institute imdea networks

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annual report 2023

developing the science of networks

foreword

Arturo Azcorra
Director of the IMDEA Networks Institute
July 2024

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IMDEA Networks Institute stands as a premier research institute dedicated to the Science of Networks and Communication Technology. At the forefront of our mission is the pursuit of fundamental, systems-oriented networking research with a strong emphasis on technology transfer to industry and standard bodies. Our diverse team of researchers boasts expertise across a spectrum of topics including mobile networks, protocols, security, optimization, and machine learning, among others.

In recent years, there has been an unprecedented surge in Artificial Intelligence (AI) research, catalyzing profound impacts across various domains. Notably, AI has revolutionized our interaction with the digital realm and reshaped our daily activities.

The domain of networks has not been exempted from this transformative wave; indeed, AI has deeply permeated network research, with countless papers exploring its application to diverse facets in networking. While such integration often enhances network efficiency, it's crucial to recognize the unique challenges of network dynamics, where rapid decision-making within milliseconds is required in many cases. Our research has revealed that for certain problems, traditional adaptive techniques outpace heavier AI approaches in learning speed, underscoring the importance of discerning which networking applications truly benefit from cutting-edge AI techniques.

While much attention in AI research has focused on optimizing network operations, we advocate for an equally significant focus on leveraging AI to enhance human-network interaction. Despite efforts in fostering user-friendly interfaces like intent-based networking, relatively little attention has been devoted to enhancing the human-network interaction through AI. At IMDEA Networks, we've tackled this challenge with a two-fold approach where AI is applied both to learn the objective of the network operator as well as the optimal network configuration that meets such objective.

A notable hurdle in integrating AI into networking lies in ensuring explainability. Given the critical nature of network operations, operators are understandably wary of entrusting crucial decisions to black-box AI systems. Therefore, embedding explainability into AI-based network management becomes imperative, allowing operators to comprehend and supervise the rationale behind AI-driven decisions. IMDEA Networks is spearheading research endeavors aimed at infusing explainability into AI-driven network operations.

In essence, while AI holds the promise of substantial advancements in network operations, prudent application is paramount, recognizing that AI may not be the panacea for all network challenges. At IMDEA Networks, we lead pioneering research efforts to fully exploit the potential of AI, leveraging its strengths while understanding and overcoming its limitations.

As every year, my gratitude goes to the Regional Government of Madrid for its continued support of this economy transforming initiative, as well as to all those who are contributing to make this exciting project an international success.

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editor
IMDEA Networks Institute

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A Research Team of Technical Leaders

The IMDEA Networks research team is comprised of distinguished technical leaders. All researchers at IMDEA Networks have exceptional research records, featuring publications in the most influential venues in their field. They have graduated from or worked at top-tier international universities. Additionally, our scientists have extensive industry experience, having worked at leading industry research laboratories and obtained numerous patents throughout their careers. This blend of academic and industry experience is crucial for conducting research that can be transferred to companies and transformed into profitable products, fostering economic growth and job creation.

Besides our world-renowned experienced researchers, the Institute's research team also includes highly motivated pre-doctoral researchers who are eager to explore new ideas while pursuing their PhD theses at IMDEA Networks. In 2023, the Institute graduated two new PhD students and hired eight new pre-doctoral researchers. This continuous output of highly qualified doctors significantly contributes to the national and European economy.

Our researchers' international reputation is evidenced by the awards and prizes they receive. In 2023, Research Associate Professor Narseo Vallina-Rodríguez was awarded the prestigious "Medal to Young Researchers" by the Royal Academy of Engineering for his outstanding contributions as a young researcher.

From 2018 to 2023, IMDEA Networks ranked No. 2 in the csrankings.org index for mobile computing research, No. 3 in measurements and performance analysis, and No. 19 in Europe for computer networks.

The Excellence of Our Scientific Results

Our team's dedication to producing outstanding scientific work resulted in numerous publications and awards in 2023. For instance, IMDEA Networks researchers received the IEEE GLOBECOM 2023 Best Paper Award for their paper "Characterizing Sub-THz MIMO Channels in Practice: A Novel Channel Sounder with Absolute Time Reference," the ACM Mobihoc 2023 Best Paper Award for the paper "Scalable Multi-Modal Learning for Cross-Link Channel Prediction in Massive IoT Networks," and the IEEE Vehicular Networking Conference 2023 Best Paper Award for the paper "Simulation of Tele-Operated Driving over 5G Using CARLA and OMNeT++." Additionally, they received the ACM WiNTECH 2023 Best Paper Runner-Up Award and the IEEE NetSoft 2023 Best Demo Award.

IMDEA Networks made a significant impact this year on leading conferences and journals in our field. We published numerous papers in top journals such as ACM/IEEE Transactions on Networking, IEEE Journal on Selected Areas in Communications, IEEE Transactions

on Mobile Computing, IEEE Transactions on Parallel and Distributed Systems, and IEEE Transactions on Information Theory, as well as at top conferences like IEEE INFOCOM, ACM IMC, ACM MOBICOM, and Usenix Security Symposium. Our researchers also served on the Technical Program Committees of these conferences. IMDEA Networks is among a select group of European institutions that have consistently published in these venues over many years. Moreover, IMDEA Networks organizes key conferences: Joerg Widmer is the general co-chair and Domenico Giustiniano the vice general chair of ACM Mobicom 2023, and Vincenzo Mancuso is one of the general chairs of IEEE SECON 2023, both held in Madrid. Additionally, Sergey Gorinsky and Marco Fiore received the Distinguished TPC Member Award at IEEE Infocom 2023. All this confirms the leadership roles of our professors in the research community.

Contributing to a Knowledge-Based Economy

IMDEA Networks aims to produce high-quality research that contributes to a knowledge-based economy. Our strategy for transferring scientific and technological developments to industry has resulted in various new collaborations and strengthened existing partnerships with key industrial collaborators.

In 2023, our researchers participated in 32 ongoing research projects funded from diverse sources: 13 European projects, 17 national projects, 2 funded by the Regional Government of Madrid, and 6 contracts with industrial partners.

Among our industry collaborations, notable strategic partnerships include those with Telefonica, which co-founded 5TONIC with IMDEA Networks and has a Joint Research Unit (JRU), along with participating in multiple research projects. Ericsson is a key partner of 5TONIC and collaborates with IMDEA Networks on several fronts, including research projects and leading Masters programs on SDN and NFV. NEC also collaborates extensively with IMDEA Networks and has established a JRU with us.

Communicating Our Results

Beyond producing high-quality technical results, it is vital for the Institute to communicate these contributions to society. This outreach targets the general public, prospective PhD students, scientists, academics, specialists from other areas, decision-makers, stakeholders, and collaborators, to highlight the benefits of having such a research institute in Madrid.

Over the past years, IMDEA Networks has consistently appeared in both national and international, specialized and general media with extensive outreach. This year was no

exception, with our news being featured in around 194 unique media outlets, including ABC, El País, Telemadrid, La Vanguardia, Invertia (El Español), Europa Press, Agencia SINC, Redes Telecom, Cadena Ser Madrid Sur, Innovaspain, Telecompaper, Total Telecom, and Science X Network.

Building on our 2023 results, we look forward to making further impactful scientific discoveries, establishing fruitful collaborations, launching exciting new research initiatives, and increasing our outreach in the coming year, all for the benefit of society.

about us

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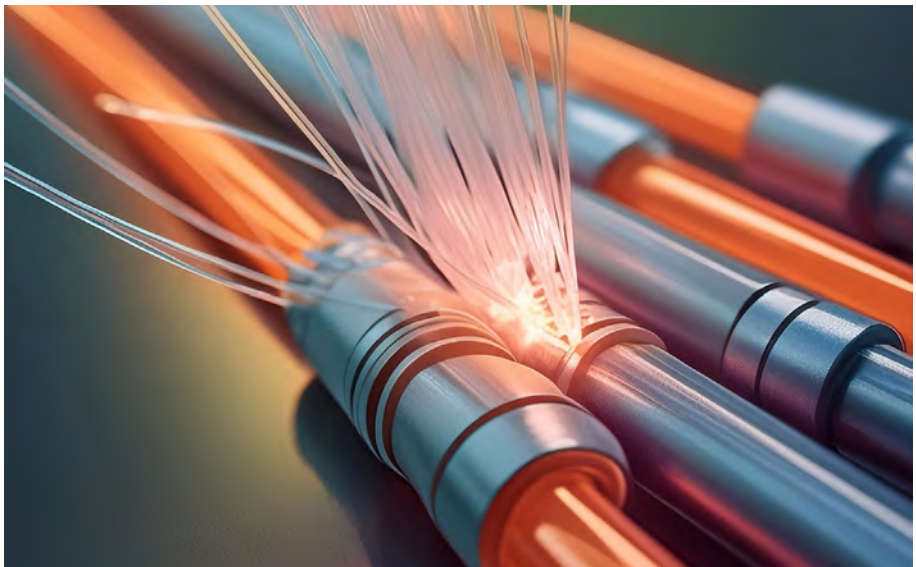
IMDEA Networks Institute is a **research organization on computer and communication networks** whose multinational team is engaged in cutting-edge fundamental science and technology. As an English-speaking institute located in Madrid, Spain, IMDEA Networks offers a unique opportunity for pioneering scientists to develop their ideas. IMDEA Networks has established itself internationally at the forefront in the **development of future network principles and technologies.** Our **team** of highly reputed researchers is designing and creating today the networks of tomorrow.

Some keywords that define us: *5G, 6G, Big Data, blockchains and distributed ledgers, cloud computing, content-delivery networks, data analytics, energy-efficient networks, fog and edge computing, indoor positioning, Internet of Things (IoT), machine learning, millimeter-wave communication, mobile computing, network economics, network measurements, network security, networked systems, network protocols and algorithms, network virtualization (software defined networks – SDN and network function virtualization – NFV), privacy, quantum communication, social networks, vehicular networks, wireless networks and more…*

2.2. Our Strategic Goals

- Conduct first class research on an international level in the area of computer networking.
- Transfer technology to the industrial sector, in order to improve its capacity for innovation and competitiveness.
- Transfer technology to spin-off-companies in order to promote the release of new products and services to the global market.
- Attract and retain human capital of excellence with the aim to internationalize research in the Madrid region.
- Collaborate with Madrid's industrial sector, research centers and educational institutions.



2.3. Our Vision

IMDEA Networks focuses on an area that has a profound impact on people's lives. Over the last decades, the Internet, smartphones, Wi-Fi and social networks transformed society and the economy. Indeed, the **widespread access to networks** has dramatically changed the way manufacturers produce and supply their goods, how public administrations operate, how professionals work and in general how individuals and society are shaped. **The Internet socio-economic phenomenon** continues to transform our lives at an amazing pace, and will continue to do so in the future with the deployment of new communication technologies and paradigms.

2.4. Our Mission

Our mission is to create value by **leading research in protocol, algorithm and systems developments** that enable the **Digital Knowledge Society**. We do this by conducting research and developing innovative and useful scientific and technical advances in the above areas, while actively **promoting their successful transfer to market**. The Institute strives to provide optimal working conditions and the most attractive and best-equipped environment in which researchers can focus on this process of innovation and scientific advance.

