

# Furkan Yakal

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## Education

- Apr 2022 – **Informatics M.Sc.**, *Technical University of Munich*, GPA: 2.0  
Sep 2025 Specialization: Engineering Software-Intensive Systems  
Highlighted Courses: Advanced Topics of Software Engineering (Testing), Distributed Systems, Computer Vision: Detection, Segmentation, and Tracking
- 2018 – 2022 **Industrial Engineering B.Sc.**, *Koç University*, GPA: 3.53/4.00 (1.4 in German Scale)  
Highlighted Courses: Operations Research, Decision Analysis, Applied Statistics, Stochastic Models  
Awards: Magna Cum Laude, Vehbi Koç Scholar Award (3 times), Dean's List (4 times)
- 2017 – 2022 **Computer Science B.Sc.**, *Koç University*, GPA: 3.53/4.00 (1.4 in German Scale)  
Specialization: Artificial Intelligence  
Highlighted Courses: Computer Graphics, Machine Learning, Computer Vision with Deep Learning
- 2020 **Informatics B.Sc.**, *Technical University of Munich*  
Erasmus+ Exchange Program

## Professional Experience

- Apr 2025 – **Data Analytics Working Student – Strategic, Operational Risk**, *BMW Group*, Munich  
Sep 2025
  - Designed and deployed a scalable ETL pipeline with Apache Airflow to retrieve ESG data from multiple APIs (Eurostat, Fred, NASA, NOAA, Treasury, World Bank, Yahoo Finance), harmonize it into domains, and store it in AWS DocumentDB.
  - Engineered a production-grade cloud environment with Docker and Terraform, deploying ETL workflows and databases on AWS.
  - Implemented automated data quality checks in Python to analyze operational risk data from ORiON, detect inconsistencies, and generate Excel-based management reports.
  - Delivered a dividend planning pipeline in Python, performing data processing and dividend calculations across markets, and visualized results through an interactive Streamlit dashboard with automated reporting.
- Sep 2024 – **Software Engineering Intern - Web & Commerce Analytics**, *BMW Group*, Munich  
Mar 2025
  - Developed and maintained a web application to provide insights into user behavior on the BMW website.
  - Processed and prepared raw user clickstream data for integration into the web application built with Dash.
  - Maintained DevOps pipelines for CI/CD to ensure seamless application deployment and operation.
  - Utilized various AWS cloud services, including S3, SageMaker, Lambda, Step Functions, Glue, EC2, and RDS, to support the application's infrastructure.
- Dec 2020 – **Data Analytics Consultant**, *EY*, Istanbul  
Jun 2021
  - Automated large-scale data validation workflows using Python and Alteryx Designer, ensuring the consistency of clients' e-documents (e-invoices, e-ledgers) while significantly reducing manual efforts.
  - Provided technology-driven consulting on e-document and e-ledger reviews for companies.
  - Worked on an ERP reconciliation project, integrating SQL databases to match customer invoice data with ERP system records, enhancing financial accuracy and compliance.
  - Developed RPA solutions with Blue Prism to automate website validation tasks.
- Jul 2020 – **Data Science Intern**, *Havelsan*, Istanbul  
Aug 2020
  - Developed data-driven models in Python for the "Bosch Production Line Performance" predictive maintenance project to forecast component failures in the assembly line.
- Jun 2019 – **Software Developer Intern**, *Vircon Group Technologies*, Istanbul  
Aug 2019
  - Developed Albatros, an intelligent software that analyzes and provides insights into customers' social media interactions and activities.
  - Integrated the Instagram API using Python, processed and prepared customer data for analysis, and managed database operations with MongoDB and Redis.

## Projects

- Jan 2025 – **A Resilient Matrix Assembly Layout Design for Mixed-Model Vehicle Production: Modeling and Mitigation of Stochastic Disruptions,**  
Jul 2025 *Master's Thesis - Informatics, Grade: 1.3*
- Contributed to the literature by formulating the Resilient Matrix Assembly Layout Problem, a stochastic mixed-integer linear programming model incorporating task-level disruptions in mixed-model vehicle production.
  - Implemented the model in Python with Gurobi, conducted computational experiments on benchmark datasets adapted from the assembly line balancing literature, and created data visualizations to illustrate the results.
  - Demonstrated that RMALP reduces reconfiguration costs by more than 50% compared to static models, highlighting the value of proactive disruption-aware layout planning.
- Oct 2023 – **Automated Data Extraction with LLMs for VESTIGAS**  
May 2024
- Developed a Python-based pipeline leveraging LLMs (Gemini, GPT-3.5/4) for automated data extraction from PDFs and images, conducting performance and accuracy comparisons.
  - Trained a custom extraction model using Azure Document Intelligence.
- Oct 2023 – **NLP-KG Web Application**  
Feb 2024
- Enhanced an NLP academic paper search application with personalized profiles, recommendations, and exploration features.
  - Implemented search functionality in Python using the Weaviate vector database and Neo4j for knowledge graph integration.
  - Integrated a GPT-powered chatbot for recommendations, topic exploration, and paper queries.
  - Enhanced the UI and developed full-stack features using MongoDB, Next.js, and TypeScript.
- Oct 2022 – **ASE Delivery**  
Jan 2023
- Designed a DHL-like pick-up station system for the Advanced Software Engineering course.
  - Designed data relationships and integrated databases using MongoDB.
  - Orchestrated microservices, implemented a CI/CD pipeline, and developed backend microservice business logic using Java with Spring Boot and REST API.
- Feb 2021 – **Predictive Analytics Using Google Mobility Data,**  
Jun 2021 *Graduation Project - Industrial Engineering*
- Developed predictive analytics models for Covid-19 cases and deaths in Germany by incorporating Google Mobility data. Implemented moving average, exponential smoothing, ARIMA, regression, and ensemble algorithms.
  - Analyzed the impact of Covid-19 on the e-commerce sub-sectors of Turkey using Google search trends and maps data. Conducted correlational studies, hypothesis tests, and surveys to derive actionable insights.
- Sep 2020 – **Emojible - A Programming Environment with Tangibles and Emojis,**  
Jan 2021 *Graduation Project - Computer Science*
- Developed a mobile programming application for children to understand programming basics using a specially designed programming language with emojis.
  - Designed and implemented an AST-based interpreter with a tokenizer, lexer, and parser to process and execute emoji-based code.
  - Built a runtime environment in Swift for variable scope, arithmetic, control flow, and function execution, and integrated Firebase for backend services in the iOS application.
- Sep 2020 – **Distribution Optimization for Anadolu Efes**  
Jan 2021
- Developed a cost-minimizing distribution and capacity model for Anadolu Efes using linear programming in Python with the Pyomo library, optimizing logistics across cities.
  - Proposed brewery expansion strategies based on demand forecasts to efficiently meet distribution needs across Turkey.

## Skills

|                         |                                                                                                 |
|-------------------------|-------------------------------------------------------------------------------------------------|
| Programming & Scripting | Python, Java, C/C++, JavaScript/TypeScript, Swift                                               |
| Frameworks & Tools      | Spring, React, Next.js, Docker, Git, PySpark, PyTorch, Pandas, NumPy, Matplotlib, Pyomo, Gurobi |
| Databases               | MongoDB, PostgreSQL, Redis, Firebase                                                            |
| Cloud Platforms         | AWS (incl. S3, SageMaker, Lambda, Step Functions, Glue, EC2, RDS, DocumentDB)                   |
| Languages               | English (Fluent), German (Intermediate), Turkish (Native)                                       |