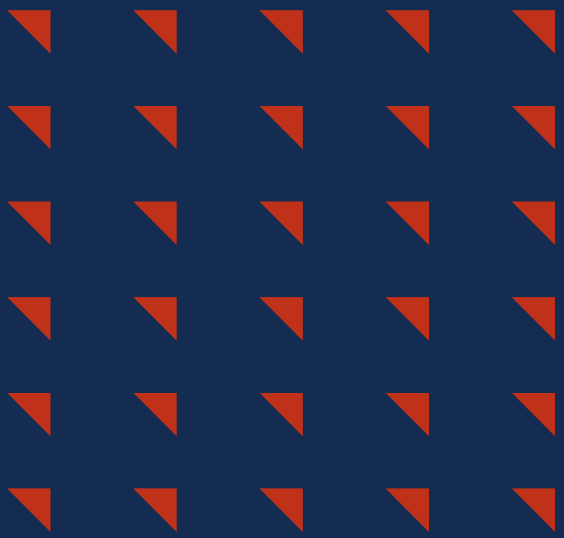
Singular Logic



R&D Annual Report 2025

2025 Overview

15+

Active
Projects

16+

Representations
in Major Events

5

Research
Prototypes

19

Research
Publications

R&D and Innovation

Preface

2025 marked a year of growth and significant accomplishments for our department. We made substantial contributions to the development of emerging data platforms and innovative applications. Among the highlights of the year have been the successful closure of the LIFE SRI-ENACT project, delivering high quality results for the uptake of Smart Readiness Indicator scheme in Europe, the launch of the HARMONY project addressing cross-border climate resilience, as well as the co-organization of the 2nd Innovation Marathon "Apps4Athens Hackathon 2.0: AI Edition".

2025

Capitalizing on the launch of five R&D projects in 2024 (CLIMRES, DATAWISE, ENHANCE, ENFORCE, MaaSAI), we focused this year on developing innovative prototypes to support smart and resilient cities and communities. We extended our core data management platform to integrate dynamic data streams and ensure robustness and scalability, and delivered a suite of web services and platforms. These include web-based assessment tools for role-specific communication and certification across buildings and cultural heritage sites, a citizen participation platform for proposals and voting, an indoor crowd monitoring tool to support comfort and evacuation, and our first VR application for evacuation training, adaptable to other scenarios.

Beyond technical developments, we delivered multiple co-design workshops and interviews using foresight and consensus-building methods, and contributed to high-quality publications on data management, VR, and AI. One co-authored paper was featured on the French Ministry of Agriculture's foresight blog. Our active presence at major European events, including Smart Cities Expo World Congress 2025 and Sustainable Places 2025, reflects our commitment to advancing digital transformation towards climate-resilient infrastructures and communities.

2026

In 2026, our primary objective is to further mature and extend our research prototypes through extensive testing and customization supporting different scenarios in emerging sustainable communities. These efforts will pave the way for new service development and strengthen our partnerships with academic institutions and fellow researchers. By actively participating in and sharing our project results at key events in data science, AI, climate resilience, and sustainable development, we aim to expand and deepen our activities and impact of our project results, fully aligned with our strategic ambitions.

The R&D and Innovation Team

Dr. Stamatia Rizou
RnD Manager

George Lagogiannis
Innovation & R&D Senior Executive

Moatasim Mahmoud
Research & SW Engineer

Dr. Ioannis Karvelas
Scientific Project Manager

Nikos Monios
Software Engineer

Iasonas Sotiropoulos
Software Engineer

Panagiotis Iatrou
Junior Software Engineer

Athanasios Papanikolaou
Junior Software Engineer

Abodi Atrash
UI/UX Specialist

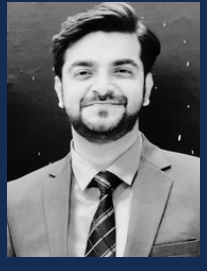
Antonia Vronti
Project Manager

Vaso Kontou
Project Manager

Georgia Rouki
Project Administrator

Nour Hammad
Project Administrator

Havva Uyar
MSCA Fellow



Rahool Dembani
MSCA Fellow

Muhammad Irfan Khalid
MSCA Fellow

Ahmed Gamal
MSCA Fellow

Our Projects

Application Domains

Energy

Buildings

Climate Resilience

Agriculture

Smart Cities

Technologies

Data

Artificial Intelligence

Automation & Control

Virtual & Augmented Reality

Role

Coordinator

Technical

Stakeholder Engagement

Dissemination & Business Exploitation

Doctoral Training

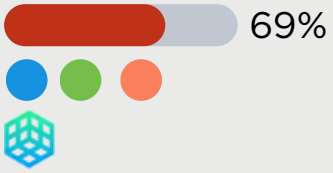
Projects' Progress

POWERYOUTH

Empowering youth for energy community actions

01/2024 - 12/2026 € 1.449.997

POWERYOUTH project aims to empower young people to play an active role towards the energy transition. SingularLogic delivered a refined version of the PARTICIPATE tool, a web-based participatory platform that facilitates youth engagement in energy community projects, encouraging young people to actively shape and lead energy initiatives. During 2025, the platform became available to the pilot partners of the project along with training materials and a user-friendly guidebook. In addition, SingularLogic led initial activities the replication and the exploitation of POWERYOUTH solution and represented the project in different fora and events.

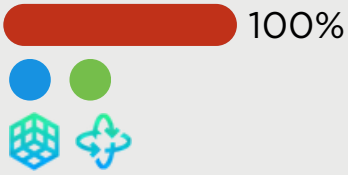


SRI-ENACT

Co-creating Tools and Services for Smart Readiness Indicator Uptake

12/2022 - 05/2025 € 1.992.708

The SRI-ENACT project concluded during 2025 and has successfully delivered a holistic and practical solution to support the widespread implementation of the Smart Readiness Indicator (SRI) across Europe. SingularLogic delivered the SRI toolkit, a user-friendly application facilitating the SRI assessment of buildings. During 2025, provided continuous support and maintenance of the toolkit and contributed to several events and policy roundtables with regards to SRI. In February 2025, SingularLogic hosted a policy workshop which brought together key stakeholders and experts including members of Greece's Liaison Group, SRI Assessors, representatives from the Ministry of Environment and Energy, and the SRI Cluster, while in May 2025 a final event was organized in Brussels showcasing the project results to EU stakeholders. The SRI toolkit developed by the project will continue to be maintained and supported beyond the project end to support the SRI uptake and the research community.