RESEARCH GROUPS

- Global Computing Group [Antonio Fernández Anta]
- Internet Analytics Group [Narseo Vallina-Rodríguez]
- NETCOM Lab [Arturo Azcorra, Albert Banchs]
- NetEcon Group [Sergey Gorinsky]
- Opportunistic Architectures Lab [Marco Ajmone Marsan and Vincenzo Mancuso]
- Pervasive Wireless Systems Group [Domenico Giustiniano]
- Wireless Networking Group [Joerg Widmer]
- Data Transparency Group (DTG) [Nikolaos Laoutaris]
- Networks Data Science Group [Marco Fiore]
- Edge Networks Group [Jaya Prakash Varma Champati]
- Cybersecurity Group [Guillermo Suárez-Tangil]
- Quantum Information Group [Marius Paraschiv]

2.5. The Institute in figures

The core strength of the Institute is its international **research team, consisting of talented researchers from 29 different nationalities,** which carries out new scientific discoveries in Computer Networks, and foster the development of emerging technologies.

83 researchers

29 nationalities

50,60% PhDs

71,08% foreign researchers

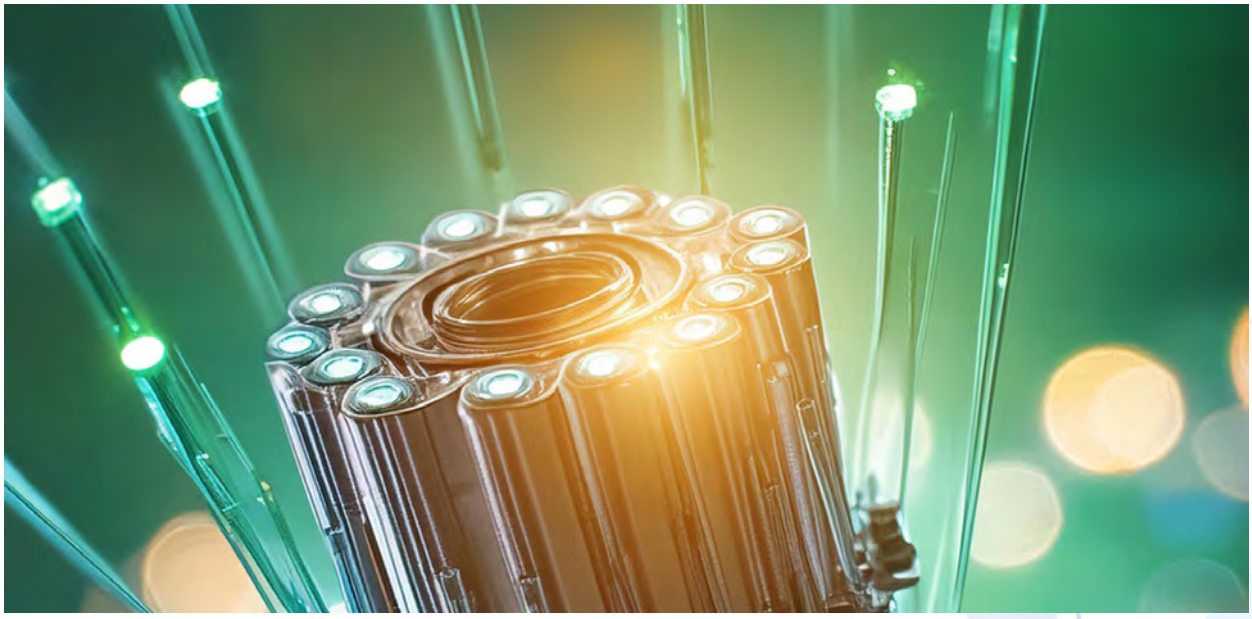
12 research groups

The facilities of IMDEA Networks Institute

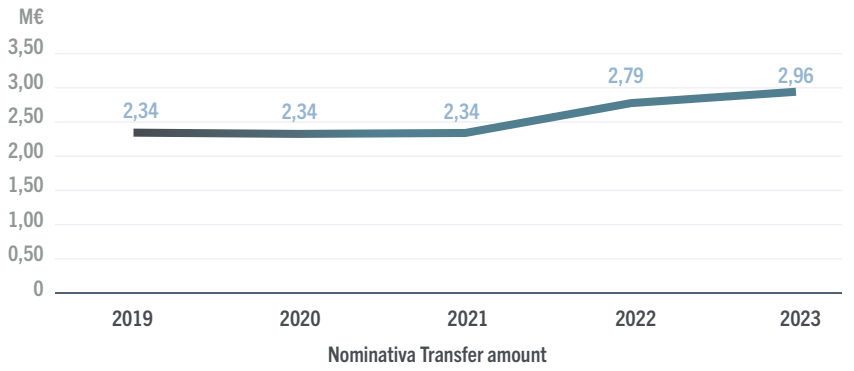
The building and laboratories of IMDEA Networks Institute are located at Leganés, Madrid.

535,49 m^2 of research labs

In order to support cutting-edge research, IMDEA Networks invests in the latest, **state-of-the-art laboratories and laboratory test equipment**, endowing the Institute with the capacity of transforming research into high added value products and services.

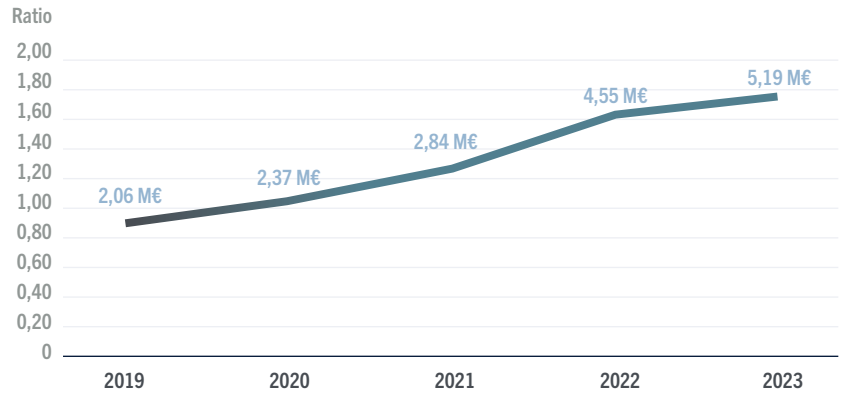


Direct Funding by the Madrid Regional Government



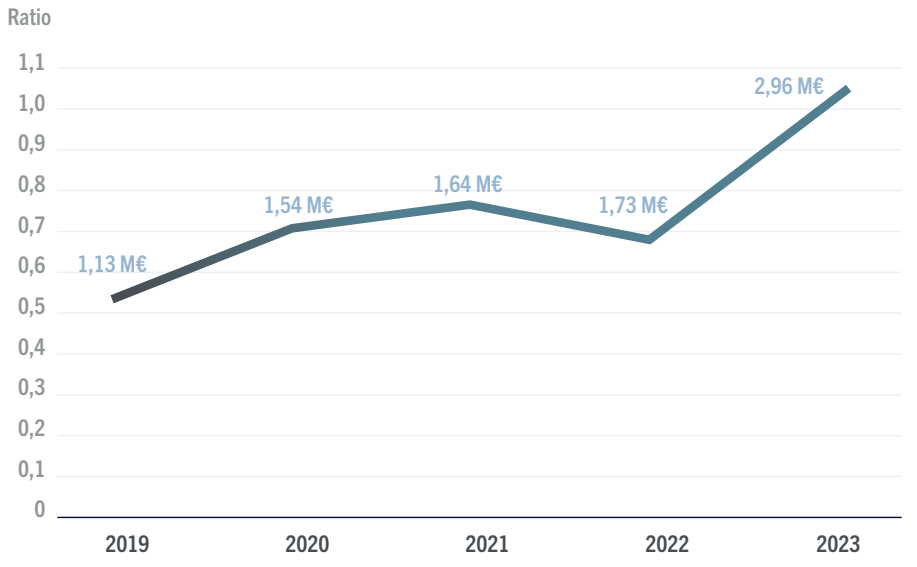
Nominativa Transfer amount

We bring Money to Madrid: Self Funding



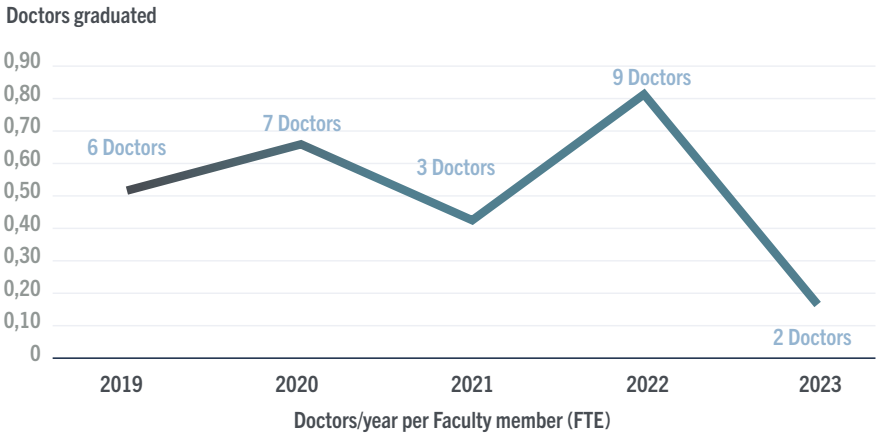
External Fund / Nominativa

We improve the Competitiveness of Madrid: Projects & Contracts with Industry

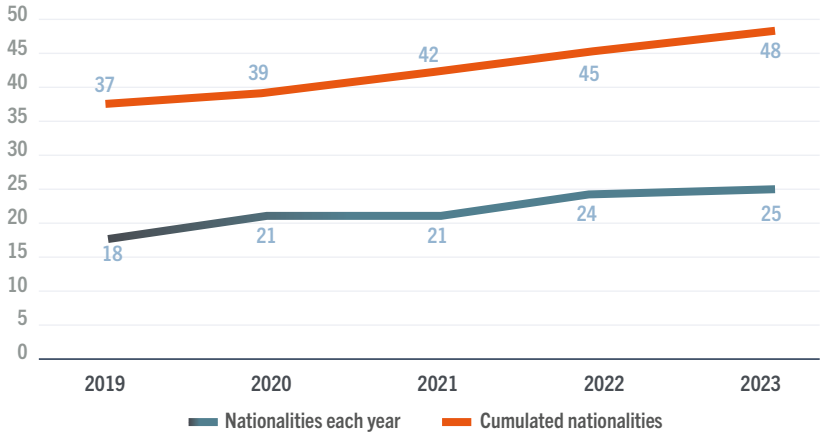


Funds from projects & contracts with industry / Nominativa

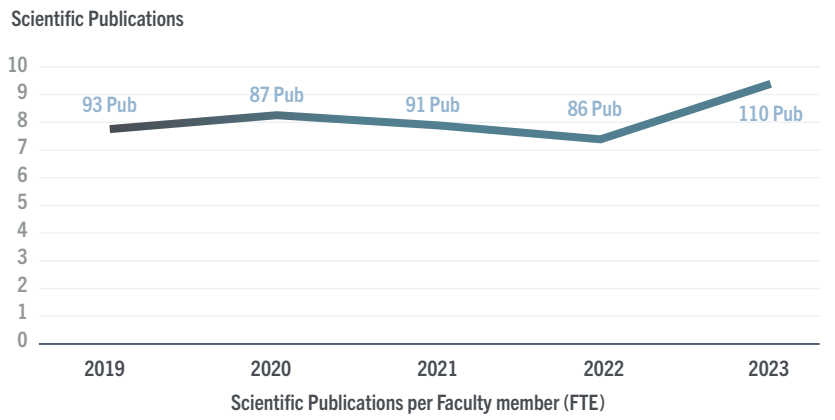
We produce Talent for Madrid: Doctors/year per faculty member (FTE)



