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Doctoral Vacancy Announcement form

Research Topic Title: "Hardware-Software Cooperation for a Sustainable Future of Computing"

No. of Openings: 1

Description: Power-Performance efficiency is essential and needs to be improved in all its aspect if we want to aim for a sustainable future in computing, and that requires close cooperation between the software and the hardware. The successful candidate will explore innovative architectural techniques, energy-efficient computing paradigms, and intelligent workload optimizations to enhance the performance, scalability, and efficiency of next-generation computing systems and software. Research areas may include Hardware/Software Co-design for Energy Efficiency, Processor Optimizations, Heterogeneous Computing, Domain-Specific Accelerators (DSA), High-Performance Computing (HPC), Parallel Programming and Execution Models, and AI-driven optimization techniques for energy-efficient execution.

Required Qualifications: Undergraduate (BSc) degree in Computer Science or related field. A postgraduate (MSc) degree is preferred but not required. The ideal candidate should enjoy working on cutting-edge systems research problems and have good software development skills (C/C++, Python). Prior research experience or specialization in related topics will be considered an advantage.

Funding: There is possibility of funding for 3 years through involvement in a Research Program for qualified applicants and/or as teaching assistants.

Research Advisor:
Name/Surname: Andreas Diavastos
Position: Lecturer
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Doctoral Vacancy Announcement form

Research Topic Title: "Advanced Optimization and Planning Methods for Sustainable Power Systems"

No. of Openings: 1

Description:

The Sustainable Power Systems (SPS) Laboratory is seeking a motivated PhD candidate to join our interdisciplinary research team focused on developing next-generation methodologies for sustainable power system planning, operation, and control. This position encompasses broad research directions within the field of sustainable energy systems, providing flexibility for the candidate to explore various aspects of this critical domain.

The successful candidate will investigate innovative approaches to power system optimization, modeling, and analysis that address the challenges of transitioning to a more sustainable and resilient energy future. Research topics may include renewable energy integration, grid flexibility enhancement, energy storage optimization, power system stability under high renewable penetration, or multi-energy system coordination. The project will combine theoretical advances in mathematical optimization with practical implementation strategies applicable to real-world energy systems.

Working within our collaborative research environment, the candidate will have opportunities to develop open-source tools for energy planning and participate in international research partnerships. The research will contribute to addressing fundamental challenges in modern power systems, including handling uncertainty in renewable generation, developing robust planning methodologies, and designing adaptive control strategies for diverse operational conditions.

Applicants should have a strong background in electrical engineering, applied mathematics, computer science, or related fields. Knowledge of power systems fundamentals, optimization techniques, and programming skills is valuable. Experience with energy systems simulation, renewable technologies, or control theory would be beneficial but is not required.

The SPS Lab provides access to advanced computational resources, opportunities to engage with the broader research community through conferences and publications, and collaboration with

both academic and industry partners. The position offers significant flexibility to shape research directions within the broader context of sustainable power systems engineering.

Required Qualifications:

- A degree in engineering, preferably with a focus on electrical engineering, control engineering, or power engineering - alternatively you have a comparable qualification.
- Sound knowledge of electrical engineering or machine learning methods or electric power system modelling and analysis
- Experience in at least one higher programming language (preferably Python, Julia, C++, or Matlab).
- Ability to work scientifically, independence, flexibility, teamwork and communication skills
- Interest in applied research work in sustainable and intelligent power systems
- Desire for professional and personal development
- Very good knowledge of English

Funding:
Not Available. Potential for funding through contribution to research/industrial projects.

Research Advisor:
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Doctoral Vacancy Announcement form

Research Topic Title: "Beyond Mutational Signatures: An AI-Powered/Intelligence Approach to Rethinking DNA Repair Mechanisms Analysis"

No. of Openings:1

Description: DNA repair mechanisms Background information: Mutational signatures represent the accumulated patterns of DNA mutations across a genome, reflecting the history of DNA damage and repair processes. These signatures are crucial for understanding the underlying mechanisms of genomic instability in various diseases, including multiple myeloma (MM). Traditionally, mutational signature analysis has relied on identifying single base substitutions (SBS) derived from variant call format (VCF) files. While informative, this approach has inherent limitations. It can overlook complex mutation patterns, such as closely spaced multiple nucleotide changes, and may lose crucial contextual information about the surrounding DNA sequence. Consequently, the reliance on SBS signatures may not fully capture the complexity of the mutational landscape and the nuanced interplay of DNA repair defects.
Proposal: This PhD research will investigate a novel approach to mutational signature analysis, moving beyond the inherent limitations of single base substitution (SBS) signatures derived from VCF files. I hypothesize that direct analysis of raw FASTQ sequencing data, leveraging an AI-driven algorithm, will reveal a significantly richer and more nuanced understanding of mutational processes. By focusing on trio mutations and their immediate sequence context, this research aims to bypass the information loss associated with traditional alignment and variant calling pipelines. This methodology will enable the quantification of complex mutation patterns and the extraction of novel mutational signatures that are currently obscured by SBS-centric approaches. Ultimately, this research will contribute to a more comprehensive understanding of genomic instability and disease pathogenesis, potentially revealing new insights into DNA repair mechanisms and the evolution of complex diseases. This project will involve the development and validation of a novel AI algorithm, the analysis of large-scale sequencing datasets, and the comparative evaluation of this approach against existing methodologies.

