Doctoral Vacancy Announcement form

Research Topic Title:	Innovative land use modelling for sustainable urban planning
No. of Openings:	1
Description:	Urbanisation poses significant challenges and opportunities for sustainable development, with approximately 56% of the global population in urban areas projected to reach 70% by 2050. Urban expansion increases land resource demand and requires innovative urban planning and land-use management solutions. Since the 1990s, Geographic Information Systems (GIS) and Planning Support Systems have been used as effective planning tools. Artificial Intelligence (AI) has recently become crucial for sustainable and resilient city planning and management. Advanced land-use modelling that incorporates AI and GIS offers a promising approach to address these challenges. Furthermore, spatial computational methods (SCM), such as Cellular Automata (CA) and agent-based models (ABM), are used for urban land dynamics and planning. Despite the promising integration of AI and SCM into urban planning tools, few approaches have been adopted by professionals. Additionally, there is limited focus on AI applications in urban planning and decision-making activities, such as scenario land use planning. Thus, it is essential to bridge this gap by developing and implementing innovative land-use models that support sustainable urban planning through interdisciplinary approaches, for example, by including climate change adaptation and UN Agenda 2030 goals. Moreover, transparent and interpretable AI models are required to enhance stakeholder understanding and foster collaboration between technologists, urban planners, and communities. Therefore, this scientific research aims to develop and evaluate innovative urban planning models using GIS, AI techniques, and advanced spatial computational methods to support urban spatial planning and decision-making. The contribution of new models to policymaking and practical urban planning processes can be identified based on precise needs and gaps. The candidate is expected to make a significant contribution to advancing the integration of AI and GIS into urban planning processes, particularly through the development of innovative and practical models for sustainable land-use management. Additionally, the candidate will contribute to bridging the gap between theoretical AI applications and real-world urban planning practices, providing valuable insights into how interdisciplinary approaches can be utilized to meet sustainability goals.
Funding:	Partial funding for the position is secured, with additional opportunities to secure full funding from various research calls and projects.

Required Qualifications:	• University degree in a field such as: Urban Planning, Geography, Rural and Surveying Engineering/Geoinformation, Civil Engineering, Computer Science, or related field. • Master's degree in a field such as: Urban Planning, Smart Cities, Geographical Information Systems, Geo-information, Artificial Intelligence, Data Science, or related field. • Ability to program in any of the following languages: Python (preferably), C#, Java, VB (using .NET SDK) (or in other language). • Excellent knowledge of English.

Research Advisor:	
Name/Surname:	Demetris Demetriou
Position:	Lecturer
Email:	demetris.s.demetriou@cut.ac.cy

Doctoral Vacancy Announcement form

Research Topic Title:	Land Readjustment using emerging technologies
No. of Openings:	1
Description:	Urbanisation is a defining trend in the 21st century, with the global urban population projected to increase from approximately 56% to 70% by 2050. The UN Urban Agenda 2030 emphasises the significance of sustainable urban development. A key strategy for achieving these objectives is land readjustment, a combined planning and financing urban land development approach that consolidates land parcels into a unified area in which a master plan is applied, followed by the subdivision of land plots. Subsequently, services and infrastructure, such as streets, parks, and utilities, are constructed, and new plots are redistributed to the original landowners. The entire process involves collaborations between landowners, local municipalities, other authorities, and/or the government. The participatory approach ensures that development costs and benefits are shared between landowners and the government/municipality. Landowners contribute portions of their property to infrastructure development and open spaces without monetary compensation and may also offer additional land to pay the proportion of costs owed to the project. Despite the relatively extensive implementation of land readjustment in approximately 29 countries and the substantial evolution of information technology, there is currently a lack of specialised systems to adequately support the entire process of land readjustment. Typically, general software systems such as Geographical Information Systems (GIS) and/or CAD, specific modules for land subdivision design, and country tailor-made modules, e.g. to calculate and allocate costs after project implementation, are utilized. Most of the research focuses on developing specific systems, tools, or algorithms for rural land consolidation projects, and only a few studies have examined land readjustment and GIS. Some existing studies have focused on one stage of land readjustment, the automated subdivision of land plots, although they disregarded the other phases of the process. Furthermore, these studies were outdated. Consequently, there is a lack of an integrated system or module for both planning and decision making, encompassing all stages of the LR process. Based on the above, this proposal aims to support land readjustment by developing a set of geo-planning tools by integrating GIS, artificial intelligence

	(Geo-AI field) (e.g. machine learning, deep learning, convolutional neural networks, evolutionary computing, large language models). This system enhances the efficiency, accuracy, and transparency of LR processes in terms of planning, design, and decision making. The candidate is expected to contribute to the development of new scientific knowledge, models, and tools that can be used for the automation and support of decision-making regarding urban land readjustment. Alternatively, the focus can be on rural land consolidation.
Funding:	Funding for the position is not available at the current stage, but it will be possible to attract partial/full funding from a proposal recently submitted or new research calls.
Required Qualifications:	• University degree in a field such as: Rural and Surveying Engineering/Geoinformation, Urban Planning, , Geography, Civil Engineering, Computer Science, or related field. • Master's degree in a field such as: Geographical Information Systems, Geo-information, Remote sensing, Artificial Intelligence, Data Science, or related field. • Ability to program in any of the following languages: Python (preferably), C#, Java, VB (using .NET SDK) (or in other language). • Excellent knowledge of English.