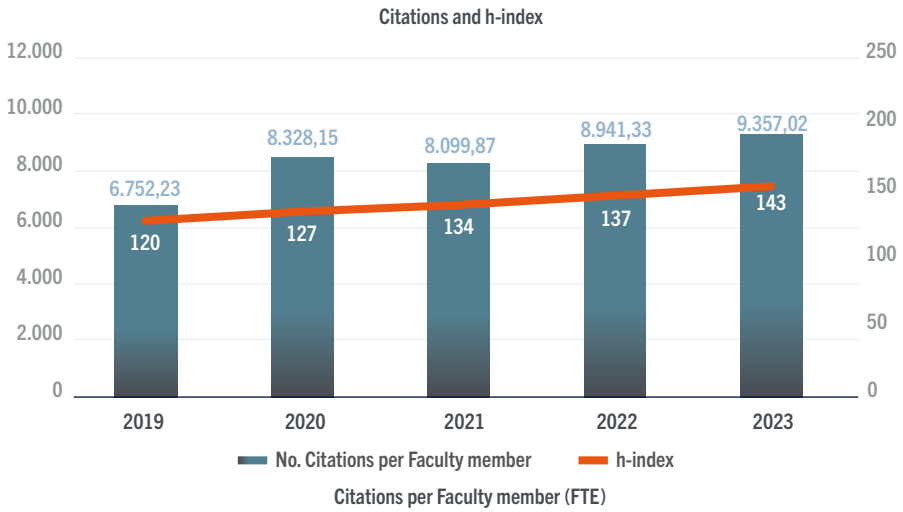
We produce Internationalization of Madrid: Nationalities (Cumulative & Current)



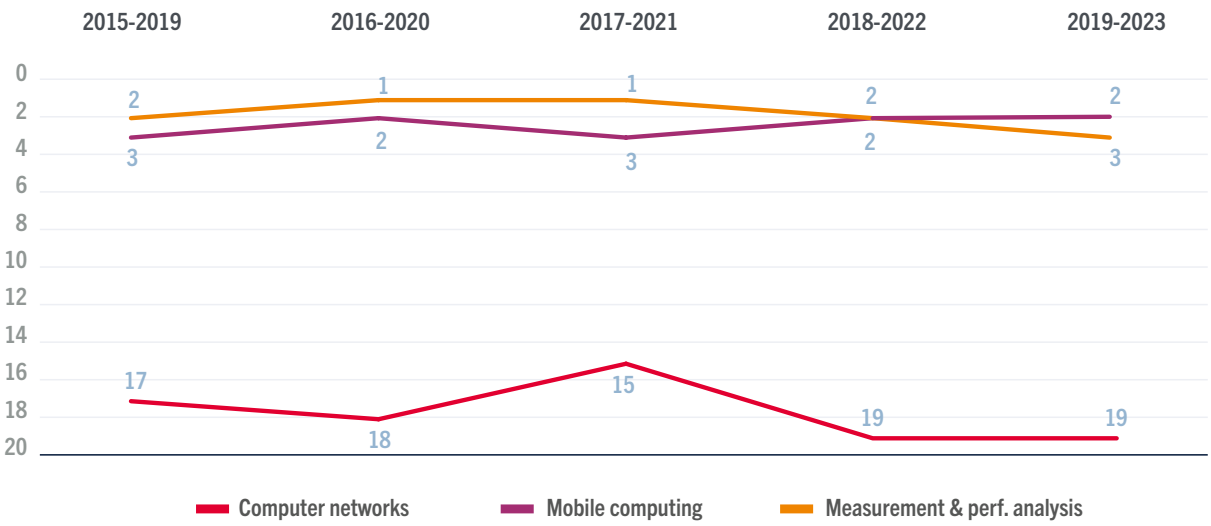
We produce Science in Madrid:Journal and Conference Publications



We produce Leadership for Madrid: Citations

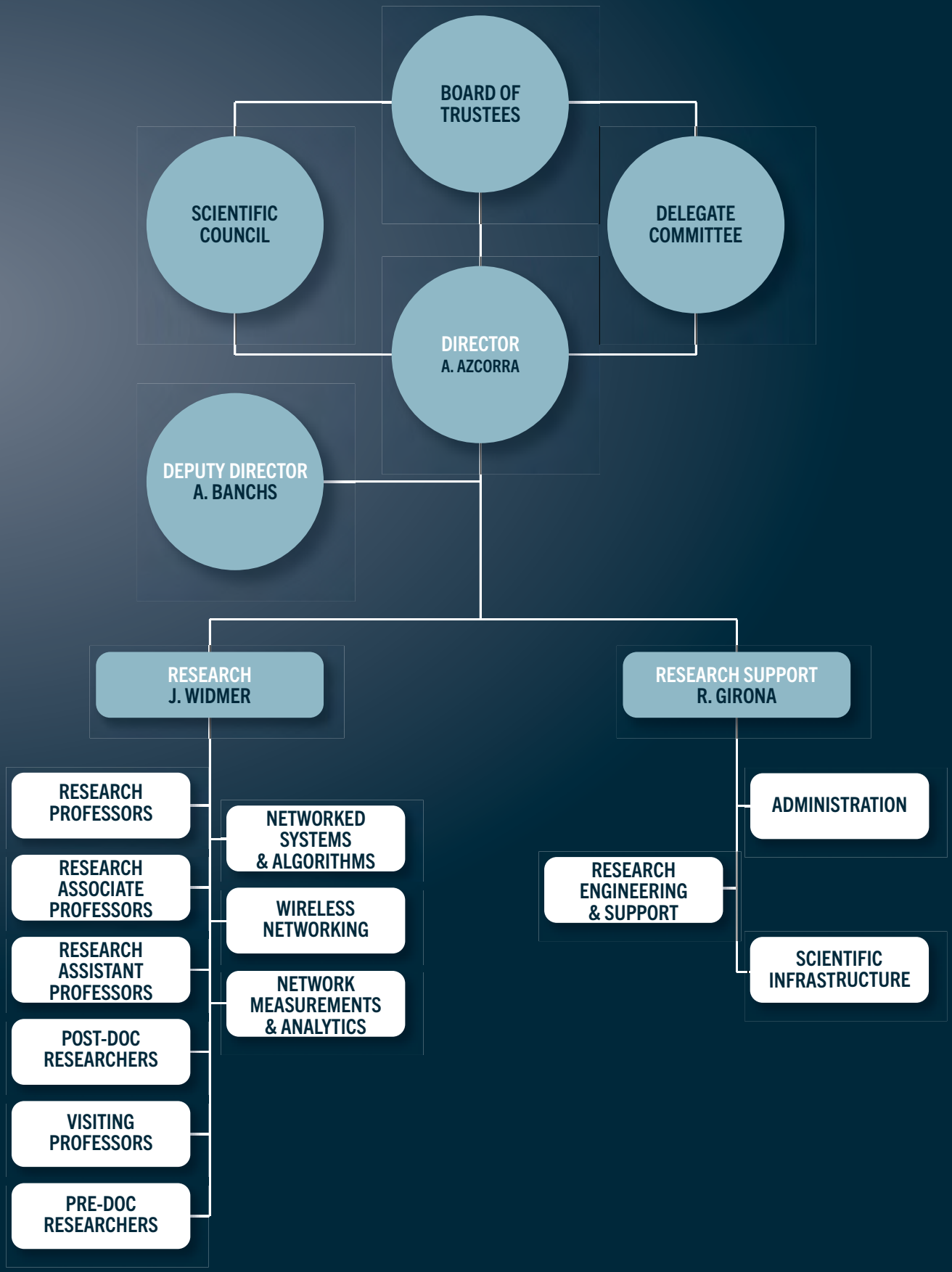


We produce Leadership for Madrid: CS-Rankings European Position



Measurement & Performance Analysis
CS-Rank 2019-2023

1 ▶ TU Delft
2 ▶ IMDEA Networks Institute
3 ▶ University of Edinburgh
4 ▶ Politecnico di Milano
5 ▶ University of Cambridge
6 ▶ University of Oxford
7 ▶ ETH Zurich
7 ▶ Uppsala University
9 ▶ KU Leuven
9 ▶ University of Southampton
11 ▶ EPFL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NETWORK MEASUREMENTS & ANALYTICS
ADMINISTRATION
RESEARCH ENGINEERING & SUPPORT
SCIENTIFIC INFRASTRUCTURE

2.6.1. Board of Trustees

The Board of Trustees of IMDEA Networks Institute is its highest organ of governance, representation and administration. In accordance with the Institute's statutes, the Board of Trustees is composed of Ex Officio Members representing the Regional Government of Madrid and Elective Members who are recognized leaders in the scientific matters of the Institute. The Director and General Manager of the Institute also participate in the Board of Trustees.

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Madrimasd Foundation for Knowledge
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Dr. Heinrich J. Stüttgen
Independent consultant

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2.6.2. Scientific Council

The Scientific Council is a very important organ of IMDEA Networks, advising us on all aspects of the Institute's scientific activities. Among many other things, the Council proposes the incorporation and renewal of Scientific Expert members of the Board of Trustees; reviews and approves scientific appointments, and generally provides support to the Director – Dr. Arturo Azcorra- and the Deputy Director – Dr. Albert Banchs – in determining scientific research strategy and policies.

The Institute's Scientific Council is composed of internationally prestigious researchers in the field of Telematics and Internet technologies. IMDEA Networks is greatly strengthened by the participation of these eminent scientists. The current members are:

Dr. Gonzalo CAMARILLO

Position: Head of Implementation Components, Ericsson. Finland

PhD: Aalto University. Helsinki. Finland

Research: Signaling; Multimedia applications; Transport protocols; Network security; Networking architectures

Prof. Dr. Carla Fabiana CHIASSERINI

Position: Full Professor, Department of Electronics and Telecommunications, Politecnico di Torino. Torino. Italy

PhD: Electronic Engineering and Telecommunications. Politecnico di Torino. Italy

Research: Wireless and mobile networks

Prof. Dr. Jon CROWCROFT

Position: Marconi Professor of Communication Systems at University of Cambridge. Cambridge. UK

PhD: Computer Science, University College London (UCL) (England, UK)

Research: Computer Science

Prof. Dr. Gustavo DE VECIANA

Position: Cockrell Family Regents Chair in Engineering Professor and Associate Chair of Electrical and Computer Engineering at the University of Texas at Austin. USA.

PhD: Electrical Engineering, University of California at Berkeley. USA

Research: Analysis and Design of Wireless and Wireline Telecommunication Networks; Architectures and Protocols to Support Sensing and Pervasive Computing; Applied Probability, Queuing and Information Theory

Prof. Dr. Jim KUROSE

Position: Distinguished University Professor of Information and Computer Sciences at the University of Massachusetts at Amherst. MA. USA.

PhD: Columbia University. United States

Research: Network Protocols and Architecture; Network Measurement; Sensor Networks; Multimedia Communication; Modeling and Performance Evaluation

Prof. Dr. Edward KNIGHTLY

Position: Sheafor-Lindsay Professor and Department Chair of Electrical and Computer Engineering at Rice University. Houston. Texas. USA

PhD: University of California at Berkeley. Berkeley. USA

Research: Wireless Networks and Protocols; Wireless Access for Developing Regions; Dynamic Spectrum Access Networks

Dr. Pablo RODRÍGUEZ RODRÍGUEZ

Position: Director, CTO Office at Google. CA. USA.

