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Homepage
John Polat

Email
can.polat0@yahoo.com

GitHub
CalciumNitrade

LinkedIn
Can Polat

Google Scholar
Can Polat

Turkish - Born in 11/1993
Native

English
Highest TOEFL iBT - 100

German
A2

French
A1

Technicals

Daily
Python (with PyTorch, TensorFlow, SciPy, NumPy, Matplotlib, Pandas, PYQT5, PIL, OpenCV, Pydantic...)
LangChain/LangGraph/LangSmith
SQL/NoSQL/PostGreSQL
pgAdmin /PySpark
Docker/MLOps/MLFlow/Optuna
ArgoCD/Flask/Fast/Grafana
AWS/GCP

Occasionally
Azure
C/C++
Node.JS/React.Js
Hadoop/Tableau
.NET
MongoDB
Java
PHP - ASP - HTML

Can Polat

Pronounced same as John

Machine Learning Engineer | Data Scientist/Engineer | Computer Engineering Ph.D. Candidate at Texas A&M University

Work Experience

Senior Machine Learning Engineer - (Multi-Agent Systems)
Eluvium AI | London | December 2024 - Present

- Developed a multi-agent system leveraging LangGraph, LangChain, LangSmith, and LLM tools to analyze email threads and track purchase orders with structured processing and adaptive decision-making. Designed graph-based agent workflows integrating long-term memory, planning, reasoning, tool use, reflection, and self-improving feedback loops for enhanced accuracy and adaptability. Incorporated a critique agent for decision evaluation and optimization, alongside a human-in-the-loop mechanism for validation and oversight. Enabled autonomous tool selection, retrieval-augmented generation, and function calling to enhance contextual understanding and execution. Implemented custom parsing, text normalization, and NLP techniques for precise PO extraction. Deployed as a Flask API, containerized with Docker, and optimized with SQL-backed data storage for efficient retrieval. Ensured scalability and reliability through CI/CD pipelines, automating testing and deployment.

Senior Machine Learning Engineer - (Generative AI for Visual and Texual Content)
Wavebreak Media Ltd. | Ireland | November 2022 - September 2024

- Monetization, fine-tune, and research of state-of-the-art LLMs and CV models, focusing on a variety of applications such as image and video captioning, text suggestions, sentiment analysis, semantic search, text-to-image generation, object detection, deblurring, super-resolution, and 3D object/scene generation/reconstruction. Additionally, Flask/Fast/.NET is used to develop scalable services/APIs for these models, while React is leveraged for interactive front-end applications. NoSQL databases (e.g., MongoDB, Redis) are employed for efficient data storage and retrieval in addition to SQL databases. Development of recommendation systems for sales optimization.
- For DevOps, tools like Docker, Grafana, Git, and ArgoCD are utilized, along with Tableau and PowerBI for business intelligence.
- Lead of 2 junior developers.

Computational Imaging Engineer
Aselsan A.S. | Turkey | August 2021 - November 2022

- Leveraged computer graphics, computational imaging, and signal processing tools, including raytracing, Fourier optics, computer vision, and deep learning, to pioneer the design and development of cutting-edge Infrared/Optical range imaging systems tailored for both space exploration and defense applications.

Computational Imaging Engineer
Arcelik Global | Turkey | December 2019 - August 2021

- Design and development of consumer display systems incorporating advanced techniques such as raytracing, computer vision, and deep learning. Creation of mobile and web apps using React. and Node.JS for backend applications in addition to Python.

Academic History

Texas A&M University
Ph.D. Computer Engineering | January 2024 - December 2027

GPA: 3.67/4.00

- **Current Focus Research Area** - Generative AI in scientific applications, with a primary focus on materials science. This includes the integration of CV, NLP with LLMs, and reinforcement learning techniques. Published multiple works which can be found below and on my Google Scholar page.
- A full paper publication in **ICLR 2025.**

Bogazici University
M.Sc. Physics | September 2019 - August 2022

GPA: 3.79/4.00 - High Honour Student

- **Research Assistant** - Fiber Laser Development and Applications Lab led by Assistant Professor Parviz Elahi (June 2021 - July 2022).
- **M.Sc. Thesis**: Noise Robust Real-Time Focus Detection with Deep Learning for Laser Micromachining. Advised by Assistant Professor Parviz Elahi.

Hacettepe University
B.Sc. Physics Engineering | September 2014 - June 2019

GPA: 3.44/4.00 - Honour Student - Top-Ranked Graduate

- Ludwig-Maximilians-Universität München - Erasmus student in physics department for academic year September 2015 - June 2016.

Certificates

Deep Learning
Given by deeplearning.ai

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DeepLearning.AI TensorFlow Developer
Given by deeplearning.ai

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Advanced Machine Learning with TensorFlow on Google Cloud Platform
Given by Google Cloud

SQL for Data Science
Given by UC, Davis

Honors and Awards

Full tuition waiver for Ph.D. Studies
Texas A&M University.

High Honor Student in Physics M.Sc.,
Bogazici University.

Top-Ranked B.Sc. Graduate in Physics Engineering,
Hacettepe University with Honors.