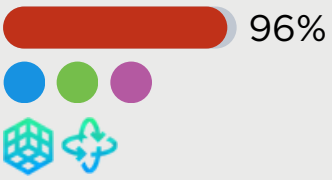


BUILDSPACE

Enabling Innovative Space-driven Services for Energy Efficient Buildings and Climate Resilient Cities

02/2023 - 01/2026 € 2.632.367

BUILDSPACE project provides innovative services for energy-efficient buildings and climate resilient cities. SingularLogic led the activities related to data management infrastructure of the BUILDSPACE services. Capitalizing on the work done in 2024, a refined prototype of the core data management platform was refined and tested. Also, the methodology and technological innovations of the platform were published and presented in international conferences during 2025. In addition, SingularLogic led the exploitation planning activities of the project and coordinated the business plans of the project.



Projects' Progress

INHERIT

Next Generation Solutions for Sustainable, Inclusive, Resource-efficient and Resilient Cultural Heritage

10/2023 - 03/2027 € 4.999.937

The INHERIT project aims to make cultural heritage buildings more sustainable, accessible and energy-efficient. In 2025, SingularLogic contributed in multiple areas contributing to key milestones of the project: i) the Data Exchange Platform which collects data from all INHERIT pilots and acts as backbone service was successfully delivered; ii) the Insights application providing real time occupancy monitoring for cultural heritage sites was developed and tested in lab environment; iii) the INHERIT Assessment Tool, a web platform offering a flexible assessment scheme for evaluating cultural sites' climate resilience, energy efficiency and accessibility. On top of the technical work, SingularLogic continued a series of co-creation workshops with the aim to collect user feedback about the INHERIT services to further improve their usability. SingularLogic as project coordinator, represented the project in key events and conferences such as the SUSTAINABLE PLACES 2025 and other online workshops boosted the visibility in Europe.

67%

DATAWiSE

Intelligent and Sustainable Building Management powered by Cross-Sectoral Lifecycle

06/2024 - 08/2027 € 4.991.148

The DATAWiSE project develops building and building portfolio management tools, leveraging cross-sectoral lifecycle data on the basis of an open, secure, interoperable, and scalable framework. Since the beginning of 2025, the project has made significant progress related to the development of services and the implementation of multiple components of the platform's architecture. SingularLogic has successfully led the completion of use cases co-design and technical requirements specification and delivered the first release of the data storage platform. In addition, the SRI toolkit developed originally in the SRI-ENACT project was leveraged, to allow the integration of the SRI assessment into the DATAWiSE toolkits. Finally, SingularLogic led the dissemination activities regarding the liaison to the Built4People partnership and ensured a dynamic presence of the project to key events, such as the Sustainable Places 2025.

64%

CLIMRES

Leadership for Climate-resilient Buildings

06/2024 - 05/2027 € 5.827.262

CLIMRES aims to foster a 'Leadership for Climate Resilient Buildings', by addressing the identification of buildings' vulnerabilities and improving their resilience in disruptive events and altered conditions caused by climate change. SingularLogic is the coordinator of CLIMRES. In 2025, SingularLogic developed the CLIMRES Data Management Platform (DMP), a robust and interoperable system designed to collect, manage and analyze urban and environmental data for climate resilience. SingularLogic also created a virtual reality (VR) application for fire safety and evacuation training with various modules on fire extinguishing, evacuation and best practices.

53%

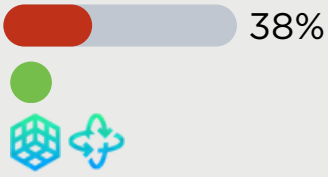
Projects' Progress

ENFORCE

Empower citizeNs to join Forces with public authORities in proteCting the Environment

09/2024 - 08/2028 € 6.365.498

ENFORCE aims to tackle the frequent mismatch between the environmental data gathered by citizens and what authorities require for enforcement purposes, through creative toolkits and protocols. The project addresses the challenges in data reporting coming from both the citizens side and the authorities' side, for the obtained data to be usable for environmental enforcement. In this line, the project capitalizes on the use of geo-spatial intelligence and AI-enhanced tools, strengthening their capacities, promoting good practices and preparing an inventory on geo-spatial intelligence and AI use. SingularLogic acts as the software integrator in this project, offering the required CI/CD infrastructure and the UI for the toolkits and the services. During 2025, the detailed specification of the ENFORCE plaza toolkit was created along with a UI prototype supporting early feedback about ENFORCE toolkit from the end users.

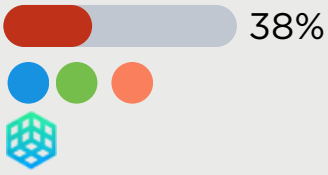


ENHANCE

Enabling One Health Coastal Management through advanced AI over Marine Copernicus and citizen science data

12/2024 - 11/2027 € 1.701.375

ENHANCE, coordinated by SingularLogic, aims to protect and restore vulnerable coastal ecosystems through innovative and sustainable solutions. The project officially kicked off in December 2024 and has since made significant and steady progress. A key milestone has been the establishment of the ENHANCE One Health Framework for Coastal Management, which provides the foundation for integrated and holistic decision-making. Within this context, SingularLogic is leading the co-creation of the ENHANCE toolkit, with a particular focus on the development of the data exchange platform for marine water quality. In November 2025, the ENHANCE project was presented at the European Commission (EC) booth during the Smart City Expo World Congress (SCEWC) 2025 in Barcelona, Spain.



HARMONY

Harmonised Protocols for Transnational Environmental Impact Assessment & Emergency Management

09/2025 - 08/2028 € 2,999,943

The HARMONY project kicked off in September 2025 with the aim to develop harmonized protocols for comprehensive disaster risk management, covering Prevention/Mitigation, Preparedness, Response, and Recovery. SingularLogic coordinates the project and leads key activities, including the development of digital tools for disaster management, cross-platform communication, data integration, real-time monitoring, and emergency response. In this early phase, the work has focused on the coordination of the stakeholder engagement plan and the setup of the Ethics Advisory Board.