PhD: École Polytechnique Fédérale de Lausanne (EPFL). Lausanne. Switzerland

Research: Networking; Distributed Systems; Information Theory; Wireless and Mobile; Network Economics; Social Networks

Prof. Dr. Ralf STEINMETZ

Position: President of Board of Trustees of IMDEA Networks Institute; Full Professor & Managing Director of Multimedia Communications Lab (KOM) at Technische Universität Darmstadt. Darmstadt. Germany

PhD: Electrical Engineering. Technische Universität Darmstadt. Darmstadt. Germany

Research: Scalable Quality of Service; Content Distribution Networks; Context Aware Communications; Adaptive Mobile Networking; Knowledge Media; Serious Games

Prof. Dr. Ioannis STAVRAKAKIS

Position: Full Professor & Head Department of Informatics and Telecommunications. National and Kapodistrian University of Athens. Athens. Greece

PhD: Electrical Engineering. University of Virginia. Charlottesville. USA

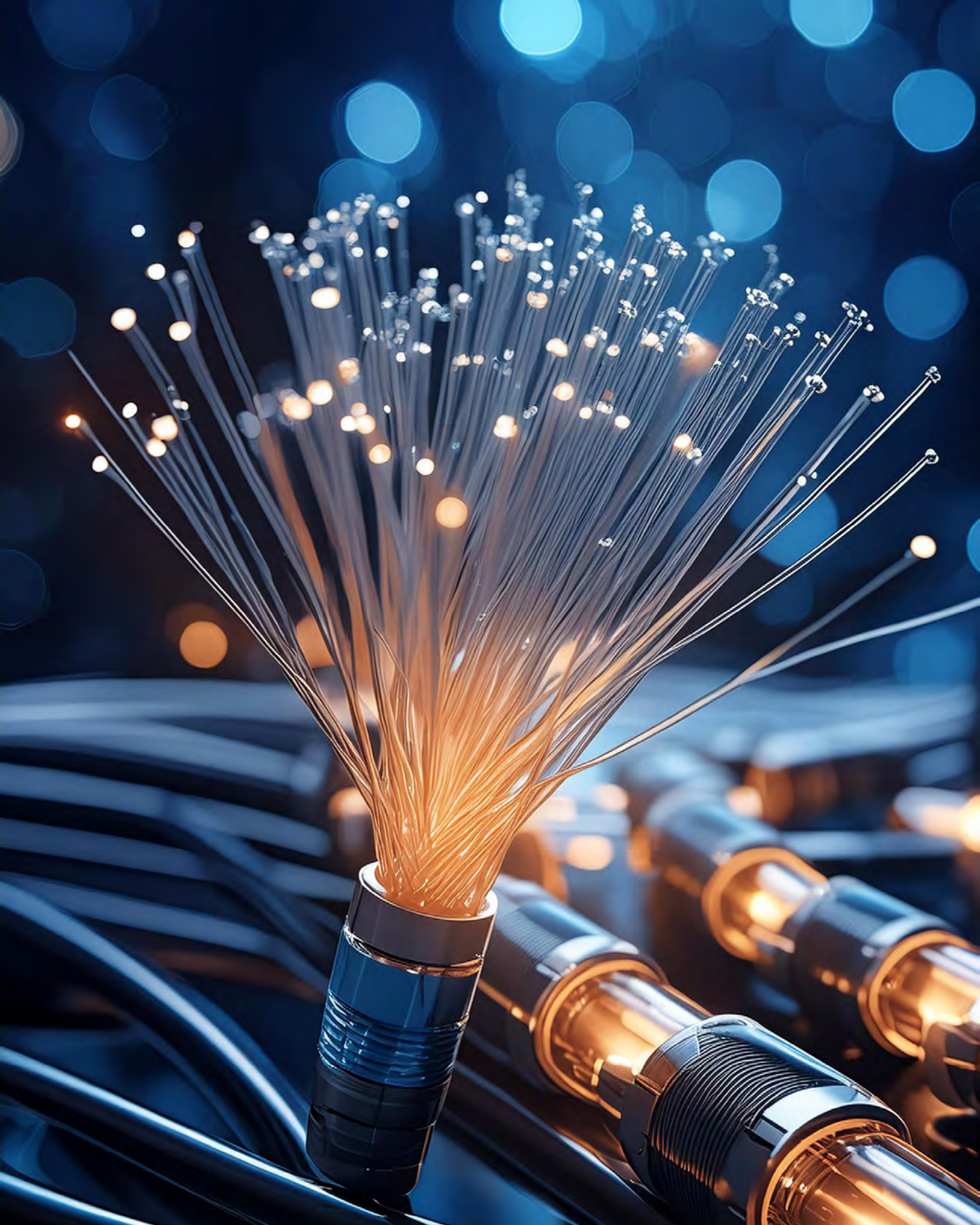
Research: Resource Allocation Protocols and Traffic Management for Communication Networks, with recent emphasis on Peer-to-Peer, Mobile, Ad hoc, Autonomic and Social Networking

Dr. Heinrich J. STÜTTGEN

Position: Independent consultant

PhD: Computer Science, Associative Memory Architecture, University of Dortmund. Germany

Research: Network Architecture and Protocols; Software Defined Networking; Internet of Things (IoT)



research areas

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As illustrated by **our motto** – **Developing the Science of Networks** – IMDEA Networks identifies and addresses major scientific and engineering challenges in communications and computer networks, and also aims to develop these results by bringing them into practical deployments. The nature of these challenges varies with ever-greater rapidity. To ensure the relevance of our research activities, we continuously adjust our research agenda to stay at the forefront of technological innovation. We organize our scientific activities into research areas that reflect our current working priorities, ensuring sufficient flexibility to allow us to respond to emerging technological challenges. The research mission of our Institute also adapts to the strengths of our growing research team and our external collaborators.

The research work at IMDEA Networks is led by **Joerg Widmer**, who is the **Research Director** of the Institute and therefore responsible for its research direction.

Currently, our scientific work focuses on the following three general areas:

networked
systems&algorithms

3.1. Networked Systems and Algorithms

Any network has a structure and needs protocols to achieve its objectives. The researchers of IMDEA Networks Institute have an extensive expertise in architectures and protocols for communication networks, e.g., for network topology design, routing, forwarding, packet classification, in-network storage, congestion control, and media access control. Besides, we have research interests in other networking domains such as social networks, energy networks, and transportation networks.

Our research takes a multi-disciplinary approach to the design and understanding of network protocols and architectures. We go beyond technological constraints and account also for social and economic factors. For example, our research on Internet routing and forwarding accounts for the multitude of Internet service providers and their individual economic interests. In working on either centralized or decentralized solutions to problems, we assume that perfect information is never available. To deal with such uncertainty as well as selfishness of individual entities, our analysis adopts game-theoretic techniques and online algorithms. Our protocol design assumes that behavior of counterparts is always unpredictable to some extent. Hence, the designed protocols rely on continuous learning and adaptation as the main modes of operation.

Practicality is another distinguishing aspect of our research. Real data serves as a departing point for our analytical efforts as well as a basis for validating our analytical conclusions. For instance, our large-scale simulation studies of Internet routing rely on real Internet topologies. Furthermore, we implement our theoretical ideas and make the prototypes available to the public, either directly or through our commercial partners.

An important focus of our work is on the systems side of networks. For example, we explore tradeoffs between simplicity and expressiveness of packet processing engines, new abstractions for heterogeneous control planes, and network virtualization techniques. We also work on networking aspects that pertain to cloud computing.

3.2 Wireless Networking

wireless networking

Given the scarcity of wireless spectrum resources and the rising demand for mobile applications, optimizing wireless communication and improving wireless network architectures is currently one of the most important and challenging research topics in networking. The proliferation of inexpensive, high-rate mobile devices and ubiquitous connectivity opens up a vast spectrum of possible new services but also poses unique challenges concerning scalability, interference and the unpredictability of the wireless medium.

IMDEA Networks is involved in a number of different wireless research areas. We are investigating emerging wireless technologies such as extremely high frequency communication for 5G and wireless LAN and Visible Light Communication, which promise to increase wireless data rates by an order of magnitude or more. Our work on capacity improvements also focuses on topics such as ultra-dense networks, intelligent interference management, cooperative coding and network coding, improved medium access control mechanisms that make use of advanced physical layer technologies such as MIMO, successive interference cancellation, etc.

At the same time, mobile network architectures need to support these new technologies as well as new use cases, and thus become more flexible. We perform research on network architectures for 5G and beyond, specifically focusing on software-defined networks

(SDN)-based architectures and network function virtualization (NFV). In addition, wireless networks are becoming more heterogeneous as they are gaining traction in more diverse use cases such as the Internet of Things (IoT) and intermittently connected or delay-tolerant networks, unmanned aerial vehicular networks. The research activities span medium access control (MAC), routing, error control and transport protocols, both as standalone entities and as part of cross-layer design frameworks. To improve the flexibility and programmability of future wireless technologies, we also explore novel programmable interfaces that expose low-level operations to foster network evolution and enable performance optimization and service customization. For a number of the above use case scenarios, efficient and accurate device localization is highly useful.

We recognize the importance of bridging the gap between theoretic results and applied wireless research and have deployed a range of wireless testbeds (for mm-wave, visible light communication, 5G, IEEE 802.11, and others) on which we implement and evaluate our ideas.

network measurements&analytics

3.3 Network Measurements and Analytics

The rapid evolution of the Internet, comprising the fixed network, mobile portable systems and the Internet of Things (IoT) has given birth to a rich ecosystem of applications, personalization and services that is changing the way billions of users communicate and interact with their environment. This digitalization of the world has allowed new innovative applications with new levels of personalization and the ability to interact the environment. However, this trend is also producing large volumes of data, which may raise privacy and security threats unseen in previous networked technologies while also generating unknown traffic patterns and performance bottlenecks which can have a negative impact on the network and user experience.

At IMDEA Networks, we are involved in novel research efforts to empirically illuminate how users, networks, devices and applications interact, behave and perform in the wild.

Our research is particularly focused on conducting analytical measurements of real-world networked systems, with a strong interest in understanding their use (and abuse) as well as the performance, privacy and security challenges present in emerging networking technologies. Our research team also develops Big Data solutions to analyze and process large-scale traffic-, network- and application-generated data fast and correctly.

At IMDEA Networks, we engage and collaborate with users, cyber-activists, industry and regulators to identify and address important problems of societal, industrial and academic interest from a practical angle. Often times, our researchers are responsible for developing practical tools to assist the different stakeholders to understand how users, devices, networks, services, and applications interconnect, perform and behave behind the scenes.

3.4 Headquarters and research laboratories infrastructure

3.4.1 Headquarters

IMDEA Networks includes in its goals the provision of the highest international level of research and technology development capabilities geared to the advancement of future Internet technologies. Our headquarters aim to fulfill the functional requirements of a leading- edge research center and to attract researchers from around the World. The main objective of our office and lab space is to provide a high quality-working environment for researchers.

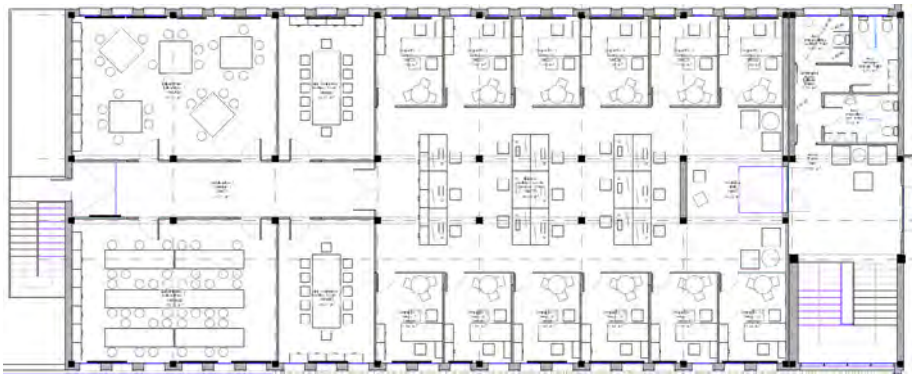
We are continuously refurbishing our site at Avenida del Mar Mediterráneo in Leganes (Madrid) in order to furnish it with renovated and extended facilities. The new spaces are conceived primarily with researchers' needs and preferences in mind, including spacious premises with state-of-the-art facilities and equipment, labs adapted to the needs of

our lines of research, with excellent communications and ICT infrastructure, and specific research equipment.

