

# Mateusz Nowaczek

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## EDUCATION

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### AGH University of Science and Technology

B.Eng. in Computer Science in Engineering Kraków, Poland | 2023 – Expected 2027

**Relevant Coursework:** Statistical Data Analysis, Optimization Methods, Databases (SQL & NoSQL), Software Engineering, Algorithms and Data Structures, Object-Oriented Programming (C++)

**Scientific Activity:** Analytica AGH (2025 -)

- Built NLP pipeline extracting geodetic parameters from natural language input
- Designed prompt parsing and data validation workflows
- Integrated multiple LLM models for conversational user interaction, intent recognition, and structured data extraction

## TECHNICAL SKILLS

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**Languages:** Python, TypeScript, C++, SQL

**Backend:** FastAPI, Django, REST APIs, JWT, OAuth

**Frontend:** React, Next.js, Tailwind CSS

**AI/ML:** PyTorch, Scikit-learn, YOLO, LSTM, NLP pipelines

**Data:** Pandas, Polars, NumPy

**Infrastructure:** Docker, Linux, Git, GCP

**Databases:** MySQL, MongoDB

## PROJECTS

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### Hermes AI - NLP Google Calendar Assistant: [View code](#)

Python application enabling natural-language control of Google Calendar using Gemini models.

- Built NLP-driven assistant translating user prompts into structured calendar operations
- Designed prompt-parsing pipeline for extracting event attributes (title, duration, reminders, color)
- Integrated Google Calendar APIs with validation layer and REST-based workflow
- Implemented create/edit/delete event automation with structured input schema
- Developed modular architecture prepared for Gmail automation extension

Tech stack: Python, Google Cloud APIs, Gemini API, REST integrations

### Bee Parasite Visual Detection - Computer Vision Project [View code](#)

Computer vision pipeline for detecting Varroa destructor parasites on bees using YOLO-based object detection.

- Curated and labeled ~1k bee images from public datasets using Label Studio (healthy vs infected samples)
- Trained YOLOv8 object detection model achieving up to ~80% detection accuracy with confidence scoring and bounding boxes
- Built FastAPI inference service for image upload, model execution, and structured prediction output
- Implemented end-to-end workflow: dataset preparation → training → REST inference endpoint

Tech stack: Python, YOLO models, PyTorch, FastAPI, Label Studio, computer vision, dataset preparation.

### RenderX [View code](#)

Full-stack web platform for trading graphic cards built with Django and Next.js (TypeScript)

- Designed and implemented JWT authentication with HttpOnly cookies, including secure login and registration flows
- Developed responsive customer interface with shopping cart, product listings, ratings, pricing and image handling
- Built advanced product filtering (price, brand, availability) and autocomplete search with optimized API queries
- Created protected REST API endpoints with input validation and role-based access logic
- Modeled relational MySQL schema with many-to-many relationships for products, users and orders

Tech stack: Django, Next.js, TypeScript, REST API, JWT authentication.

### FEM Simulation [View code](#)

Engineering-focused simulation solving a transient heat conduction problem with internal heat sources using the Finite Element Method.

- Implemented 2D FEM solver based on Fourier heat equation with Gauss-Legendre integration and Jacobian mapping
- Modeled copper domain with five steel volumetric heat sources and implicit time-stepping scheme
- Built global matrix assembly pipeline ( $H$ ,  $C$ ,  $Hbc$ ,  $P$ ) with boundary conditions and OOP mesh architecture
- Simulated non-stationary heat diffusion and analyzed energy accumulation using heatmaps and time-series data

Tech stack: Python, NumPy, Matplotlib, OOP, FEM, Scientific Computing.

## ADDITIONAL

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- Engineering Thesis (in progress): research focused on short-term BTC price prediction and correlation analysis using advanced machine learning and deep learning methods, including LSTM-based models and time-series data processing.
- IBM - Python for Data Science, AI & Development - course
- Cambridge English Qualification - B2 Certificate
- Participated in HackYeah hackathon as part of a 4-person team where we built a full-stack retirement simulator for ZUS.