scientific Research Projects \(BAP\)](#) programme; where I began asking Prof. M. Fatih Amasyalı for advice, and left the rover to work in his group

Honours & Awards

Danish Data Science Academy (DDSA) Visit Grant, University of Southern Denmark	2025
Runner-up, British Heart Foundation (BHF) Data Science Centre ECG Challenge	2025
Third place, Artificial Intelligence in Healthcare Competition	2024
TUSEB Research Scholarship (Health Institutes of Turkiye), for the ECG work behind the M.Sc. thesis	2023
TUBITAK Research Scholarship (national research council of Turkiye), on optimising the order of training examples	2021
Third place, Teknofest Autonomous Rover Competition	2021

Publications

Author name in **bold**. † = first author, * = equal contribution (co-first author); [Q1] denotes a first-quartile journal. Aggregate metrics (h-index, citations) are on Google Scholar.

- [1] † **T. Tanyel**, S. Atmaca, K. Gokce, M. Y. Balik, A. Guler, E. Aslanger, I. Oksuz. "Interpretable ECG Analysis for Myocardial Infarction Detection through Counterfactuals." *Biomedical Signal Processing and Control*, 2025. [Q1]
- [2] P. M. Konrad, **T. Tanyel**, S. Ayvaz. "Self-Reports Do Not Identify Self-Models: An Identifiability Test for Counterfactual Reports." *ICML 2026 Workshop on Philosophy of Machine Learning (PhilML)*. oral
- [3] N. Denizoglu*, **T. Tanyel***, E. C. Erkan, M. E. Seker, E. Meltem, et al. "Landmark Regression with Attention U-Net for Assessing Breast Positioning Quality in MLO Mammography View." *Diagnostics*, 2026. [Q1]
- [4] O. Camurdan*, **T. Tanyel***, E. Aktufan Cerekci, D. Alis, E. Meltem, N. Denizoglu, et al. "Annotation-Efficient, Patch-Based, Explainable Deep Learning Using a Curriculum Method for Breast Cancer Detection in Screening Mammography." *Insights into Imaging*, 2025. [Q1]
- [5] † **T. Tanyel**, C. Nadarajan, N. M. Duc, B. Keserci. "Deciphering Machine-Learning Decisions to Distinguish between Posterior Fossa Tumor Types Using MRI Features." *Cancers*, 2023. [Q1]
- [6] † **T. Tanyel**, I. Oksuz. "Evaluation of Explainability Methods in Medical Image Analysis." In *Explainable Machine Intelligence in Healthcare*, 2025. book chapter

Selected on venue, contribution and field; the complete, categorised list is [a separate document](#).

Professional Experience

Founding AI Engineer

Oct 2025 – Present

Promake Inc.

- Built the first version of the product, and have held technical ownership of its agent systems from demo through launch to daily use.
- Designed and shipped the multi-agent orchestration stack across website creation, e-commerce setup, advertising, and business management, built to handle open-ended small-business requests rather than a fixed set of flows.
- Reduced the cost of agent runs through changes to the agent architecture and context management, which kept unit economics workable as usage grew.
- The platform is used by tens of thousands of people and several hundred paying businesses, with many agent sessions running concurrently; the company joined the Google for Startups Accelerator in 2026.
- Mentored six interns and two junior engineers.

AI Team Lead

Jan 2025 – Oct 2025

PhillipCapital Group

- Set up the AI unit within a traditional financial institution, building and mentoring a team of three engineers, and hiring my successor before leaving.
- Built LLM-based systems for report summarisation, daily investment insights, and document search, connected to internal tools through MCP-based infrastructure, following discovery with more than 20 users across sales, research, and portfolio teams.
- Built infra for analytics and dashboards that gave leadership regular visibility into customer and representative activity.
- Presented an assessment of what AI could realistically do for the group, and where PhillipCapital stood, at the company's internal global conference, and took part in the follow-up panel with senior colleagues from the group's other country offices; this fed into the group's technology plans and into technology-transfer discussions with the Singapore headquarters.

AI Engineer

Sep 2023 – Jan 2025

Hevi AI

- Built the AI stack for *hBreastMMG*, an AI-based breast-cancer diagnosis platform, from concept to beta.
- Set up the data pipeline for over 400,000 mammography images and ran labelling of 60,000+ with five radiologists, working with more than ten in total on annotation and on clinical review of model output.
- Introduced an approach for automated assessment of mammographic positioning quality; code and labels were open-sourced.
- It is part of the first radiology AI suite from Türkiye to be CE marked under the MDR.

AI Engineer

Feb 2022 – Aug 2022

Optdcom (R&D Center)

- Researched and prototyped NLP systems using deep learning and computational linguistics to improve product-review analysis for e-commerce platforms (Amazon, Trendyol, Hepsiburada).

Teaching, Mentoring & Academic Service

Guest lecture: “Deep Learning for NLP”

2022

Prepared and delivered within the *Introduction to Natural Language Processing* course (BLM4580), Yildiz Technical University.

Research Mentor, University of Southern Denmark

2024 – Present

Mentored an undergraduate researcher; the resulting work on mechanistic interpretability and verification led to three ICML 2026 workshop papers and related preprints.

Mentor, YTU Mentorship Club

2023 – Present

Mentored four Computer Science and Biomedical Engineering students on academic and personal development.

Mentor, YTU Medical Technologies Club

2022 – 2023

Mentored student project groups building AI systems for healthcare.

Peer Advisor, Yildiz Technical University

2022 – 2023

Peer counselling and mentoring in the Computer Engineering department.

Journal peer review. Reviewer for *Biomedical Signal Processing and Control* and *npj Digital Medicine*.

Selected Academic Training

AESIM Summer School on Mathematical Foundations of Trustworthy & Explainable AI, Nesin Mathematics Village (2023, accommodation grant) · inzva Deep Learning & Applied AI Study Groups (2021–2022).

Coursework taken beyond the degree programme. As an undergraduate: *Multivariate Statistical Data Analysis*, a PhD-level computer science course, and *Introduction to Neural Engineering (Neuroscience)*, taken from the Biomedical Engineering department; both completed with the highest grade. Alongside these, non-credit online coursework (Coursera) in [medical neuroscience \(Duke University School of Medicine\)](#), [neurobiology \(University of Chicago\)](#), and [philosophy of cognitive science \(University of Edinburgh\)](#), 2022; each title links to its certificate. This is the background to the network-neuroscience and philosophy-of-ML work listed above.

Technical Skills

Python · PyTorch, FastAPI, FastMCP · LangChain, LangGraph, Langfuse, Deepagents, Anthropic API, AWS Bedrock · PostgreSQL, ClickHouse, MongoDB, Kafka · Docker, Git, AWS, GCP, Azure · English (fluent), Turkish (native).