The area of the building already remodeled in 2023 amounted to 3,025 m^2.

During 2023 we have performed the following work to improve our facilities:

• **Refurbishment of the first floor of the west wing:** the refurbishment works of the first floor of the west wing of our main building finished by the end of June 2023. With these works, the institute has 12 more offices, 15 more open area seats, and 4 more laboratories to perform its research activities.



• **New canopy for the main parking:** a new canopy of polycarbonate has been installed in the main parking of the institute, to provide shadow to a larger number of spaces of the parking.

• **New space for meeting on the outside:** a new space has been enabled on the garden of the institute to have meetings and discussions on the outside, on a more relaxed environment.

3.4.2 Research laboratories

At our scientific laboratories we aim to transform our research results into high value added products and services. They allow us to perform:

- The measurements and prototypes of the devices, protocols and algorithms developed by our researchers.

- Simulations of highly complex baseband and medium access control systems, as well as sophisticated radio subsystems.

- Radio parameter measurements involved in mobile and fixed communications and evaluation of effects on the radio spectrum of the new protocols and algorithms designed in the Institute.

- The development and deployment of reliable, high-performance networked systems, of software defined networking, and of novel architectures and protocols for behavioral networking and for network economics.

In order to support cutting-edge research, IMDEA Networks invests in the latest, state-of-the-art laboratory test equipment, endowing the Institute with the capacity of transforming research into high added value products and services.

The laboratories are used for:

- Constructing prototypes and measuring the devices, protocols and algorithms developed by the researchers.

- Simulating complex base-band and medium access systems, as well as sophisticated radio subsystems.

- Measuring radio parameters involved in mobile, fixed and satellite communications, designing and characterizing radiating elements, and measuring the effects on the radio electric spectrum of new protocols and algorithms designed by the Institute.

IMDEA Networks is aware of the importance of having the best equipment to perform experimental work. We invest in the latest technologies.

In the scope of the project ESFRI-SLICES-CM, an AMARI UE Simbox E 064 has been acquired, which allows the flexible implementation of different loads in the 5G and 4G radio interface over a wide range of operating frequencies. Also, 2 USRP N310 have been purchased to test the different waveforms proposals for the future 6G standard, the base-band processing for the 5G base stations that are implemented using the USRPs will be implemented using a Dell PowerEdge R7615 bought for this purpose, and everything will be interconnected by a Ruckus Wireless ICX 7850 32-port QSFP28 switch. All this equipment is intended to implement a node for the ESFRI-SLICES-CM infrastructure, which is part of the ESFRI inititiave, that is a strategic instrument to develop the scientific integration of Europe and to strengthen its international outreach. SLICES is intended to extend ESFRI reach to the area of wireless networking.

In the scope of the project ADVANCE_6G, the following equipment has been purchased:

- 2 USRP N310 to develop a powerful NG-RAN testbed, to be integrated into the computing infrastructure and Institute communications. Each gNB in the testbed would be composed of an USRP N310 and a server with 2 Intel Xeon Gold 6338N CPUs. This will allow

us to process, transmit and Receive 5G waveforms using 5G Open Air Interface (OAI), which provides the More advanced software -defined implementation of cellular networks.

- 6 Dell PowerEdge R7625 to the analyze metadata in mobile networks and develop solutions based on AI to tackle 6G networks operations, from network management to fraud detection of IoT services support.

- 3 Dell PowerEdge R660xs to provide processing capabilities to each of the three nodes required for the experimental quantum network to be deployed at 5TONIC. This experimental network consists of three sites with NFV equipment, implemented in the selected servers, interconnected through two quantum links (one site would act as an intermediary in end-to-end communications). This network will address the development of mechanisms for the efficient and secure transmission of information between distributed software components over classical 5G/6G networks, using quantum computing technologies.

- 3 Edgecore 32x100G QSFP28 swithces to provide a high-capacity data plane with multitenant and programmable features and support for multiple embedded operating systems.

- 8 RF Evaluation Kits to validate the RF part of an 5G mmWave System, carry out field tests, experiment with different configurations and analyze the behavior of RF signals.

Also, 2 Extreme Networks 5420F-48P-4XE switches, 2 Extreme Networks 5420F-48T-4XE switches and a switch Extreme Networks 5420F-24P-4XE will provide internet access and connectivity to the new refurbished area of the institute, everything backed up by a UPS SOCOMEC NeTYS RT 3300VA/2700W.

5TONIC

The 5TONIC Laboratory

The 5TONIC Laboratory offers a complete 5G network infrastructure designed to support the development, analysis, testing, and demonstration of cutting-edge 5G and 6G technologies.

5TONIC's mission is to foster a collaborative global environment where industry and academia can drive innovation in 5G and 6G, promoting both technological advancements and new business ventures.

In 2023, 5TONIC activities pursued three objectives:

1. Supporting the development of new technological solutions for 5G and 6G.

2. Assisting in the implementation and deployment of new use cases that take advantage of 5G capabilities.

3. Expanding the lab's reach and scope.

To support the first objective, 5TONIC members Telefónica and Ericsson advanced their pioneering work on end-to-end automated network slicing in 5G Standalone environments. They collaborated with UE vendors such as Google, Samsung, TCL, and Xiaomi to successfully complete the second phase of project LIME.

As an example of the second objective, Capgemini Engineering also demonstrated the Secure Connected Car REMOTIS within a real 5G environment as part of the FISHY project Security framework, which received significant media attention.

Regarding the third objective, 5TONIC published a white paper in June 2023 titled "Exploring the Future of the Network - Building a New Tech Ecosystem." This document details the lab's mid-to-long-term activities and plans.

New equipment acquisitions through the UNICO and MadQ-CM projects, initiated in 2023, will enhance and extend the lab's infrastructure. These projects will enable 5TONIC to become a node of the MadQCI network and expand its 5G coverage to the UC3M Campus.

5TONIC further expanded its infrastructure beyond IMDEA Networks by deploying 3GPP 5G PNINPN infrastructure and facilities in Valencia.

IMDEA Networks won a public tender by Spain's Ministry of Defense for 5G lab services, making the Ministry an Institutional Collaborator of 5TONIC. Additionally, GMV secured two projects awarded by EUSPA and CCN (Centro Criptográfico Nacional), which will utilize the 5TONIC lab for demonstration purposes, complementing the existing ERASMO project collaboration.

On the international stage, 5TONIC strengthened its position in 2023 as a leading 5G-to-6G research ecosystem at both the national and European levels. The members of the lab's participation in over 20 6G R&D SNS projects highlights its focus on key evolutionary aspects of 5G, including TSN, Digital Twin, and XR, with an emphasis on high-end Industry 4.0 and mission-critical 5G scenarios.

Finally, 5TONIC welcomed several new collaborators in 2023, including Open Nebula, Aerotools, GMV, and Atos.

research projects, grants and fellowships

4.1. Funding awards

We dedicate extensive resources to obtaining external funding to support our research team and in particular those members who excel in their capacities, with the objective to promote the scientific and technical potential of our human capital and, as a direct result, the outreach of the Institute's activities.

The funding of our individual researchers takes the form of awarded grants, scholarships and fellowships. These awards are similar to externally funded research in their openness and the strict selection processes used, and they confer prestige on the awardee as well as on the organization he/she is affiliated to.

4.1.1. National

Ramón y Cajal Grants

Programa de Ayudas para contratos Ramón y Cajal

Awardees

- Dr. Narseo VALLINA-RODRÍGUEZ, Research Associate Professor
- Dr. Guillermo SUÁREZ-TANGIL, Research Assistant Professor

Funded by

Spanish Ministry of Science and Innovation *(Ministerio de Ciencia e Innovación - MICINN)*

Ramón y Cajal Grants

Programa Ramón y Cajal - Ayudas para la creación de puestos de trabajo de carácter permanente

Awardee

- Dr. Vincenzo MANCUSO, Research Associate Professor

Funded by

Spanish Ministry of Economy, Industry and Competitiveness *(Ministerio de Economía, Industria y Competitividad - MINECO)*

Juan de la Cierva Incorporation Grants 2019

Awardee

- Dr. Claudio FIANDRINO, Senior Researcher

Funded by

Spanish Ministry of Science and Innovation (MICINN), National Programme for the Promotion of Talent and its Employability, part of the National Plan for Scientific and Technical Research and Innovation 2017-2020

Grants for training university teachers – FPU

(Ayudas para la Formación del Profesorado Universitario)

Awardee

- Yago LIZARRIBAR, PhD Student

Funded by

Spanish Ministry of Universities *(Ministerio de Universidades)*

INVESTIGO-SEPE Grants for young job seekers to undertake research and innovation initiatives

(Ayudas para la contratación de jóvenes demandantes de empleo en iniciativas de investigación)

Awardees

- Alfonso RODRÍGUEZ, PhD Student
- Pablo FERNÁNDEZ, Research Engineer
- José Manuel PANDELO, Research Engineer
- Louis MIERMONT, PhD Student
- Celia NAVARRO, Research Engineer
- Michal TERESZKOWSKI-KAMINSKI, Research Engineer
- Anthony SÁNCHEZ, Research Engineer
- Iñaki BRAVO, Research Engineer
- José GALLEGO, Research Engineer

Funded by

Ministry of Employment and Social Economy

4.1.2. Regional

Predoctoral Grants (CAM 2022)

Awardees

- Sergio DÍAZ ARANDA
- Beyza BÜTÜN
- Bei OUYANG

Funded by

Department of Science, Universities and Innovation of the Regional Government of Madrid

Talent Attraction Grant – Modality 1: Researchers with Experience

Awardee

- Marco FIORE, Research Professor

Funded by

Department of Science, Universities and Innovation of the Regional Government of Madrid

Talent Attraction Grant – Modality 2: Young Postdoctoral Researchers

Awardee

- Dr. Antonio BAZCO-NOGUERAS, Post-Doc Researcher

Funded by

Department of Science, Universities and Innovation of the Regional Government of Madrid

4.2 Ongoing projects

Externally funded research projects enable us to collaborate with researchers from other organizations and backgrounds. Research funding is awarded following an open competitive selection process in which project proposals, and the private or public sector organizations presenting them, are subject to rigorous scrutiny. Such thoroughness helps to ensure that research undertaken with those funds is relevant, well managed and with high probabilities of success in achieving its stated goals.

UNITE

(Unmanned aerial vehicles for non-terrestrial communications and sensing)

Funded by: European Commision HORIZON-MSCA-2022-SE-01

Duration: December 2023 to November 2027

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101129618.