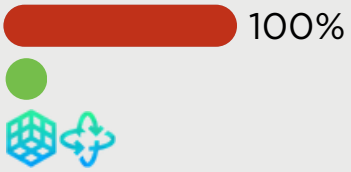
Projects' Progress

ATLANTIS

Improved resilience of Critical Infrastructures AgainsT LArge scale transNational and sysTemic rISks

10/2022 - 09/2025 € 9.998.535

ATLANTIS concluded successfully in October 2025. Over its 3-year journey, the project met its ambitious goals in increasing the resilience and protection capabilities of interconnected European Critical Infrastructures (ECI) against evolving systemic risks, including large-scale, combined cyber-physical threats. During 2025, SingularLogic refined and tested the inter-DLT technologies-based traceable communication framework for Critical Infrastructures developed in the first phase of the project. Furthermore, SingularLogic contributed to the cross-domain large-scale pilot in health, logistics/supply chain, and border control and the multi-dimensional assessment of the ATLANTIS solution.



AGRIDATAVALUE

Smart Farm and Agri-environmental Big Data Space

02/2023 - 01/2029 € 7.145.500

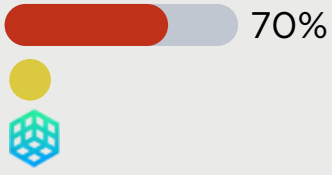
AgriDataValue develops a trusted, federated agri-data space that enables the responsible use of agricultural and environmental data for AI-driven services. It brings together decentralised data management, secure access control, edge and real-time processing and traceable, data-driven business models to support innovation while preserving data sovereignty and trust across the ecosystem. In addition to earlier work on secure data exchange and ecosystem enablement, SingularLogic has worked on expanding the project's techno-socio-economic radar, systematically monitoring regulatory, market, technological and societal developments shaping digital agriculture in Europe.

ENTRUST

Next Generation of Trustworthy Agri-Data Management

01/2023 - 12/2026 € 2.705.392

EnTrust is a doctoral network training a new generation of data professionals to enable fair, transparent and trusted data sharing across the agri-data value chain. Within EnTrust, SingularLogic hosts two doctoral researchers working on: value assessment of agricultural data and privacy-preserving technologies for secure data sharing. Over the past year, this work has delivered strong scientific results, including 13 peer-reviewed publications and conference contributions, with two additional manuscripts under review. Network collaboration has also been strengthened through secondments, with researchers completing a total of eight months in host organisations.



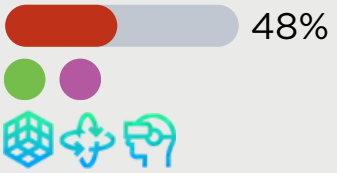
Projects' Progress

6G-ICARUS

Research Collaboration and Mobility for Beyond 5G Future Wireless Networkss

03/2024 - 02/2028 € 501.400

The 6GICARUS project aims to investigate, combine and improve current technologies to address numerous obstacles that 6G networks will face to define the future wireless networks (FWNs). During 2025, SingularLogic contributed to the definition of the definition of system requirements for the development of tools supporting end-to-end quality of service (QoS) through advanced multi-connectivity for 6G mobile communications. SingularLogic also as the dissemination, exploitation, communication leader of the project, created the visual identity of the project and maintained the project's communication channels.



MOTOR5G

MObility and Training fOR beyond 5G Ecosystems

11/2019 - 01/2025 € 3.979.000

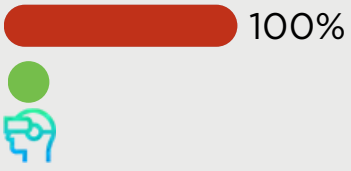
The MOTOR5G project is an innovative training network that aims to train skilled young researchers for the advancement of 5G networks and beyond. The project concluded in January 2025. During the project SingularLogic hosted a PhD candidate who developed 360° video streaming algorithms.

RECOMBINE

Research Collaboration and Mobility for Beyond 5G Future Wireless Networkss

01/2020 - 06/2025 € 478.400

RECOMBINE is a staff exchange programme for future wireless networks and beyond 5G technologies. The project concluded in June 2025. During this final phase, SingularLogic worked on the design and implementation of a clustering algorithm for classifying VR users based on their viewing behavior. The company participated in the staff exchange programme and benefited by hands-on training on VR applications and optimization techniques in the context of beyond 5G networks.

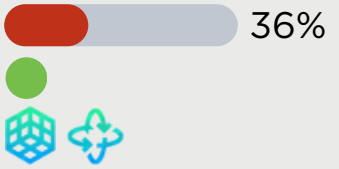


MaaSAI

Agile Manufacturing as a Service through AI Autonomous Agents

12/2024 - 11/2027 € 6.999.228

The MaaSAI project aims to create a comprehensive digital system to automate and facilitate interactions between suppliers of manufacturing systems (Providers) and manufacturing companies (Consumers) in a Manufacturing-as-a-Service (MaaS) ecosystem, in an agile, efficient and transparent manner. During 2025 SingularLogic led the implementation viewpoint architecture, that describes, technically, the different component of the MaaSAI framework. Additionally, SingularLogic has worked on the technical specification and design of the blockchain integration as well as smart contracts for the MaaSAI ecosystem.

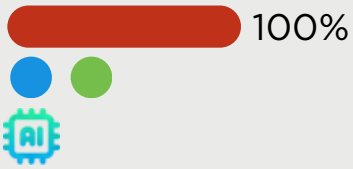


Projects' Progress

FLOODGUARD

06/2025 - 10/2025

FLOODGUARD has been a 3-month specification project funded under SPACE4Cities Pre-Commercial Procurement programme with the aim to design a flood risk management solution to help cities better anticipate, assess and respond to flooding events through data-driven tools. The project explored the integration of Copernicus Earth Observation data, AI-supported hydrological and hydraulic modelling and digital twin concepts to enable more dynamic flood risk analysis and decision support, moving beyond static and fragmented risk assessments.
SingularLogic coordinated the design of the FLOODGUARD solution, leading the overall concept design, system architecture and use-case definition in close collaboration with consortium partners and city stakeholders. The FLOODGUARD conceptual design was presented at the European Commission (EC) booth during the Smart City Expo World Congress (SCEWC) 2025 in Barcelona, Spain.