Required Qualifications: Degree in Computer Science/Engineering Electrical Engineering, or biology, emphasis will be given on bioinformatics background

Funding: Funding possibility through EU projects

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Research Advisor:
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Doctoral Vacancy Announcement form

Research Topic Title: "MRI based Brain Lesions Segmentation, Mapping and Analysis for diagnosis and monitoring the multiple sclerosis disease"

No. of Openings:1

Description: Magnetic Resonance Imaging (MRI) is one of the main imaging techniques in the diagnosis and monitoring of the multiple sclerosis (MS) disease, providing non-invasive, high-resolution insights into brain structure, neurological disease progression, follow-up, prediction of its course and its function. This PhD will focus on advancing MRI-based brain mapping techniques to improve the diagnosis and longitudinal monitoring of the MS disease. Application will be done for segmenting a series of brain MS images taken at different timepoints as well as at different other brain tumours. The study will focus on anatomical brain maps and will try to characterize the appearance of the abnormalities presented by these disorders and predict the disease progression.
A key objective of the research is the development of quantitative imaging biomarkers that can serve as reliable indicators of disease prognosis, evaluation, progression, and therapeutic response. Using state-of-the-art machine learning algorithms, the project aims to automate the segmentation of lesions and other pathological features, offering clinicians a robust tool for prognosis, early diagnosis, monitor the evolution of the disease to help with treatment planning. The goal will be the development of a system which can eventually be used in daily clinical practice.
The candidate(s) must have good programming skills mainly in Python language.

Required Qualifications: Degree in Computer Science/Engineering Electrical Engineering, or biomedical engineering

Funding: Funding possibility through EU projects

Research Advisor:
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Doctoral Vacancy Announcement form

Research Topic Title: "Ultrasound Video Analysis of Carotid Artery Texture Variability Throughout the Cardiac Cycle: Implications for Stroke Risk Stratification"

No. of Openings:1

Description: Stroke is a leading cause of disability worldwide, with carotid artery disease being a significant contributor to this risk. This PhD project aims to monitor texture variability of carotid plaques throughout the cardiac cycle using advanced ultrasound imaging techniques for the stratification of the risk of stroke. The research will focus on quantifying texture features of carotid plaques and assessing how these features change dynamically during different phases of the cardiac cycle, by analyzing ultrasound video data.
The candidate will employ real-time video analysis to capture the mechanical forces acting on plaques and monitor the changes. A particular emphasis will be placed on understanding how texture variability correlates with plaque stability, morphology, and ultimately, stroke risk. In addition, the project will incorporate artificial intelligence and deep learning methodologies to develop predictive models for stroke risk stratification, leveraging characteristics derived from the ultrasound images.
The candidate(s) must have good programming skills mainly in Python language.

Required Qualifications: Degree in Computer Science/Engineering Electrical Engineering, or biomedical engineering

Funding: Funding possibility through EU projects

Research Advisor:
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Doctoral Vacancy Announcement form

Research Topic Title: "Neonates diaphragmatic movement monitoring using ultrasound video analysis "

No. of Openings: 1

Description: The diaphragm is responsible for about 70% of the tidal volume during rest breathing. Moreover, when diaphragmatic function is impaired, it may result in respiratory medical conditions, causing significant difficulty in breathing, frequently necessitating prolonged mechanical ventilation support. In healthy humans, the diaphragm breathing activity can be detected as early as 10 to 12 weeks of gestation, occurring at an average frequency of 60 per minute. Neonates primarily rely on abdominal respiration because their ribcages are not fully developed, unlike those of older children and adults. Identifying neonatal diaphragmatic dysfunction through ultrasound video is crucial, particularly in cases involving diaphragmatic paralysis which may benefit from therapeutic interventions tailored and prolonged ventilatory support.
The purpose of this PhD will be to propose an integrated semi-automated video analysis system for the accurate diaphragmatic motion analysis in neonates. The candidate will employ real-time video analysis to capture movement and monitor diaphragmatic motion from ultrasound b-scan videos. A particular emphasis will be placed on understanding movement and monitor variability. In addition, the project will incorporate artificial intelligence and deep learning methodologies to develop predictive models for diaphragmatic motion, leveraging features derived from the ultrasound videos .
The candidate(s) must have good programming skills mainly in Python language.