Satellites and unmanned aerial vehicles (UAVs) represent a perfect match for non-terrestrial sensing and communications in 6G. Hence, it is of great interest to combine UAVs with satellites to maximize their respective advantages for emerging applications. This project tackles the challenges of using UAV for non-terrestrial communications and non-terrestrial sensing, in combination with satellites, for 6G. The objectives of this research include:

1) Data-driven UAV deployment: to perform intelligent analysis of the spatial and temporal needs for UAV deployment using data mining techniques in important 6G scenarios;

2) Communications and sensing channel modelling: to establish realistic channel models to describe the 3D environment in non-terrestrial applications;
3) Separate non-terrestrial communications and sensing designs: to develop efficient data transmission strategies to ensure the reliable delivery of information and the accurate acquisition of network perception using new channel models, reconfigurable intelligent surfaces and computer vision;
4) Integrated non-terrestrial communications and sensing designs: to devise robust signal processing and networking algorithms to integrate non-terrestrial communications with non-terrestrial sensing using dual-functional waveforms and UAV wireless charging based on the previous separate designs;
5) Sensing-based communications designs: to design effective non-terrestrial communications methods using the network information acquired from non-terrestrial sensing;
6) Disseminate, exploit and communicate the outcomes of this research to the wider community.

Achieving the above measurable objectives will provide crucial inputs to the exploitation of UAVs in non-terrestrial communications and non-terrestrial sensing for 6G by solving its major challenges, which will allow us to address the digital inequality issue and to enhance the terrestrial network functionality.

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101129618.
More info

CYBERACTIONING

(Training Cybersecurity Skills through Advanced Higher Education Joint Programmes)

Funded by: European Commision DIGITAL-2022-SKILLS-03
Duration: October 2023 to September 2027

This project has been funded by the European Union Digital Europe Programme grant CYBERACTIONING (Grant Agreement 101123445).

CYBERACTIONING project is originated by a consortium originally formed within the European University Alliance ARQUS, with the addition of five SMEs and a Research Centre, all of them covering four different European countries and with a high level of expertise in the field of cybersecurity. It aims to train professionals in this field through the following initiatives: (a) a joint European Master in cybersecurity with a mobility path along the four universities; (b) a MOOC in cybersecurity aiming at training a minimum of 800 students from non-ICT sectors in each edition; (c) a scholarship programme to attract highly qualified students; (d) a programme of agreements and incentives to attract faculty, companies and research centres and generate synergies; and (e) the acquisition of key technological infrastructure for support of the programmes.

The two training activities (Master and MOOC) have been developed taking into account the main frameworks and recommendations for the development of professional training plans in the field of cybersecurity, such as NICE (National Initiative for Cybersecurity Education)

from NIST in the USA or the Joint Task Force (JTF) on cybersecurity, involving ACM, IEEE and other reference organizations. This adaptation of the training initiatives to the actual demands will guarantee an accurate impact in the European and global labour market.

Finally, the project foresees a dissemination plan that ensures the impact of the proposed activities, mainly based on the celebration of a research conference, a programme of agreements with companies and organizations in the cybersecurity sector, a programme of grants for internships and research stays, and a set of initiatives for the dissemination of the training activities promoted by the members of the consortium.

This project has been funded by the European Union Digital Europe Programme grant CYBERACTIONING (Grant Agreement 101123445).
More info

PARASITE

(Methods and techniques to characterize supply chain threats in software)
Funded by: Ministry of Science and Innovation
Duration: September 2023 to August 2027

PARASITE is an ambitious and holistic research effort to create an evidence-based observatory to characterize, model, and analyze the modern software supply chain, its actors, behaviors, and the rampant and diverse range of security and privacy threats targeting them. PARASITE builds on over 20 years of experience and highly impactful research in program testing, cybersecurity, and cybercrime. It aims to push the boundaries of our understanding of the supply chain and its socio-technical ramifications and implications. Our approach will address the current set of challenges and limitations of existing static and dynamic analysis methods for understanding the supply chain and its inherent risks. Specifically, existing static analysis methods to identify dependencies in compiled and packaged software need to address challenges arising from differing versions of compilation toolchains, target architecture, optimization, and other compile-time configuration which substantially alter the final artifact of software production from its source code. Additionally, we have no methods to attribute and identify vulnerabilities in modern programs, as most analysis methods consider them as monolithic objects rather than multiparty ones.
More info

DRONAC

(Distributed Reliable Objects for Networked Applications Coordination)
Funded by: Ministry of Science and Innovation
Duration: September 2023 to August 2026

Over the past decade, blockchains have come to the fore as tools for coordinating entities with very different and possibly competing interests that benefit from working together.

Current blockchain systems maintain a reliable storage of data, organised as a fully ordered sequence of transactions, and only provide eventual consistency to access it. However, we believe there are many alternatives to explore beyond this usual service. In one dimension, the total order between transactions imposed by the ledger is useful, but at the cost of having to solve distributed consensus, which limits scalability. Some applications may not need the transactions to be fully ordered, and could coordinate with weaker order guarantees such as no order, DAG orders, or barriers (setchains). In another dimension, applications may want a stronger level of consistency than eventual consistency, such as linearizability, sequential consistency, or causal consistency.

In this project, we intend to enrich the distributed ledger ecosystem with several alternative types of reliable distributed storage objects that allow data records to be stored and read. Reliable distributed storage objects will be Byzantine fault tolerant and provide persistent and immutable storage. The quality of service (or type) of a reliable distributed object will be defined by the two dimensions presented above: order and consistency guarantees. This will allow applications that need to coordinate to share records with the appropriate level of order guarantees and the desired type of consistency.

The practical interest of these objects will be illustrated by three practical application scenarios that require the implementation of computing and networked services: (a) coordination of electricity producers and consumers, (b) coordination of platoons of autonomous vehicles using edge computing, and (c) construction of machine learning models for assisted driving using federated learning.
More info

6TH SENSE_ELSA

(6G location and sensing-based analytics)

Funded by: Ministry of Science an Innovation
Duration: September 2023 to August 2026

Localization has achieved great attention in 5G networks, and was strongly pushed by the 3rd Generation Partnership Project (3GPP) for standardization. This area of innovation thrives: according to market research studies, the market size of Location-Based Services (LBS) is expected to grow at a Compound Annual Growth Rate of 17.6% during the period 2022-2027.

Location is now one of the most active areas of standardization in 3GPP, and new releases of the standards promise to further enable new techniques for accurate and fast positioning toward 6G networks. In parallel, higher spectral bandwidths will provide better range resolutionfor processing received signals reflected off objects, thus enabling precise environmental sensing and localization. Finally, MachineLearning (ML) and artificial intelligence are playing an increasing role in 5G, and are expected to play an even greater role in 6G

networks. Localizing and sensing 6G terminals, people and things accurately and reliably will allow network operators to design innovative servicesfor new stakeholders. At national level, the strategic line “Internet de la próxima generación” will greatly benefit from advancing theknowledge in location, sensing, and analytics for developing future cellular networks.

Despite the large standardization effort and expectations for future cellular generations, the lack of experimental studies in cellular locationand sensing limits the scientific impact and innovation in this area. 6G-ELSA aims to fill this gap, studying the key scientific and technological enablers of future cellular network for location and sensing-based analytics. 6G-ELSA will provide an end-to-end integratedplatform for enhanced localization and sensing. To this end, departing from currently available 5G software, 6G-ELSA will make holistic contributions at all layers of the protocol stack, from the core network all the way down to the physical layer in the radio access, providing analytics for external stakeholders.

In order to advance the knowledge and foster adoption of the developed results, the research and development of the project will be driven by an important example use case that we expect in future cellular networks on localization and environment sensing for fine-grained human activity recognition and new user interactions.

The project consists of two Scientific and Technical (S&T) work packages, one on architecture, use cases and demonstrations, and one on management. The research methodology of the project is set up as follows: i) the research will be performed on key S&T enablers identified at the time of the proposal and that we will address in WP1 and WP2; ii) all the research in the project will be related to common reference architecture and use case on human activity recognition, identified and used by all research domains; iii) selected technology components developed during the project will be integrated in proof-of-concept demonstrations (in WP3): we will integrate the different components under a single 5G-NR open platform and demonstrate the potential of 6G for sensing and positioning services. We will test individual components first in isolation and then we will validate the integrated platform as a whole as indicated in the implementation plan.
More info

DATABRI-X

(Data Process & Technological Bricks for expanding digital value creation in European Data Spaces)

Funded by: European Union HORIZON-CL4-2021-DATA-01 (Work Leading Data and Computing Technologies).
Duration: October 2022 to September 2025

The emergent European Data Economy relies on the availability of data as a basis for further innovation and exponential development of technologies, especially the development of trustworthy ‘made in Europe’ AI that reflects European values. Data Spaces, platforms and marketplaces are enablers, key to unleash the potential of such data. However, data shar-

ing and data interoperability are still at their infancy. Through DataBri-X, European Data Spaces, platforms and marketplaces and their wide range of business, governmental and public, research and civil society stakeholders will be equipped with a holistic and flexible data governance process and a seamless integrated standards based toolbox for data- and metadata management which can be assembled along relevant requirements, provides open source as well as commercial tools (the bricks / bri-X), and mechanisms to load 3rd party resources like language resources or AI models, and can be easily deployed into Data Spaces and thereby will contribute to make Europe the most successful area in the world in terms of data sharing and data re-use, to gain the full benefit from the value of data, while respecting the legal framework relating to security and privacy. The project's objective is to provide a holistic, energy-efficient and user-friendly toolbox of practical, robust and scalable bricks/Bri-X (processes, technologies and tools) that improve the interoperability, usability, discoverability, quality, and integrity of data and metadata, with the aim of making data sets ready for expanded digital value creation in the context of European Data Spaces. The DataBri-X toolbox will be offered in compliance with accountability, fairness, privacy, and confidentiality regulations as well as FAIR principles and will build on existing and emerging initiatives. The DataBri-X consortium comprises 14 partners from 6 EU members and 1 associated country (UK), that together form a complete value chain of actors.
More info

BRAIN

(Explainable and robust AI for integration in next generation networked systems)

Funded by: Ministry of Science and Innovation

Duration: September 2022 to August 2025

Fifth-generation (5G) networks are now entering a stable phase in terms of system architecture and commercial release, and the identification of the advanced features that will shape the evolution of 5G into the sixth generation (6G) of mobile network systems has already started. Despite being at early stages of conceptualization, some key aspects of the future infrastructure have been identified by the community: 6G will bring a paradigm shift from connected things to connected intelligence, supporting even more stringent KPI requirements than 5G, and global coverage (air, ground, and underwater). Therefore, there are strong expectations that Artificial Intelligence (AI) will permeate the 6G network infrastructure, allowing for much swifter and more effective decision-making in scheduling, control and orchestration operations of the end-to-end communication systems. Ultimately, this will allow 6G to support ambitious performance targets such as near-zero latency, apparent infinite capacity, or 100% reliability and availability, so as to support new and diverse classes of innovative mobile services.