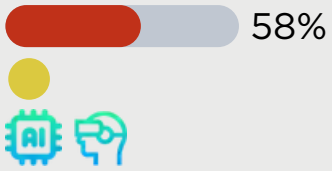


AGORA

Training Young Researchers on Shaping Metaverse for Business and Social Value

09/2023 - 08/2027 € 3.829.874

AGORA is a doctoral network designed to expand the knowledge of the new generation of researchers on Metaverses' multilevel value creation. AGORA's approach is to train researchers on different levels of Metaverse's business and societal value, paving in this way a more integrated understanding of this disruptive ecosystem.
SingularLogic hosts two PhD researchers working on Metaverse marketing, ethics, and gamification. Over the past year, this research resulted in 3 published conference papers, in addition to one conference paper and two journal papers under review. The research activities of 2025 included conducting and analyzing over 25 interviews with relevant stakeholders including Metaverse designers, AR/VR developers, digital marketers, and legal experts.



SPRING

Doctoral Network for reSilience exPeRts IN future larGe-scale critical infrastructures

03/2026 - 02/2030 € 4.376.316

The SPRING project aims to develop an innovative research and training programme to prepare next generation experts in critical entities resilience design. Fifteen doctoral candidates will collectively engage in an ambitious interdisciplinary research project focusing on aspects related to the resilience design, real-time monitoring and control, anomaly detection and isolation, and incident response, in geographically distributed systems of cyberphysical systems. The PhD topics will investigate open research questions about the use of systems and control theory, formal methods, explainable AI, data-driven approaches, and human-centered design to build safe and resilient societal-scale critical entities. SingularLogic will host two PhD candidates focusing on distributed smart supplies in energy infrastructures. The project will start officially in March 2026.

Insights

DATAWiSE: Data Storage & Management for Sustainable Builidings

For the purposes of the DATAWiSE project, we have designed and implemented the data storage and management layers, which integrate, store, and manage both static BIM data and dynamic sensor data in a scalable, reliable, and efficient way, ensuring fast querying and seamless interaction with other platform components.

The infrastructure features a data pipeline which includes 2 message brokers and a database. An Apache Kafka message broker is used to create subscriptions to topics of interest and listens to incoming messages. Upon arrival, the messages are sent to an Orion Context broker deployment. The Orion Context broker is responsible for creating subscriptions for new assets and for pushing the payload to the database (MongoDB). The subscriptions created by Orion notify CKAN for the incoming messages and thus the data can be visualized in it. For this pipeline we tried 2 approaches; the first was based on a python-based microservice which was deployed as a pod in a Kubernetes cluster. The second was based on a no-code tool called Apache NiFi, which is a drag-and-drop tool for creating data pipelines using predefined blocks.

The data storage and management components will work in synergy with the components defined in the Communication Layer (File Manager, Data Sharing Platform, Data Space Connector) of the platform to provide the infrastructure required to support the functionality of the DATAWiSE services and the exposure of the data to relevant data spaces. Collectively, these components provide the technical backbone of the DATAWiSE to operate and assist the end users in making informed decisions related to the energy efficiency and management of their buildings.

Nikos Monios
Senior Software Engineer

INHERIT: Crowd Monitoring Insights Tool

The Crowd Monitoring Insights developed by Singularlogic in the INHERIT project provides a dynamic, data-driven understanding of how cultural heritage buildings are used throughout the day. By integrating occupancy data, mobility behaviour, and indoor environmental conditions, the service enables continuous monitoring of how people move through and interact with heritage spaces. Its frontend dashboard visualises real-time crowd levels, room-by-room activity, and IEQ indicators, allowing facility managers and researchers to observe emerging patterns, detect unusual behaviours, and respond quickly to overcrowding or comfort-related issues.

Built on a robust architecture that combines MQTT-based data ingestion, a centralized PostgreSQL database, and a REST API, the service supports scalable, low-latency analysis suitable for complex multi-building sites. The system processes high-frequency sensor data, performs validation and enrichment, and exposes curated metrics for real-time and historical visualisation. This modular pipeline enhances reliability and makes the service adaptable to a wide range of building typologies and monitoring needs. The service will be tested in two cultural heritage sites in Greece and in Turkey in the context of the INHERIT project.

The service is expected to offer a versatile tool for studying spatial behaviour, environmental quality, and building performance in cultural heritage contexts. Its insights support evidence-based decision-making for crowd management, energy optimisation, and preservation-friendly space allocation.

Iasonas Sotiropoulos, Abodi Atrash
Software Engineer, UI/UX Designer

CLIMRES: Fire Evacuation VR Training

The CLIMRES fire evacuation VR training application was developed as an immersive, standalone VR application focused on training individuals in fire safety principles and fire evacuation procedures. The application integrates a variety of training modules using interactive 3D content and utilizes haptic feedback and spatial sound effects for creating a realistic and engaging learning environment. The application contains 15 immersive training modules, designed as interactive tasks in different practical scenarios. These modules cover fire safety principles, indoor fire evacuation procedures and best practices and the roles of emergency management teams (EMTs)

The presented tasks require the trainee to observe, react and make decisions in response to dynamic events such as sounding alarms, visible flames, or blocked exits. At key moments, the user must choose how to respond, with choices for evacuation, attempting to extinguish manageable fire, or take other safety actions. Each decision made by the user is tracked and evaluated in real time. After completing a training scenario, the application provides immediate feedback, helping users understand the consequences of their actions.

This feedback is designed to reinforce correct responses and offer constructive guidance when improvements are needed, supporting both learning and retention. The timeline of the experience is structured to promote active learning while respecting the pace and choices of the trainee. The application also has a base of theoretical knowledge that can be navigated within the VR environment. It provides a theoretical background and explanation on topics like types of fire and extinguishers. Additionally, the VR training application has a fire knowledge quiz for testing the trainee's knowledge on the learned topics. Moreover, it also implements data collection for recording the trainees' answers to questions, time taken to complete each module and routes used in evacuation tasks. The collected data is used to validate and assess the training application and improve its content.