Required Qualifications: Degree in Computer Science/Engineering Electrical Engineering, or biomedical engineering

Funding: Funding possibility through EU projects

Research Advisor:
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Doctoral Vacancy Announcement form

Research Topic Title: "Advanced Power Semiconductor Devices and Power Electronic Systems for Renewable Energy, Electric Mobility, and Smart Grid Applications"

No. of Openings: 1

Description: We are seeking highly motivated and talented PhD candidates to join our research team at Cyprus University of Technology. The successful candidates will engage in cutting-edge research within the field of power semiconductor devices and power electronic systems, with a focus on the following areas:

- Wide-Bandgap (WBG) and Ultra-Wide Bandgap (UWBG) Semiconductor Technologies (SiC, GaN) for high-efficiency power conversion.
- Advanced TCAD Modelling and Simulation for the design and optimisation of semiconductor devices tailored for smart grids, renewable energy systems, electric vehicles, and next-generation power systems.
- Failure Mechanisms and Reliability Analysis of power electronic devices, with comparisons to IGBT technologies.
- Energy Storage and Battery Technologies, including degradation mechanisms, aging models, and condition monitoring.
- High-Efficiency Power Conversion Systems for renewable energy integration, electric vehicle powertrains, and grid-connected applications.
- Smart Grid Applications including AC/DC and DC/DC power conversion for distributed energy resources and microgrids.
- Electrified Mobility Solutions, focusing on powertrain efficiency, fast charging technologies, and electric vehicle infrastructure.

This research directly contributes to impactful advancements in:

- Renewable Energy Systems: High-efficiency power conversion for solar and wind energy integration.
- Electric Mobility: Powertrain optimisation and energy management for electric vehicles, including electric aircraft and maritime applications.
- Smart Grids and Energy Distribution: Enhancing grid stability and energy efficiency through advanced power electronics.
- Sustainable Power Systems: Contributing to zero-carbon emission solutions for future energy systems.

The selected candidates will have the opportunity to collaborate within international research projects, including the FLAGCHIP Horizon Europe initiative, and contribute to impactful advancements in power electronics and energy systems. Financial support opportunities, particularly for exceptional candidates, exist through contributions to project deliverables or involvement in teaching activities. These opportunities can be discussed during the interview stage.

Required Qualifications:

- A Bachelor's and Master's degree in Electrical Engineering, Power Electronics, Semiconductor Physics, or related fields.
- Strong background in power semiconductor devices, power electronics, or energy systems.
- Proficiency in simulation tools such as Silvaco TCAD, LTSpice, or Matlab is highly desirable.
- Excellent communication skills in English (written and spoken).
- Self-motivation, teamwork skills, and a commitment to high-quality research.

Funding: Financial support opportunities, particularly for exceptional candidates, exist through contributions to the deliverables of the FLAGCHIP Horizon Europe project, deliverables of the advisor's starting grant, and involvement in teaching activities. Indicative financial support at the time of writing this announcement is 13,000€ per annum and 3,000€ for fee support, for approximately three years.

Research Advisor:
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Doctoral Vacancy Announcement form

Research Topic Title: "Intelligent fault diagnosis for distributed systems and networks"

No. of Openings: 1 (one)

Description: The emergence of 5G, IoT, WSN and Industry 4.0 technologies has made possible the collection of large amounts of real-time data about a monitored environment. There is currently a need to develop fault tolerant methods and architectures for distributed systems and networks. The proposed research will focus on innovative fault diagnosis approaches that can learn characteristics or system dynamics of the monitored environment and adapt their behavior in order to handle missing or inconsistent data and achieve fault tolerant monitoring.

Required Qualifications: Undergraduate (BSc) and postgraduate (MSc) degrees in Electrical Engineering or Computer Science or related field. Prior research experience or specialization in related topics will be considered an advantage.

Funding:
Funding is available for full-time qualified applicants through involvement in aerOS https://aeros-project.eu/, a Horizon Europe Research Program

Research Advisor:
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Research Topic Title: "Internet of Things (IoT) for Smart Environment Monitoring"

No. of Openings: 1 (one)

Description: Due to the recent advances in IoT and 5G technologies, the application of wireless sensor networks (WSNs) offers the opportunity to monitor the environment in real-time at an unprecedented temporal and spatial resolution. Environmental monitoring applications can cover a variety of different topics both for indoor and outdoor monitoring. Indoor monitoring applications typically involve sensing temperature, humidity, light, sound, and air quality in a building's interior. Other important indoor applications may include fire and contaminant detection. Outdoor monitoring applications may include weather forecasting; air and water pollution monitoring; detection of earthquakes, volcano eruptions, flooding, or released chemical hazards; habitat monitoring, smart agriculture; and traffic monitoring. This research will focus on the design of intelligent algorithms and approaches for converting the collected environmental data into meaningful information to enable decision support in smart environment applications.