The BRAIN project will contribute to making this vision of 6G as a network augmented via pervasive artificial intelligence a reality, by addressing the two main roadblocks. On the one hand, existing AI models employed for network management are black boxes, and their complete lack of transparency is a clear barrier for adoption: here, BRAIN aims at

proposing new AI tools for network management that are explainable and trustworthy by design and specifications on robustness that allow to benchmark existing AI models. On the other hand, the disruptive softwarization of the network architecture has opened new opportunities for a deep integration of AI into the future 6G infrastructure that have yet to be explored: here, BRAIN will investigate novel approaches for the design, implementation and evaluation of in-band network intelligence, i.e., AI models that run directly into the user-plane programmable switches, operating at line rate over the transiting data traffic, and laying the foundations to a truly AI-native 6G network..
More info

GREENEDGE

(Energy-efficient Monitoring in the era of Edge Intelligence)
Funded by: Ministry of Science and Innovation.
Duration: September 2022 to August 2025

Monitoring a process/phenomenon of specific interest at the network edge is prevalent in Cyber-Physical Systems (CPS), remote healthcare, smart buildings, intelligent transport, etc., that are essential building blocks of smart cities. Todays monitoring systems extensively use Internet-of-Things (IoT) sensors. In the era of the Edge Intelligence, there is a major research thrust for deploying small Machine Learning (ML) models on the IoT sensors making them capable of doing local inference on the collected data. The small ML models consume lower energy at the cost of lower inference accuracy compared to large ML models, namely, Deep Neural Netowrks (DNNs) that run on edge servers. In this context, there are several unanswered questions on the Total System Energy (TSE) consumption in the monitoring systems. A natural question is: where should the inference be performed for a data sample so that TSE is reduced? Another impending question is: when should the sensors smaple in order to further reduce the TSE? The latter question is inspired by the fact that in today's system, the data collected sensors has high redundancy.

The GreenEdge project answers the above questions by exploring the TSE savings that can be achieved in a monitoring application using intelligent sampling and scheduling the inference between the edge server and the IoT sensors. GreenEdge will achieve this while respecting the applications' Quality of Service (QoS) requirements. This will be conducted in three stages: (1) performing measurements of energy consumption, processing times, and communication times on the IoT sensor and the edge server, (2) establishing models and algorithmic solutions that schedule the sampling and the inference by exploiting the trade-offs between the TSE consumption, inference accuracy, IoT battery limitation, delay in detecting essential events etc., and (3) applying the new findings and validating the efficacy of the proposed algorithms in two exemplary applications with varied characteristics, namely, a cognitive assistance application and a wildfire monitoring testbed.
More info

MLEDGE

(Cloud and Edge Machine Learning)

Funded by: Ministry of Economic Affairs and Digital Transformation (UNICO CLOUD 2022)
Duration: January 2023 to June 2025

Data-driven decision-making powered by Machine Learning (ML) algorithms is changing the way society and the economy work, and is having a profound positive impact on our daily lives. In fact, ML applications are becoming even more ubiquitous and integrated, often invisibly, into our daily activities, having a direct impact on things like how we find our way around a city, how we decide what to buy or where to eat, while at the same time we can keep ourselves safe from financial fraud, or have tools that remind us to take medication or suggest new personalized habits for a healthier lifestyle.

However, for ML-based solutions to be effective at such tasks, data often has to be processed close to the end user. Furthermore, such data may be private and of a confidential nature. Distributed Learning and, in particular, Federated Learning (FL: Federated Learning) emerges as a leading paradigm within the ML branch satisfying these two properties. FL has grown in parallel with the expansion of cloud to the edge (CloudEdge) but, interestingly, both paradigms have mostly developed independently, despite their natural parallelism and potential synergistic gains.

In this project, Cloud and Edge Machine Learning (MLEDGE), we will work to reverse this trend by deploying FL as a standalone but optimized cross-industry layer on top of CloudEdge, using real-world data and applications to demonstrate that this synergy can produce great benefits for all. MLEDGE aims to enable a thriving ecosystem of secure and efficient ML edge services capable of facilitating the use of sensitive personal and B2B data to train ML models for consumers while protecting the privacy of the data and its owners. Recent studies in the field of the "European Data Strategy" estimated that the data economy will reach an impact of 827 billion euros for the EU27 as early as 2025. However, even today privacy concerns and property hinder their full development. MLEDGE will be instrumental in increasing these projections in the period 2025-2030.
More info

ADVANCE_6G

(Scientific infrastructure of computing and communications for advanced experimentation in 6G networks)

Funded by: Ministry of Economic Affairs and Digital Transformation
Duration: September 2022 to June 2025

The next technological revolution in the field of communications networks will be the sixth-generation mobile networks, or 6G networks. IMDEA Networks is playing a determining role in the development of this new technological paradigm, leading several pioneering

projects of 6G technology, developing cutting-edge lines of research and playing a determining role in the SNS JU (Small Network and Services Joint Undertaking), a Large-scale European public-private initiative to research and develop advanced 5G and 6G technologies. However, in order to continue playing this role and ensure that Spain has a relevant role in research in this revolutionary field, it is essential to have a leading experimental platform at a global level that allows the evaluation and validation of new disruptive ideas and new technologies in the field of 6G networks, thus ensuring their practical viability. In order to create this unique experimental platform, IMDEA Networks participates in the SLICES-RI research infrastructure (www.slices-ri.eu) included in the ESFRI Roadmap 2021. IMDEA Networks has contributed since its inception to SLICES-RI and has a relevant role, managing the node of the 5TONIC laboratory (www.5tonic.org) integrated in SLICES-RI.

ADVANCE_6G aims to provide the scientific and technological infrastructure and equipment that will allow 5TONIC to address, in an integrated manner with SLICES-RI, an infrastructure for experimentation in advanced 5G and 6G, offering a catalog of resources and services available to the research community, not only nationally but also internationally. More info

MADQUANTUM-CM

(MADQuantum-CM. Quantum Communication in the Autonomous Region of Madrid)

Funded by: The Regional Government of Madrid through the Spanish Plan for Recovery, Transformation and Resilience and the NextGeneration EU Funds from European Union

Duration: January 2022 to March 2025

The overall objective of the project is to structure and coordinate Quantum Communications R+D+i capacities of the Community of Madrid (CM), among themselves and with other Autonomous Communities with common interests, within the framework of the Complementary Plan for Quantum Communication whose main objective is the alignment of Spain with the key European initiatives in the field of Quantum Communication, both the Quantum Flagship and the EuroQCI. MADQuantum-CM project develops the participation of the Community of Madrid in the Complementary Plan for Quantum Communication, contributing to its scientific-technological objectives as well as the creation of talent and the industrial ecosystem, through 7 scientific-technical lines:

- Line 1: EuroQCI – Towards a European Quantum Communications Infrastructure
- Line 2: Hardware for quantum communications
- Line 3: Software for quantum communications
- Line 4: Hardware for quantum processing
- Line 5: Software for quantum processing
- Line 6: Human Resources and training for innovation and entrepreneurship
- Line 7: Innovation and industrial ecosystem, dissemination and exploitation of results

The main line of the project is line 1, in which technological developments and deployments will be carried out to contribute to the first objectives defined in the European programs: the creation of a high-security communications network, resistant to any computer attack, orchestrated either through classical or quantum means.

Line 2 will contribute to the development of line 1 through hardware developments for quantum communication, first for fiber systems, considering both technologies easier to integrate in the network and to industrialize (Continuous Variables), as well as those more optimal for long distances/rates (Discrete Variables) and secondly for free space, which includes satellites, foreseeing the space segment that will be necessary in the EuroQCI for very long-distance communications in the short/medium term, and communications with an unmanned aerial vehicle (UAV). Likewise, within this line, technology based on entanglement will be developed, including quantum repeaters for Quantum Communications for long distances (>300 km) over optical fibers.

Line 3 will focus on systems and new protocols with advantages in terms of security, distance and functionality, as well as security studies of experimental systems and their integration into the networks.

Quantum Communications, however, not only produce secure systems, their ultimate goal is the ability to create quantum correlations between any two points in the network. These quantum processing technologies will be developed in lines 4 and 5. The main applications of these developments may be: ultra-precise distribution of time signals, quantum sensors, distributed quantum computing, etc.

Finally, lines 6 and 7 aim to educate and train researchers, by hiring research personnel in their different stages of training, and generate human capacities for the development of a national industry that covers the entire value chain around quantum communications.
More info

Funded by the European Union
NextGenerationEU
GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN

ECOMOME

(Energy consumption measurements and optimization in mobile networks)

Funded by: European Union through the NextGenerationEU/PRTR Funds and the Spanish Scientific Agency/Ministry of Science and Innovation
Duration: February 2022 to January 2025

The energy consumption of mobile networks has been the source of animated debates in the recent period, with the deployment of 5G technologies. However, the energy consumption estimations put forward by the different parties in the debate showed significant differences, up to two orders of magnitude. This is a result of a lack of accurate models and meaningful metrics in this field. More precisely, the control plane of a mobile network

represents a significant share of the traffic exchanged between the user and the network infrastructure, much more than in any other network technology, and this role will become even more important with the development of network function virtualisation and orchestration. Models focusing on the application-level traffic are bound to make harsh approximations, leading to results that can not really help the involved parties.

Project ECOMOME addresses this problem of accurately modelling and optimising the energy consumption of a mobile network, with a focus on 4G and 5G technologies. This will be achieved through three main research axes. The first contribution will be represented by the first independent measurement study of energy consumption in a mobile network. We will address both user equipment and the radio access network, conducting a network metrology study on real operational networks and on experimental testbeds. The measurement data collected in this campaign will represent the input for other contributions in the project, but it will also be made openly available to the research community.

The second objective of the project is to use this measurement data in order to design accurate energy consumption models for mobile networks. In this sense, we take an original approach with respect to the literature, by focusing on modelling the impact of the building blocks of the mobile network, a series of "atomic" network mechanisms and functions which practically compose any service scenario and any user context. Modelling these atomic network mechanisms requires a detailed knowledge of the way a mobile network functions, but then allows the accurate modelling of any general scenario.

Finally, the project also targets the proposal of energy efficient networking solutions. Indeed, the measurement data and the energy consumption models will allow us to detect the most energy-hungry phases in a mobile network. To reduce their impact, we will propose network intelligence solutions, which are based on observing the traffic transported by the network, detecting whenever the network settings are over-consuming, and adapting the network configuration with energy efficiency metrics in mind.
More info

AEON-ZERO

(Network Intelligence for zero-touch orchestration and anomaly detection)

Funded by: The programme "UNICO 5G I+D" funded by the European Union-NextGenerationEU and the Ministry of Economic Affairs and Digital Transformation through the Spanish Recovery, Transformation and Resilience Plan
Duration: December 2021 to December 2024

To meet the ambitious goals set for 5G evolution and 6G systems, the mobile network architecture is being redesigned for end-to-end softwarization and cloudification, completing the decoupling of network functions from the underlying hardware, and granting an

unprecedented flexibility to the communication infrastructure. NI will play a paramount role in the effective operation of future softwarized and cloudified mobile networks.

Both industry and academia are making substantial efforts to accelerate the integration of solutions for automated network management into the mobile network environment. However, even in presence of a full ZSM deployment where a plethora of NI instances takes resource and VNF management decisions in a completely autonomous manner, interactions with network managers will still be needed at multiple levels.