Research Advisor:	
Name/Surname:	Demetris Demetriou
Position:	Lecturer
Email:	demetris.s.demetriou@cut.ac.cy

Doctoral Vacancy Announcement form

Research Topic Title:	Modelling climate change and land policies to support disaster risk management
No. of Openings:	1
Description:	This research focuses on addressing the challenges posed by climate change, which is increasing the frequency and intensity of natural disasters such as wildfires, floods, and droughts. Effective land policies that mitigate these risks are essential for enhancing resilience and reducing disaster-related losses. This research aims to develop innovative models that integrate climate change factors into land use planning and disaster risk management by utilizing Google Earth Engine (GEE), a powerful cloud-based geospatial platform. The study will use a district in Cyprus (e.g. Limassol District) as a case study area, allowing the exploration of how different land policy scenarios (e.g., zoning restrictions, reforestation programs, and floodplain management) can reduce vulnerabilities to natural disasters. Through scenario-based modeling, the research will simulate the impact of land policies on disaster risks such as floods and wildfires. By incorporating real-time climate data, the models will assess how these policies enhance climate resilience and contribute to long-term disaster mitigation. Key objectives include the identification of relevant land policies, integration of climate change projections into simulations, and the evaluation of policy effectiveness through time-series analysis and spatial data. The project will focus on testing a number of land policy scenarios, including urban sprawl control, conservation measures, agricultural land use conversion, and disaster risk management. Outcomes from the models will provide data-driven insights and recommendations for policymakers to optimize land use strategies and enhance disaster resilience. The candidate is expected to contribute to the development of new scientific methodologies and tools for disaster risk assessment and land policy analysis to fill critical gaps in current approaches to disaster risk management in the context of climate change, with implications for broader regional and global applications.
Funding:	Funding for the position is not available at the current stage, but it will be possible to attract partial/full funding from research calls.

Required Qualifications:	• University degree in a field such as: Geosciences, Agricultural Science, Geography, Environmental Engineering/Science, Civil Engineering, Rural Surveying Engineering/Geoinformation, Urban Planning, Physics, Computer Science, or related field. • Master's degree in a field such as: Geographical Information Systems, Geo-information, Remote sensing, Artificial Intelligence, Data Science, Climate Change, Environmental Science/Engineering, Emergency/Disaster Management, or related field. • Ability to program in any of the following languages: Python, C#, Java(preferably), VB (using .NET SDK) (or in other language). • Excellent knowledge of English.

Research Advisor:	
Name/Surname:	Demetris Demetriou
Position:	Lecturer
Email:	demetris.s.demetriou@cut.ac.cy

Doctoral Vacancy Announcement form

Research Topic Title:	Automating the creation of 3D Cadastre using special drawings and 3D City Models
No. of Openings:	1
Description:	This proposed research addresses a critical gap in the automation of transforming 2D cadastral drawings, commonly used in Cyprus for registering horizontal properties such as apartments, into fully functional 3D cadastral systems. Currently, these 2D special drawings, which detail the internal divisions of buildings including rooms, parking spaces, and common areas, are the foundation for property registration. However, there is no automated method to convert these 2D representations into 3D models that can capture the complex spatial and ownership relationships inherent in multi-level urban structures. This lack of automation represents a significant research gap, particularly as cities worldwide are moving toward more integrated 3D cadastre systems for modern land administration. The aim of this research is to develop an automated process for generating 3D cadastre from these 2D special drawings, with the goal of integrating them into existing 3D city models. By automating the recognition of different property ownership layers and shared spaces, the research will offer a solution to the challenges posed by manually converting this data. The project will leverage existing tools such as ESRI CityEngine, ArcGIS, and BIM software like Revit for 3D model creation, while employing Python scripting and ArcPy to automate the extraction and processing of data from the 2D drawings. Moreover, artificial intelligence methods, particularly machine learning and neural networks, will be explored to further automate the interpretation and transformation of these drawings into 3D spatial divisions, thereby reducing manual input and improving efficiency. This research is particularly important as it addresses the need for more accurate and efficient cadastral systems that can be utilized in urban planning, property management, and disaster preparedness. By automating the generation of 3D cadastre, this work will contribute to modernizing land administration practices, offering a comprehensive view of property rights in complex urban settings. The expected contribution of the candidate will be the development of a novel workflow or software tool that facilitates the rapid creation of 3D cadastral models, enhancing land management and urban planning capabilities both in Cyprus and internationally.
Funding:	Funding for the position is not available at the current stage, but it will be possible to attract partial/full funding from research calls.

Required Qualifications:	• University degree in a field such as: Rural Surveying Engineering/Geoinformation, Computer Science , Civil Engineering, , Urban Planning or related field. • Master's degree in a field such as: Geographical Information Systems, Geo-information, Urban Informatics/Smart cities, Computational geometry, Artificial Intelligence, Data Science, or related field. • Ability to program in any of the following languages: Python (preferably), C#, Java, VB (using .NET SDK) (or in other language). • Excellent knowledge of English.

Research Advisor:	
Name/Surname:	Demetris Demetriou
Position:	Lecturer
Email:	demetris.s.demetriou@cut.ac.cy