Required Qualifications: Undergraduate (BSc) and postgraduate (MSc) degrees in Electrical Engineering or Computer Science or related field. Prior research experience or specialization in related topics will be considered an advantage.

Funding: n/a

Research Advisor:
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Position: Associate Professor
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Doctoral Vacancy Announcement form

Research Topic Title: "Enabling Fine-Grained Control Over JavaScript Execution Through Advanced Static and Dynamic Analysis"

No. of Openings: 1

Description: JavaScript is a fundamental component of modern web applications, enabling rich, dynamic, and interactive functionalities. However, it also introduces numerous security and privacy challenges, exposing users to significant threats. This PhD position focuses on designing and developing advanced static and dynamic analysis techniques and tools to improve web security by providing fine-grained control over JavaScript execution in modern web browsers. The research will address challenges such as obfuscation, minification, and dynamic code generation by designing de-obfuscation methods, real-time monitoring mechanisms, and efficient fine-grained behavior/functionality classification techniques. The goal is to detect and prevent intrusive or malicious behaviors, such as tracking and fingerprinting, in real time as users browse the Web. The selected candidate will contribute to advancing the field of web security by developing innovative tools and methodologies that enhance user security and privacy on the Web.

Required Qualifications:

- Bachelor's (BSc) and Master's (MSc) degrees in Computer Science or a related field.
- Strong programming skills and experience in web technologies. Background in software analysis techniques, web security, or machine learning is desirable.
- The ideal candidate should have a strong interest in cutting-edge research. Prior research experience or specialization in related topics will be considered an advantage.

Funding: Funding may be available for qualified candidates through research program participation and/or teaching assistant positions.

Research Advisor
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Research Topic Title: "Theoretical and Experimental Investigation of Geothermal Systems"

No. of Openings: 1 (one)

Description: Required a theoretical and experimental investigation of geothermal systems

Required Qualifications:

BSc and/or MSc in Electrical Engineering and Computer Engineering or Computer Science or Physics, or any other related subject. Strong mathematical modeling background will be considered an advantage.

Funding: No funding

Research Advisor: Paul Christodoulides
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Doctoral Vacancy Announcement form

Research Topic Title: "Production of Hydrogen by Frequencies Hydrolysis and impurities of materials. Theoretical and experimental approach."

No. of Openings: 1 (one)

Description:
Required a theoretical and experimental approach for the production of hydrogen by frequencies, hydrolysis and impurities of materials.

Required Qualifications:
BSc and/or MSc in Electrical Engineering and Computer Engineering or Computer Science or Physics, or any other related subject.

Funding: No funding

Research Advisor: Paul Christodoulides
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Doctoral Vacancy Announcement form

Research Topic Title: "Enabling power systems of lower costs and carbon emissions through decentralized energy storage management, renewable and dispatchable generation. The case of Cyprus for an isolated power system"

No. of Openings: 1 (one)

Description:
Current power systems were designed many years ago, without provisions for integrating any non-dispatchable generation (e.g., Renewable Energy Sources) or handling bidirectional energy flows. Significant challenges that all Transmission and Distribution System Operators (TSOs and DSOs) need to address are congested assets such as power lines and transformers, system stability due to excess generation and low demand and optimum economic dispatch due to the stochastic nature of renewable generation. Such problems become even worse in isolated power systems where system weakness increase with the increase of RES and significant curtailments take place.

Energy storage can be a solution, as it can absorb excess renewable generation and provide it when it is needed, resulting to a smoother power demand as seen by the dispatchable generators and hence, allowing a more efficient generation unit commitment and dispatch. Nevertheless, with centralized storage there is little or no benefit for grid congested substations and power lines, which face power flows close to their limits and in case of any faults or failures, significant distributed generation or load may be disconnected for system's stability reasons. Hence, allowing decentralized energy storage at different congested locations of the utility grid, allows an increased penetration of RES with a reduced curtailment. The main objective of the study is to examine the addition of decentralised storage at different strategic substations of the grid through energy management optimization of the storage to quantify the benefits of the system in terms of investment and running costs and RES integration gain.
Required Qualifications:

Funding: No funding

Required Qualifications: BSc and/or MSc in Electrical Engineering and Computer Engineering or Computer Science or Physics, or any other related subject.

Research Advisor:
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