

Murat Hatunoğlu

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SUMMARY

Computer Engineering graduate with hands-on experience in machine learning, image processing, and full-stack development. Skilled in developing deep learning models for medical image segmentation and building cross-platform applications with Flutter and PyQt5. Successfully completed a TÜBİTAK 2209-A funded research project on augmented reality-assisted surgical navigation, which was published in IEEE Xplore.

EDUCATION

Başkent University Nov 2021 – June 2025
BS in Computer Engineering (Full Scholarship)
◦ GPA: 3.04/4.0

EXPERIENCE

Computer Engineering Intern Ankara, Türkiye
Creas Technology July 2023 – Aug 2023
◦ Developed a PDF chatbot using Python and the LangChain framework for intelligent document querying.
◦ Implemented sequential memory to enable context-aware, multi-turn conversations with the chatbot.
◦ Facilitated private and efficient access to organizational information stored in PDF documents.

Computer Engineering Intern Ankara, Türkiye
Yeşil Yazılım July 2024 – Aug 2024
◦ Designed and built a Task Management System using ReactJS (frontend) and NodeJS (backend).
◦ Enabled users to create tasks, set priorities, assign team members, and update task statuses in real-time.
◦ Structured the system to enhance collaboration, improve task tracking, and boost team workflow efficiency.

PUBLICATIONS

Augmented Reality-Assisted Surgical Guidance System for Kidney Nephrectomy with Remote Expert Consultation May 2025
Ali Efe Karagül, **Murat Hatunoğlu**, Anıl Yaşartürk
◦ Presented at the **International Congress on Human-Computer Interaction, Optimization and Robotic Applications (ICHORA'25)**.
◦ DOI: [10.1109/ICHORA65333.2025.11017201](https://doi.org/10.1109/ICHORA65333.2025.11017201) [🔗](#)

PROJECTS

AR-Assisted Surgical Navigation System (Final Year Project)
◦ Trained deep learning models (U-Net and 3D U-Net) for medical image segmentation on volumetric datasets.
◦ Developed a desktop surgical planning application using PyQt5 for 3D visualization and annotation of segmented organs.
◦ Implemented real-time communication between the desktop surgical planning application and the Unity AR system using TCP for data transfer and UDP broadcast for automatic device discovery on the local network.
◦ Integrated a voice assistant into the surgical planning application and AR application using OpenAI APIs, enabling natural language interaction for hands-free operation.
◦ Project accepted and funded under **TÜBİTAK 2209-A** University Students Research Projects Support Program.

Intelligent Document Q&A System (RAG)

- Built a Retrieval-Augmented Generation (RAG) system with FastAPI (backend) and Next.js (frontend) for intelligent document querying.
- Implemented hybrid retrieval combining vector search (pgvector) and BM25 keyword search.
- Integrated Sentence Transformers for embeddings and multiple LLM providers (Ollama/OpenAI).
- Deployed async document processing with Celery + Redis, enabling real-time ingestion and citation-based answers.

MCP Dev Productivity Agent

- Built custom MCP servers in Node.js/TypeScript for GitHub, Jira, and the local terminal, enabling natural-language workflows in Claude Desktop.
- Implemented tools for pull request summarization, automated test execution, and issue creation with structured outputs.
- Helped streamline repetitive developer tasks by automating PR reviews, test reporting, and issue tracking.

Satellite Change Detection with Siamese U-Net

- Implemented a deep learning pipeline using a Siamese U-Net architecture for satellite image change detection.
- Trained and evaluated the model on the LEVIR-CD dataset (637 image pairs), achieving strong performance on building change segmentation.
- Applied threshold optimization and data augmentation to handle class imbalance and improve prediction accuracy.

Inventory Management Mobile App

- Built and published an inventory management app using Flutter and Firebase for a real client.
- Enabled device stock tracking, profit calculation, search, and filtering features with real-time updates.
- Used Firebase Authentication and Firestore for secure user management and cloud storage.
- Available at App Store (Unlisted Application)

Full-stack E-commerce Web Application

- Built a full-stack shopping website with Flutter (frontend), Java Spring Boot (backend), and PostgreSQL (database).
- Developed REST APIs to connect UI and backend services.

SKILLS

Technical Skills: Python, Java, C, C++, SQL(PostgreSQL), Flutter, Tensorflow, PyTorch

Core Competencies: Machine Learning, Deep Learning, Medical Image Processing, Full-Stack Development, Mobile App Development, Research Project Writing (TÜBİTAK 2209-A and ICHORA25 Congress Paper).

LANGUAGES

English - Advanced (YÖKDİL - 90, TÖMER - 83)