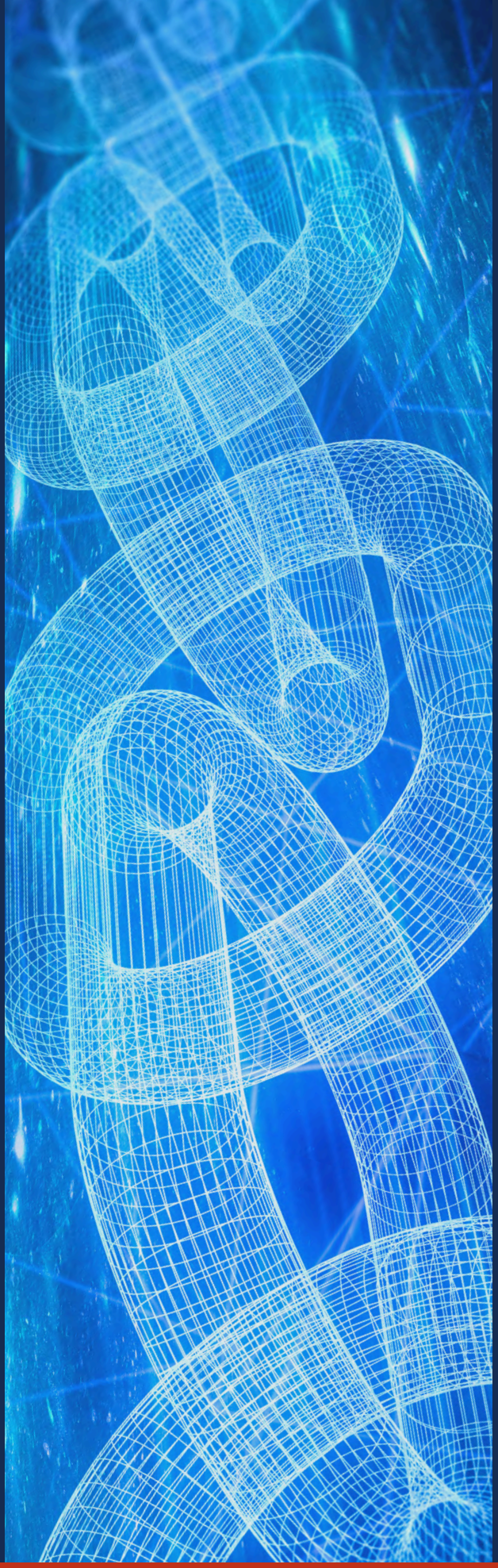
Moatasim Mahmoud
Research & Software Engineer at SingularLogic
PhD Candidate

MAASAI: Blockchain Network

The Blockchain Application, developed as part of the MaaSAI project, is a blockchain based application that enables secure, transparent and safe exchange of data and information in a decentralized manner. The application is designed towards the domain of smart manufacturing, more specifically manufacturing-as-a-service, and it records an agreement between a consumer and a provider. Furthermore, it keeps track of any updates during the manufacturing process and makes all parties aware of them. The application is built by three distinct layers: the blockchain layer, the API layer, and the UI layer. The first one includes the blockchain infrastructure which includes the network itself as well as the deployed smart contracts that enable the applications logic. The UI layer is the final web-based UI with which the end-users interact. The API layer provides the connection between the aforementioned layers all the while interacting with the smart contracts layer and handling cryptographic identity management without requiring third-party applications such as digital wallets.

Overall, the Blockchain Application provides a structured and extensible foundation for supporting trusted collaboration in manufacturing-as-a-service environments. By combining decentralized ledger technology with a layered application architecture, the system enables transparent agreement management, real-time process monitoring, and secure data exchange among participating stakeholders. The separation between blockchain infrastructure, application logic, and user interaction ensures modularity and flexibility, allowing the solution to evolve alongside emerging requirements and future integrations. As such, the application establishes a robust architectural basis for subsequent development, validation, and deployment.

Athanasios Papanikolaou
Software Engineer at SingularLogic



Find more about the research and experiments in the Publications Page at [11].

ENTRUST: JADE-FL Federated Learning Framework

JADE-FL represents a cutting-edge security framework designed to fortify Federated Learning (FL) systems against the dual threats of data privacy leakage and adversarial manipulation. As FL systems increasingly decentralise model training to edge devices (such as agricultural sensors or mobile phones), they become vulnerable to model poisoning attacks where malicious actors inject corrupt data to degrade performance and privacy breaches via gradient leakage.

To solve this, JADE-FL introduces a unified "defence-in-depth" architecture. It combines CKKS Homomorphic Encryption to allow the central server to aggregate user updates without ever seeing the raw data, alongside Differential Privacy (DP) to guarantee that individual user contributions remain anonymous mathematically. Crucially, it employs a novel adaptive weighting mechanism based on cosine similarity. This mechanism analyses the direction of incoming model updates that deviate significantly from the "consensus" direction (indicating potential malice) and automatically down-weighted or rejected.

The framework was rigorously validated using the PlantVillage dataset, a standard benchmark in smart agriculture containing 54,305 images of healthy and diseased plant leaves. Experimental results demonstrate that JADE-FL successfully neutralizes malicious attacks while maintaining high classification accuracy, proving its viability for deploying secure AI in heterogeneous, real-world environments like precision farming.

Rahul Dembani
MSCA Fellow at SingularLogic
PhD Candidate

Find more about the research and experiments in the Publications Page at [1] [3] [13] [17].

ENTRUST: Stakeholder Perspectives and Policy Implications on Agri-Robots

Understanding how agricultural technologies are perceived by those expected to use, support, or regulate them is critical for their successful adoption. A recent study co-authored by Havva Uyar explores how agricultural stakeholders perceive the importance and role of agricultural robots, moving beyond technical performance to examine issues of trust, usefulness and broader socio-economic implications. The research captures perspectives from across the agricultural ecosystem, highlighting how farmers, advisors and institutional actors evaluate robotics in relation to labour demands, efficiency, autonomy and long-term sustainability.

The findings show that perceptions of agricultural robots are not uniform. While some stakeholders view robotics as a necessary response to labour shortages and structural challenges in agriculture, others raise concerns related to cost, skills, control and the transformation of farming practices. Crucially, the study demonstrates that acceptance depends as much on contextual, institutional and governance factors as on technological maturity. This underlines the need for innovation and policy approaches that address real-world constraints and expectations, rather than focusing solely on technological readiness.

The relevance of this research extends beyond academia. The study was featured on the French Ministry of Agriculture's foresight and innovation blog, contributing to policy-oriented discussions on the future of automation and digital transformation in agriculture. This recognition highlights the value of evidence-based insights that connect stakeholder realities with policy and innovation agendas, supporting more responsible and trusted deployment of agricultural robotics.

