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 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.

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

BEng, MEng in Electrical and Computer Engineering *2024*
National Technical University of Athens, Athens Greece

ACHIEVEMENTS

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

PROJECTS

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.

Erminia A Domain Specific Language that allows Humans and LLMs to interpret ARC-AGI Abstracted Images, build in Rust.

TECHNICAL SKILLS

Languages	Python**,** C++, C, Go, SQL, Rust, Shell
Frameworks	Apache Spark, PyTorch, Hadoop, Scikit-learn
Cloud/DevOps	Docker, Git, Vi, Postman
Compilers/Parsers/OS	Bison, Flex, LLVM, QEMU/KVM, Linux Kernel API & VFS