Petros Avgerinos

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MSc Candidate in Computational Science and Engineering at Imperial College London, with hands-on experience developing AI-powered systems in large-scale research projects, and a strong passion for Domain-Specific Languages, particularly their application in modeling and simulating complex real-world problems.

EXPERIENCE

Institute of Communication and Computer Systems (ICCS - NTUA)

R&D Engineer (AI/ML) *10/2024-8/2025*

- Designed and developed an LLM-powered recommendation system, in a team of 3 engineers, for an e-commerce client, integrating OpenAI's and ElevenLabs's API to enhance user experience and engagement. The system functioned as an agent, using LangChain and a series of Transformers, trained on synthetic data, to classify user intent into LLM produced structured output. The system was then capable of producing tangible action such as product search, product comparison or checkout. Relevant conversation history was retrieved from earlier queries and responses stored in a Postgres database on Azure, using pgvector for semantic search, which resulted in highly personalized responses.
- Engineered a medical data processing library in idiomatic Python that reduced runtime errors and streamlined the handling of clinical notes and multimodal patient data, enabling more reliable downstream ML applications, in accordance with HL7 FHIR standards. This library was part of a pipeline for circulating and storing HHR of dementia patients across an ecosystem of AI/ML applications in detecting dementia and providing care and recommendations for treatment.
- Contributed to EU-funded research projects through proposal writing, project management, and consortium coordination, ensuring alignment with technical and funding requirements. My work entailed the collaboration with interdisciplinary teams of clinicians, data scientists, and industry partners to translate cutting-edge AI methods into applied healthcare and industrial solutions.
- Lead the technical writing and consortium coordination for multiple Horizon Europe (HE) and European Defense Fund (EDF) Proposals, across domains such as healthcare, smart cities, defense, cybersecurity and innovative advanced materials. Conducted comprehensive literature reviews to identify State-of-the-Art (SotA) and Beyond SotA solutions in using AI, Generative AI, and Explainable AI to enhance project innovation. Served as lead author for the Methodology section (Section 3), providing a structure for our proposed solutions through detailed work package design, milestone and deliverable planning, and comprehensive risk assessment. Additionally, contributed to project budgeting, partner negotiations, and consortium expansion through outreach and acquisition of new partners.

Research Intern *7/2024-9/2024*

- Designed and developed an XAI-driven cognitive assessment tool, named DEMET (DEMentia Explainable Transformer), which leveraged ensemble learning techniques in order to combine statistical classifiers and transformers to detect dementia from spontaneous speech samples. DEMET demonstrated that ensemble models can significantly improve performance, achieving over 97% accuracy on the DementiaBank dataset. I explored the use of phonological features derived from the speech samples of the DementiaBank dataset to detect dementia and generated explanations from three different explainable methods, namely LIME, Transformers-Interpret and Anchors, to assess each method's performance on both qualitative and quantitive metrics. Results showed that LIME and Transformers-Interpret were more effective in providing interpretable explanations for clinical use.
- Contributed to EU-funded research projects through concept note draft writing, proposal writing, and consortium coordination and building.

EDUCATION

MSc Candidate in Computational Science and Engineering *2026*

Imperial College London, London UK

- Modules include Modern Programming Methods, Computational Mathematics, Applying Computational/ Data Science, Data Science and Machine Learning, Deep Learning, Modeling and Numerical Methods, Advanced Programming, Inversion and Optimization, Patterns for Parallel Programming
- Member of Imperial College London Medics Coding Society

BEng, MEng in Electrical and Computer Engineering *2024*

National Technical University of Athens, Athens Greece

- Achieved 1st Class Honors equivalent
- Relevant Modules include Computer Architecture and Advanced Computer Architecture, Operating Systems and Advanced Operating Systems, Programming Languages, Compilers, Software Engineering, Microprocessors, Databases and Advanced Topics in Databases, Distributed Systems, Human-Computer Interaction, Object Oriented Programming.

COMPETITIONS & HACKATHONS

IBM-Z Datathon 2025 (24h Hackathon) - IBM *11/2025*
• Built Hippocrates' Feather, an automated note-taking and form-filling full-stack application for clinical consultation support. Watch the **demo here**.

Ennovation Competition 2025 (Startup Incubator) - Athens Center for Entrepreneurship and Innovation *3/2025-5/2025*
• 3rd Place for our agentic workflow spin-off, for e-commerce, accessibility and business productivity

AI Hackathon 2025 (72h Hackathon) - Athens Center for Entrepreneurship and Innovation *10/2024*
• 3rd Place for our hands-free web browsing accessibility solution, SurferHelper.

PROJECTS

Erminia A **Domain Specific Language** that allows Humans and LLMs to interpret ARC-AGI Abstracted Images, build in **Rust**. The Erminia DSL is a collection of software tools and libraries designed to facilitate the interpretation of ARC-AGI abstracted images as code. The primary motivation for creating this language is to provide a standardized way to represent ARC-AGI images, and allow researchers and developers wanting to participate in the ARC-AGI challenge to fine-tune Large Language Models (LLMs) on this representation, leveraging the inherent ability of LLMs to predict and generate code snippets, as opposed to interpreting images directly. *3/2025 - Current*

Alan Compiler Developed a **Compiler** for the Alan Programming Language in **C++14**, using **Flex** for lexical analysis, **Bison** for parsing tokens into syntactically valid constructs and **LLVM** for generating optimized bytecode across multiple target architectures. *2/2024 - 8/2024*

Blockchat A blockchain application built in **Go**. This application showcases a decentralized blockchain system, allowing users to join the blockchain network, send messages or Bitcoin, and engage in transactions with the assurance of a Proof of Stake validation mechanism. *1/2024 - 4/2024*

BePresent A full-stack, end-to-end mobile application to NOT use your phone while with friends. Enjoy life, Be Present. Built on **Dart, with Flutter** for the frontend, and **Python, MySQL and Django** for the backend. *1/2024 - 2/2024*

TECHNICAL SKILLS

Languages	Python**,** C++, C, Go, SQL, Rust, Java, Dart, Shell
Frameworks	Apache Spark, PyTorch, Hadoop, Scikit-learn, FastAPI, Django, Flutter
Networking	HTTP, Websockets
Cloud/DevOps	Docker, Git, Vi, Postman, Github Actions, Azure
Compilers/Parsers/OS	Bison, Flex, LLVM, QEMU/KVM, Linux Kernel API & VFS