Policy blog feature:
https://www.veillecep.fr/2025/04/perception-des-robots-par-le-monde-agricole/

Havva Uyar
MSCA Fellow at SingularLogic
PhD Candidate

Find more about the research and experiments in the Publications Page at [6].

AGORA: Ethical Considerations of Digital Marketing in Metaverse Technologies

Metaverse technologies are increasingly adopted across sectors such as healthcare, gaming, education, and social interaction with branding and marketing emerging as key applications. Brands particularly in the luxury fashion industry are leveraging the metaverse to engage consumers through AI-driven personalization, spatial computing and immersive virtual commerce. Virtual stores, 3D advertising, and blockchain-based loyalty programs offer deeper engagement than traditional digital marketing. However, these innovations raise serious ethical concerns related to privacy, transparency, and consumer autonomy. Metaverse platforms collect extensive biometric and behavioral data including eye tracking and physiological responses, intensifying risks of surveillance, manipulation, and compromised informed consent especially for vulnerable users such as minors. While regulatory frameworks such as the GDPR, AI Act, DSA, DMA, and COPPA establish essential protections, rapid technological advancements continue to outpace their effective application in immersive environments.

As an AGORA Marie Skłodowska-Curie Actions (MSCA) Fellow, Muhammad Irfan Khalid examines how the rapid evolution of metaverse technologies calls for a reassessment of digital marketing ethics and the development of regulatory frameworks tailored to immersive environments. His research addresses emerging ethical challenges such as invisible data collection, AI-driven emotional targeting, and avatar-based profiling, which undermine core principles including informed consent, fairness, non-discrimination, and user autonomy. Adopting a multi-stakeholder approach, the research draws on in-depth interviews with metaverse developers, digital businesses and brands, regulators and end users. These insights have informed peer-reviewed conference publications that explore privacy-by-design practices in metaverse development and assess the limitations of existing digital and AI regulations in addressing real-time, biometric-driven marketing. The research proposes a five-pillar ethical framework for responsible, user-centered metaverse marketing, emphasizing the need for updated guidance and industry-led practices to ensure trust, autonomy, and user well-being.

Muhammad Irfan Khalid
MSCA Fellow at SingularLogic
PhD Candidate

Find more about the research and experiments in the Publications Page at [8] [15].

ENHANCE: From User Personas to Co-creating Services

The ENHANCE project, coordinated by SingularLogic, has reached an important early milestone with the identification of the use cases that will guide the development of its One Health digital toolkit. This milestone was achieved through a structured and iterative co-creation methodology that places stakeholders at the core of digital tool development for coastal management, ensuring that the toolkit is grounded in real needs and operational realities.

The co-creation process began with collaborative groundwork involving project partners and a wide range of stakeholders. User personas were developed to represent the diverse groups affected by coastal ecosystem challenges, such as public authorities, professionals, educators, and citizen scientists. These personas informed the creation of user stories that describe practical needs and goals in realistic scenarios. Through a series of workshops and feedback cycles, these stories were progressively refined into clear user requirements. Stakeholders were closely involved in validating priorities, reviewing early concepts, and assessing usability and accessibility, allowing each development phase to build upon the previous one and remain aligned with real-world practices.

This participatory process resulted in the identification of eight use cases that reflect key aspects of coastal management within the One Health framework. These include visualization and monitoring tools that support real-time water quality alerts and citizen participation, solutions that enable sustainable aquaculture and protected area management, dynamic coastal risk mapping to support policy and regulatory decisions, and training and educational tools that leverage real-world data and citizen science to strengthen environmental awareness and sustainable tourism.

Together, these use cases define the scope and ambition of the ENHANCE toolkit. By embedding stakeholder input throughout the design process, the project is establishing a strong foundation for a digital solution that is technically robust, inclusive, and adaptable, supporting integrated and forward-looking coastal management under the One Health approach.

Antonia Vronti
Project Manager at SingularLogic

Dissemination

KEY EVENTS IN 2025

YES-Europe Annual Conference 2025
Vienna, Austria, October 2025

MIPIM - The Global Urban Festival 2025
Cannes, France, March 2025

SUSTAINABLE PLACES 2025
Milan, Italy, October 2025

Smart City Expo World Congress
Barcelona, Spain, November 2025

Apps4Athens Hackathon 2.0
Athens, Greece, November 2025

Innovent Forum 2025
Larissa, Greece, February 2025

16+

Other Events

DATAMITE MeetUp
Athens, Greece, February 2025

KEY - The Energy Transition Expo 2025
Rimini, Italy, March 2025

ERF2025 - The European Robotics Forum
Stuttgart, Germany, March 2025

Third Innovation Days
Nice, France, April 2025

DATAWEEK 2025
Athens, Greece, May 2025

AI-on-Demand Platform Innovation Lab,
Paris, France, June 2025

SynErgia Day
Athens, Greece, July 2025

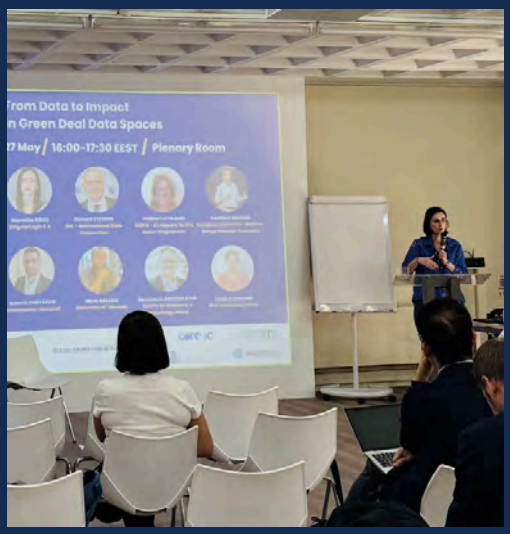
ADR25 - AI, Data, and Robotics Forum 2025
Stavanger, Norway, September 2025