Interests

Cats
Literally any Felidae

Formula 1
#LH44

MotoGP
An H-D rider, though

Sailing
Amateur Sailor

Archery
Certificated by Hacettepe University, Olympic

Professional Projects Worth Highlighting

- **Multi-Agent System for Procurment and Purchase Orders:** Developed an AI-driven email processing system using modern frameworks like LangGraph and LangChain to automate email classification and handling for sales and procurement teams. This solution intelligently differentiates between purchase order emails, procurement inquiries, and portal messages, extracts and updates PO details asynchronously, and logs events for real-time state management —reducing manual email processing by up to 80% and enabling teams to focus on strategic, value-added tasks.
- **Recommendation System for Assets:** In this project, I developed a recommendation system to suggest relevant assets to users based on their country and business segment, leveraging user data to enhance personalization. I utilized OpenSearch and Redis to ensure efficient data querying and rapid processing. For DevOps, I integrated Docker, ArgoCD, Flask, and Grafana, optimizing deployment and monitoring. This system was implemented for the platforms DesignWizard and DesignWizard-App.
- **Intelligent Template Maker:** Traditional template creation is time-intensive and demands creativity, making it difficult to scale. To address this, I designed a system to automate text placement within images, using object detection and segmentation models to determine optimal positioning, font, and sizing. By incorporating Reinforcement Learning from Human Feedback (RLHF), this project aimed to replicate and enhance the design process, producing high-quality templates automatically.
- **Optical Component Optimization:** A primary challenge in optical design is optimizing both component placement and quantity, particularly as reducing even a single component can yield significant cost savings in high-production environments. I successfully minimized component requirements without compromising optical quality, achieving savings of over $100,000.
- **High-Precision Telescope Mirror Alignment with Deep Learning:** Achieving precise alignment in imaging systems is critical, especially at micron-level tolerances, where human intervention is no longer viable. In this project, I developed a deep learning model using CNNs to infer optimal step sizes for mirror positioning from interferometry data, automating the alignment process for superior accuracy with minimal human oversight.
- **Backlight Quality Comparison Application:** Previously, TV backlight quality assessments lacked a standardized method, with results varying based on the individual conducting the test. To resolve this, I measured intensity variations across backlight surfaces using a CCD camera and modeled the data with SciPy and NumPy, creating a quantitative comparison model. A custom GUI now allows Arçelik Global to consistently classify TV backlight quality across units, providing an objective and repeatable solution.
- **Lens Classifier Application:** Large-scale production typically relies on sampling methods for quality testing, which often lack precision. To improve this process, I developed a TensorFlow-based classifier with a VGG-style CNN architecture, automating the classification of TV backlight lenses. This system not only enhanced accuracy but also significantly streamlined the quality control process.

Publications

Peer Reviewed Journals

- **Polat C.**, Kurban H., & Kurban M., (2025), Enabling Ease of Access to Quantum Chemistry with Transformer-Based Text Encoding and Physics-Informed Multilayer Perceptron. Machine Learning: Science and Technology. **(Under revision for publication).**
- **Polat C.**, Kurban H. & Kurban M., (2025), QuantumShellNet: Ground-State Eigenvalue Prediction of Materials Using Electronic Shell Structures and Fermionic Properties via Convolutions. Computational Materials Science. (Link).
- **Polat C.**, Kurban M., & Kurban H., (2024), Multimodal Neural Network-Based Predictive Modeling of Nanoparticle Properties from Pure Compounds. Machine Learning: Science and Technology (Link).
- Kurban, M., **Polat, C.**, Serpedin, E., & Kurban, H. (2024). Enhancing the electronic properties of TiO2 nanoparticles through carbon doping: An integrated DFTB and computer vision approach. Computational Materials Science, 244, 113248. **(Link).**
- **Polat C.**, Yapici G. N., Elahi S., & Elahi P. (2023). High-precision laser focus positioning of rough surfaces by deep learning. Optics and Lasers in Engineering, 168, 107646. **(Link).**

Conference Proceeding

- **Polat C.**, Kurban H., Serpedin E., & Kurban M.. TDCM25: A Multi-Modal Multi-Task Benchmark for Temperature-Dependent Crystalline Materials. **ICLR 2025** (2025, April 24-28).
- **Polat C.**, Gungor A., Yorulmaz M., & Kizilelma B., A Transformer-based Real-Time Focus Detection Technique for Wide-Field Interferometric Microscopy. SIU 2023 (2023, July 5-8)
- **Polat C.**, Yapici G.N., Elahi S., & Elahi P.. Noise Robust High Precision and Real-Time Focus Detection for Laser Micromanaging. CLEO 2022, (2022, May 15-20).
- **Polat C.**, Yapici G.N., Elahi S., & Elahi P.. Machine Learning-Based High Precision and Real-Time Focus Detection for Laser Material Processing Systems. SPIE. Photonics Europe 2022, (2022, April 3-8).
- Elahi S., **Polat C.**, Safarzadeh O., & Elahi P.. Noise Robust Focal Distance Detection in Laser Material Processing Using CNNs and Gaussian Processes. SPIE. Photonics Europe 2022, (2022, April 3-8).