

## Department of Electrical and Computer Engineering

**Title:** *"Accelerating Bioinformatics and Biomedical Applications via Massively Parallel Reconfigurable Systems"*

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**Room KENTP. – A008, Old Campus**  
**University of Cyprus**

**Abstract:** The quest for advancement in healthcare diagnosis, monitoring and therapy, all key aspects of improving the quality of life, becomes heavily dependent on high-performance, real-time computation systems. Such systems are necessary to compute extremely complicated algorithms used by bioengineers and doctors worldwide and come in the form of supercomputers or large clusters, which were the only capable solutions keeping up with the application demands. However, such systems are large, expensive and energy devouring. Recent advancements allow the integration of reconfigurable hardware (FPGAs) and graphics processing units (GPUs), alongside with general-purpose processors (CPUs).

We used these state-of-the-art technologies for accelerating a popular bioinformatics application (CAST). A fully functional FPGA-based system was designed for performing CAST on massive biological data. An optimized multi-threaded software version and a GPU-based version were implemented as well and the three solutions were compared against each other. The comparison between these competing state-of-the-art solutions presented in this work, can provide useful insight for developing future hybrid solutions to accelerate other bioinformatics and biomedical applications. These hybrid architectures can benefit researchers working in the fields of biology, medicine and biomedical engineering, as are the first step to design a transparent, user-friendly, high-end processing system that will accelerate the computations needed for advancing their research, and dynamically reconfigure itself to adjust to the application and user requirements.

**Biography:** Agathoklis Papadopoulos pursues a PhD in Computer Engineering from the University of Cyprus, under the supervision of Dr. Theocharis Theocharides. His research interests include embedded systems design and application-specific hardware systems for biomedical and bioinformatics applications. Agathoklis received his 5-year Engineering Diploma (Dipl.-Ing.) in Electrical and Computer Engineering from National Technical University of Athens in 2009. During his studies at NTUA, he specialized at the fields of Hardware Design, Microprocessor and Microcontroller Systems, Database Systems and Bioengineering. Agathoklis currently is a researcher at KIOS Research Center for Intelligent Systems and Networks and a member of Embedded & Application Specific Systems-On-Chip Laboratory (EASoC).

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