RETASTE 2025
Greece, Athens, September 2025

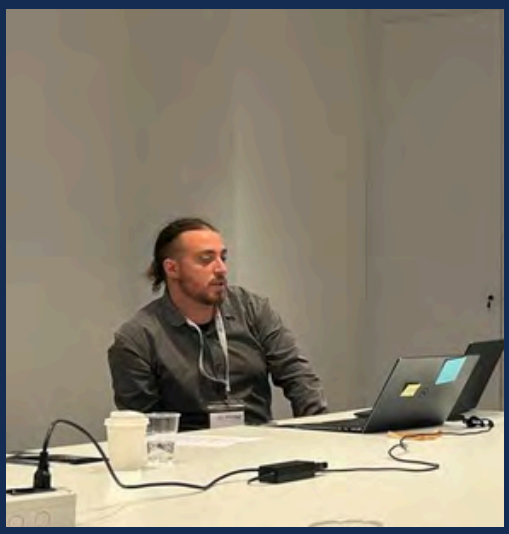
4th Joint Smart Readiness Indicator (SRI) Event
Brussels, Belgium, October 2025

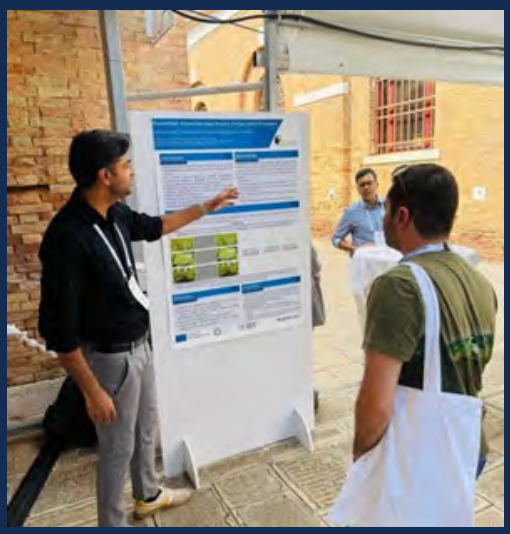

ENTRUST

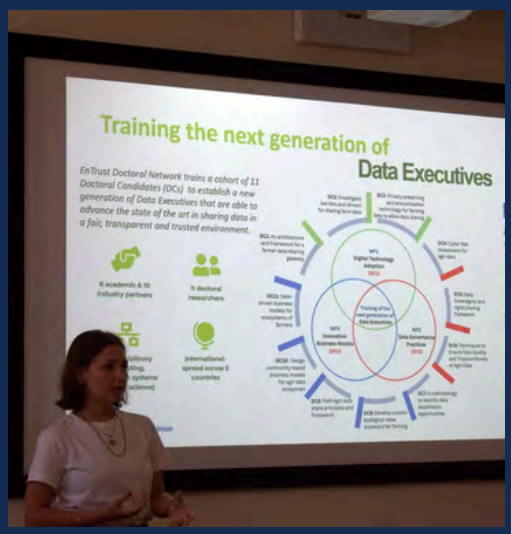

Μπάρμπα Στάθης


From Data to Impact
Green Deal Data Spaces
17 May / 16:00-17:30 EEST / Plenary Room

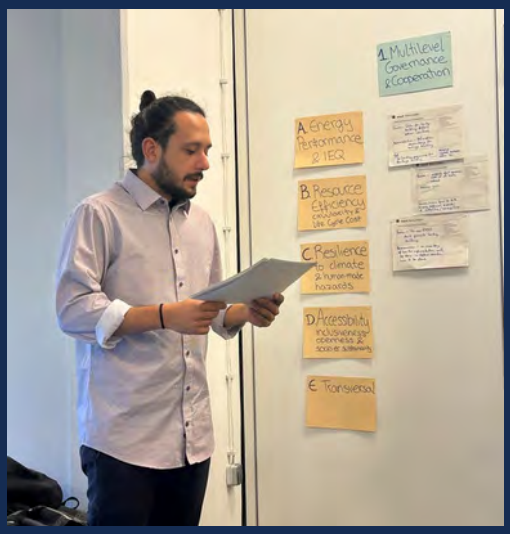

STAV360: A Dataset for Subjective Tile-based Assessment of 360° Videos
ZUJ






Training the next generation of Data Executives
EnTrust Doctoral Network trains a cohort of 11 Doctoral Candidates (DCs) to establish a new generation of Data Executives that are able to advance the state of the art in sharing data in a fair, transparent and trusted environment.
6 academic & 10 industry partners
11 doctoral researchers
International-spread across 5 countries


Empowering Youth to support energy communities
POWER youth
RETASTE 2025


1. Multilevel Governance & Cooperation
A. Energy Performance & IEQ
B. Resource Efficiency
C. Resilience
D. Accessibility


Motivation & Problem Statement

CONFERENCES

ICIT 2025 Conference
"STAV360: A Dataset for Subjective Tile-based Assessment of 360° Videos"

4th IEEE International Workshop on Metrology for Living Environments (MetroLivEnv 2025)
"An Extended Reality-Based Framework for User Risk Training in Urban Built Environments"

10th IEEE European Symposium on Security and Privacy (EuroS&P 2025)
“Fusioncrypt: Enhancing Agricultural Image Security through Hybrid Encryption.”

16th International Conference on Information, Intelligence, Systems and Applications (IISA2025)
"An Urban Data Management Platform for Bridging Trusted Ecosystems, Dataspaces, and Digital Twins"

IntelliSys 2025 (SAI Conferences)
“Enhancing Privacy and Efficiency in Federated Learning Through Hybrid Homomorphic Encryption”

24th Conference e-Business, e-Services, and e-Society (I3E 2025)
“Rethinking Digital Marketing Ethics in the Metaverse: A Framework for Responsible Engagement.”

The 3rd International Online Conference on Agriculture
“Symbiotic AI for Resilient Agriculture: A Federated Co-learning Framework with Interactive Counterfactual Explanations for Crop Disease Management”

UbiComp/ISWC Conference
“Memory-Augmented LLMs for Sustainable Urban Energy Management via Weather-Energy Pattern Learning.”

FLICS 2025
“JADE-FL: Joint Adaptive Defence and Encryption for Federated Learning”

PROJECT MEETINGS

19+ Project Meetings

HARMONY Kick-off Meeting

October 2025, hosted by SingularLogic in Athens, Greece

Policy Event on Smart Readiness Indicator

February 2025, hosted by SingularLogic in Athens, Greece

POWERYOUTH Plenary Meeting,
February 2025, Vienna, Austria
ENTRUST T4 Training Week,
February 2025, Maynooth, Ireland
ATLANTIS Plenary Meeting,
March 2025, Turin, Italy
3 DATAWiSE Plenary Meeting,
March 2025, Turin, Italy
SRI-ENACT Final Plenary Meeting,
May 2025, Brussels, Belgium
CLIMRES Plenary Meeting,
June 2025, Milan, Italy
ATLANTIS Plenary Meeting,
June 2025, Avigliana, Italy
DATAWiSE Plenary Meeting,
June 2025, Valencia, Spain
MaaSAI Plenary Meeting,
July 2025, Bordeaux, France
ATLANTIS General Assembly
September 2025, Brussels, Belgium
ENFORCE General Assembly,
October 2025, Crete, Greece
INHERIT Plenary Meeting,
October 2025, Zagreb, Croatia
ENHANCE Plenary Meeting,
November 2025, Barcelona, Spain
BUILDSPACE Final Plenary Meeting,
November 2025, Brussels, Belgium
ATLANTIS Final Review Meeting,
November 2025, Brussels, Belgium
AgriDataValue Plenary Meeting,
November 2025, Ljubljana, Slovenia
DATAWiSE Plenary Meeting,
December 2025, Zaragoza, Spain

2025 Publications

[1]
Dembani, R., Karvelas, I., Akbar, N. A., Rizou, S., Tegolo, D., & Fountas, S. (2025). Agricultural data privacy and federated learning: A review of challenges and opportunities. Computers and Electronics in Agriculture, 232, 110048. https://doi.org/10.1016/j.compag.2025.110048

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Akbar, N. A., Dembani, R., Lenzitti, B., & Tegolo, D. (2025). RAG-Driven Memory Architectures in Conversational LLMs-A Literature Review with Insights into Emerging Agriculture Data Sharing. IEEE Access. DOI: https://ieeexplore.ieee.org/abstract/document/11080430

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Akbar, N. A., Rezvanian, S., Dembani, R. (2025). Memory-Augmented LLMs for Sustainable Urban Energy Management via Weather-Energy Pattern Learning. Ubicomp-ISWC 2025. Accepted, soon will be published

[4]
Papadopoulos, G., Papantonatou, M.-Z., Uyar, H., Kriezi, O., Mavrommatis, A., Psiroukis, V., Kasimati, A., Tsiplakou, E., & Fountas, S. (2025). Economic and environmental benefits of digital agricultural technological solutions in livestock farming: A review. Smart Agricultural Technology, 10, 100783. https://doi.org/10.1016/j.atech.2025.100783

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Papadopoulos, G., Papantonatou, M.-Z., Uyar, H., Nychas, K., Psiroukis, V., Kasimati, A., Nieuwenhuizen, A., Van Evert, F. K., & Fountas, S. (2025). Stakeholders' perspective on smart farming robotic solutions. Smart Agricultural Technology, 11, 100916. https://www.sciencedirect.com/science/article/pii/S2772375525001492

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Sotirios N. Aspragkathos, Panagiotis Rousseas, George C. Karras, Stamatia Rizou, and Kostas J. Kyriakopoulos (2025). Coastal Management through Safe Event-Triggered Predictive Control for UAVs. European Robotics Forum 2025.

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Khalid, M. I., Mahmoud, M., Rizou, S, Pappas, I. O. (2025). Building Metaverse Responsibly: Findings from Interviews with Experts. 17th Mediterranean Conference on Information Systems (MCIS 2025) – presented.

[9]
Gamal, A. Business Strategies for Competitive Technological Advantage: A Systematic Review on Gamification in Metaverse. In LMDE 2025 CONFERENCE (p. 113)

[10]
Mahmoud, M., Rizou, S., Panayides, A. S., Lazaridis, P. I., Karagiannidis, G. K., Kantartzis, N. V., & Zaharis, Z. D. (2025). Modeling User Perception for Multi-Quality Tile-Based 360° Video Streaming. IEEE transactions on Multimedia – accepted.

2025 Publications

[11]
Mahmoud, M., Rizou, S., Panayides, A. S., Lazaridis, P. I., Karagiannidis, G. K., Kantartzis, N. V., & Zaharis, Z. D. (2025, May). STAV360: A Dataset for Subjective Tile-based Assessment of 360° Videos. In 2025 12th International Conference on Information Technology (ICIT) (pp. 67-72). IEEE.

[12]
Konstantakos, S., Asparagkathos, S., Mahmoud, M., Rizou, S., Quagliarini, E., & Bernardini, G. (2025, June). An Extended Reality-Based Framework for User Risk Training in Urban Built Environment. In 2025 IEEE International Workshop on Metrology for Living Environment (MetroLivEnv) (pp. 455-460). IEEE.

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Dembani, R., Karvelas, I., Rizou, S., & Tegolo, D. (2025, August). Enhancing Privacy and Efficiency in Federated Learning Through Hybrid Homomorphic Encryption. In Intelligent Systems Conference (pp. 689-696). Cham: Springer Nature Switzerland. https://link.springer.com/chapter/10.1007/978-3-032-00071-2_42

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Dembani, R., Karvelas, I., Rizou, S., & Tegolo, D. (2025, August). FusionCrypt: Enhancing Image Security Through Hybrid Encryption. In IEEE European Symposium on Security and Privacy. https://zenodo.org/records/16759729

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Khalid, M. I. (2025, September). Rethinking Digital Marketing Ethics in the Metaverse: A Framework for Responsible Engagement. In Conference on e-Business, e-Services and e-Society (pp. 362-377). Cham: Springer Nature Switzerland.

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Uyar, H.; Karvelas, I.; Rizou, S.; Costopoulou, C.; Fountas, S. Reframing the Value of Agricultural Data: Stakeholder Perceptions, in Proceedings of the 3rd International Online Conference on Agriculture, 22–24 October 2025, MDPI: Basel, Switzerland, https://sciforum.net/paper/view/24927

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Dembani, R.; Karvelas, I.; Rizou, S.; Tegolo, D. Symbiotic AI for Resilient Agriculture: A Federated Co-learning Framework with Interactive Counterfactual Explanations for Crop Disease Management, in Proceedings of the 3rd International Online Conference on Agriculture, 22–24 October 2025, MDPI: Basel, Switzerland, DOI: https://sciforum.net/paper/view/24778

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2025 Annual Report

R&D and Innovation

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