Building upon the experience and results of the ongoing DAEMON project, funded by the European Commission, AEON-ZERO will focus on developing NI solutions that are in fact usable by mobile network operators. The target models will embed and present interfaces that make the interactions above as simple and smooth as possible and render final decisions that are interpretable and clearly explainable. In this way, AEON-ZERO will contribute to closing the current gap between the competences of network experts and the skills needed to configure the increasingly complex AI algorithms that underpin such NI.
More info

AEON-CPS

(Network Intelligence for cyber-physical system support)

Funded by: the programme "UNICO 5G I+D" funded by the European Union-NextGenerationEU and the Ministry of Economic Affairs and Digital Transformation through the Spanish Recovery, Transformation and Resilience Plan
Duration: December 2021 to December 2024

AEON-CFS will focus on the monitoring and control operated by Network Intelligence (NI) on cyber-physical systems (CPSs) relying on 5G networks and their 6G evolutions. In AEON-CPS, we will study fundamental properties of automated machine learning (AutoML) and explainable artificial intelligence (XAI) to support the prompt and automatic identification of performance anomalies of CPSs and the associated corrective actions (intelligent troubleshooting). We will use specific CPS applications for NI in CPS environments, and in particular for what concerns future solutions for intelligent transportation, i.e., assisted and automatic driving applications. The work will result in the design of novel interpretable and explainable automatic ML/AI technologies and SW tools. The validation of methodologies and tools will be carried out in realistically emulated cellular environments. AEON-CPS will benefit the society by making CPSs more controllable and optimizable in an automatic way, while at the same time offering the opportunity to support quick, precise and human-understandable troubleshooting actions.
More info

MAP-6G

(Machine Learning-based Privacy Preserving Analytics for 6G Mobile Networks)

Funded by: Ministry of Economic Affairs and Digital Transformation, European Union NextGeneration-EU

Duration: January 2022 to December 2024

Although there is not a unique understanding of what 6G will be, several initiatives are ongoing that have put forward highly advanced visions of potential concepts and preliminary technologies that will form 6G networks. With the current deployment of 5G networks, high data rate and low latency are provided for communication, in addition to some first steps towards deployments that also provide commercial localization services. 6G mobile networks, however, will go far beyond the use cases that can be covered by 5G, enabling not only significantly improved network performance but also substantially more complex services that rely on location and context information gathered by the network. In particular, 6G mobile networks will enable orders of magnitude higher localization accuracy and lower latency than prior technologies. This will be a unique opportunity to design new services and analytics, but also a threat for privacy. For this reason, this project will design native privacy-preserving machine learning mechanisms for 6G networks in order to manage the massive amount of data generated by services in 6G networks, based on emerging Federated Learning techniques. The final demonstrator will integrate the developed modules within the mobile network and will be demonstrated using testbeds comprising data servers, edge nodes and end-user devices.

More info

RISC-6G

(Reconfigurable Intelligent Surfaces and Low-power Technologies for Communication and Sensing in 6G Mobile Networks)

Funded by: Ministry of Economic Affairs and Digital Transformation, European Union NextGeneration-EU

Duration: January 2022 to December 2024

The mobile communication industry is one of the few industry sectors that has been growing at a very fast pace for more than three decades. 5G mobile networks promised to change our modern society and vertical industries and are now gradually being rolled out commercially. The research focus is now shifting towards sixth generation (6G) mobile systems and architectures. While 5G is largely used for communications, 6G mobile networks will go far beyond 5G use cases, involving a vastly larger number of connected devices, significantly higher performance requirements, and support for detailed object and environment sensing in addition to communication. To this end, 6G networks will need to embrace new concepts and capabilities. The overall objective of this project is to integrate such crucial new technologies into 6G to improve wireless communications, provide environmental sensing,

and significantly lower the per-device energy footprint to avoid a vast increase in overall network power consumption. We will take a holistic approach, harnessing reconfigurable intelligent surfaces, visible light communication, and RF backscatter, that 6G networks will use. This project is timely, as the solutions that we will design during the project (concluding in December 2024) can be incorporated in the pre-6G systems that are expected to be ready for deployment around the same time, and in line with the roadmap proposed by the 5G Infrastructure Association (5GIA) and the Sustainable Development Goals set by the United Nations. We plan to provide one final demonstrator in collaboration with industry partners of the consortium, integrating communication, sensing and low-power design for the important and emerging use case of the Internet of Everything.
More info

PROMIN

(IMDEA Network's plan for attracting talent and promoting degrees related to telecommunications, at national and international leve)

Funded by: Ministry of Economic Affairs and Digital Transformation, European Union NextGeneration-EU

Duration: January 2022 to December 2024

The main objective of the Plan for the Promotion of Telecommunications Studies (PPET) is to attract talent to telecommunications studies, thus helping to solve the shortage of talent in technologies such as advanced 5G and 6G, which are essential for research centers and industries.

This plan will deploy a series of actions for the dissemination of these studies among the different levels of students, so as to improve the attraction of good students to them, while emphasizing the incorporation of female talent, currently at very low levels, and international students for the master's and doctoral levels.

This promotion plan is considered unique, and the deployment of actions to be carried out will be developed throughout Spain, beyond the geographical scope or action of each of the beneficiary entities of the PPTE.
More info

SOCIALPROBING

(Scalable and Cost Competitive Data Collection and Analysis Techniques for Social Probing)

Funded by: Ministry of Science and Innovation

Duration: December 2022 to November 2024

SocialProbing brings together an interdisciplinary group of researchers who will combine their knowledge and skills to develop techniques, technologies and tools that allow probing fundamental aspects of society in a scalable and affordable way.

Probing a certain population group provides information to be able to evaluate and improve their situation. The rapid digital deployment and the success of social networks have notably increased the possibility of probing society through these new channels. But to the same extent, problems have arisen in conducting digital surveys, due to the sense of lack of privacy on the part of the participants and the lack of incentives to participate. All this is aggravated if the information to be collected is of a sensitive nature (social, gender, economic, health, ...). Furthermore, by leaving out of the survey a segment of the population that does not use digital platforms, it is possible that there is bias in the conclusions obtained.

SocialProbing proposes a new methodology to alleviate these issues, and at the same time to advance in the acquisition of data through digital channels. This methodology is based on the massive and continuous use of surveys by digital means in which information is collected indirectly. The use of this type of survey has two great advantages over direct surveys. On the one hand, with the same number of participants, a much larger fraction of the population is reached, with the consequent increase in scalability and reduction in costs. On the other hand, it reaches segments of the population that do not use digital platforms.

In SocialProbing, a Computer Science group and a Statistics group have joined knowledge and skills. The first will be in charge of developing the computational aspects, proposing and deploying computer systems that serve for efficient storage and processing, while the second will propose the appropriate statistical techniques to generate knowledge of the new type of data that is generated via digital channels, which requires the development of new theory and techniques to ensure the consistency and reliability of the results. To show the utility and expand the potential impact of the project, the development of technological and methodological tools will be completed with their application to three timely problems of great relevance in society: (1) the COVID-19 pandemic, (2) social inequalities (such as gender), and (3) climate change (such as visibility and potential impact on society). These three are, indisputably, three of the most important problems in our society today, so their study is of great relevance both for scientific advancement and for the implementation of new technologies, transferable to the business fabric.
More info

COMET

(Understanding the Trail of the Malware Ecosystem from the Underground Markets to the Surface)

Funded by: Ministry of Science and Innovation
Duration: December 2022 to November 2024

Supported by an underground economy, cyber-dependent crimes have rocketed in recent years. Knowledge, but more importantly, tools are exchanged in online markets. An example

is crypto-mining malware, which has permeated from these underground communities to illicitly produced over 57M USD of revenues as shown later in a case-study that is as part of an on-going measurement. This income fuel the underground economy and gear other cyber-criminal activities.

The goal of this project is to better understand cyber-dependent crimes that are enabled by malware from a software development perspective. The purpose is threefold: a) to profile malware developers, b) to understand their business model, and c) to measure the support offered by online markets and forums. A central aspect of the project will be developing technology for malware characterization.

This is, ascribing malware to a given campaign, seller or author (namely, miscreant). This will be used to measure the trail left by malware developers and hacking groups when trading software through anonymous markets. Malware characterization is a difficult task because it deals with active adversaries in a context where partial code reuse is common. Two separate communities have tackled the problem of malware characterization: the malware analysis community study malware found in the wild, while the cyber-crime community look at marketplaces where actors share malware. However, market places are not echoed chambers and the tools produced permeate through to the wild. This project aims to bridge the gap between these two disparate approaches, measuring the commonalities, and then delivering a new approach to understand this ecosystem through malware characterization which is stronger than the sum of its parts. As a key novelty, we will be looking at the exchange of malware source code together with binaries found on the wild.
More info

Comunidad de Madrid

ESFRI-SLICES-CM 2023

(Large-scale scientific infrastructure for experimental studies in computing / communication)

Funded by: Regional Govermment of Madrid
Duration: January 2023 to October 2024

The development of the SLICES 5TONIC node aims to deploy an advanced 5G and 6G experimentation infrastructure, offering a catalogue of resources and services available to the research community, not only nationally but also internationally. The main objectives during 2023 are threefold: (i) deploy the blueprint developed in SLICES to provide an advanced programmable cellular network, (ii) deploy deterministic networks integrating different types of technologies; and (iii) develop the embryo of the system for making the infrastructure available to the research community (access control, resource reservation, remote control and management of experiments, etc.).
More info

RISE-MM

(Reconfigurable Intelligent Surface-Enabled millimeter Wave Communication for Beyond 5G Cellular Networks)

Funded by: European Union HORIZON-MSCA-2021-PF

Duration: September 2022 to September 2024

The 5G mobile communication era has just started, and we are already experiencing the dominance of various new applications with enhanced broadband connectivity requirements. These requirements will become even more critical with the integration of cellular networks in different sectors of society. Conventional sub-6 GHz-based cellular networks represent a short-term solution, where available spectral opportunities are limited and will unquestionably dry up soon. To this end, RISE-MM aims to set the ground for the THz spectrum-based cellular networks. Combining the researcher's experience on reconfigurable intelligent surfaces (RIS)- enabled networks and the expertise on mmWave communication and its practical implementation of IMDEA Networks, in RISE-MM, we will develop channel models for RISE-MM communication in indoor and outdoor deployment settings. Moreover, the project aims to develop an algorithm for joint communication and sensing (JCAS) through RISE-MM using machine learning techniques.

RISE-MM aims to validate the proposed channel models and the algorithm using system-level simulations (SLS) and software-defined radios (SDR)-based mmWave experimentation platforms. It will also implement the proposed channel models using a large testbed with tens of 60 GHz off-the-shelf devices, which will provide a more realistic performance analysis for large-scale deployments to complement the SLS and SDR-based results. The practical deployment of RISE-MM will also help formulate the optimal RIS placement policy, which is a critical factor for RIS-enabled network planning.

RISE-MM is a unique scientific advance because it capitalises on communication theory, machine learning, and practical experimentation to propose new networking models to design and characterise RISE-MM communication for beyond 5G/6G cellular networks. In addition, the specifically developed JCAS algorithm can be the basis of novel developments for passive object detection and identification.

More info

SLICES-SC

(Scientific Large-scale Infrastructure for Computing/Communication Experimental Studies – Starting Community)

Funded by: European Union H2020-INFRAIA-2020-1 (Integrating and opening research infrastructures of European interest. Integrating Activities for Starting Communities)

Duration: March 2021 to August 2024

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No.101008468.

Today we are experiencing the digital transformation happening with an unprecedented pace, with the community constantly researching on new solutions to support this transformation with ample computational power and connectivity. Towards addressing such research efforts, Research Infrastructure (RI) specific to addressing Digital Sciences research efforts have been deployed worldwide, towards trying to address key aspects contrary to off-the shelf commercial infrastructure:

1) **Full control over the parameters of an experiment**,

2) **Repeatable experiments regardless of the physical infrastructure**,

3) **Valid experimental results, which are easy to cross-reference and replicate**.

As such, several RIs have emerged, **offering experimentation services with bleeding edge resources**, that otherwise are only offered only in industrial R&D laboratories, with limited functionality. Towards combating these issues, SLICES Research Infrastructure is about to be deployed, aiming to provide high quality experimentation services with emerging technologies around the area of **digital sciences (5G/6G, NFV, IoT and Cloud Computing)**, in an Internet scale setup.

With SLICES-SC, we aspire to foster the community of researchers around this ecosystem, create and strengthen necessary links with relevant industrial stakeholders for the exploitation of the infrastructure, advance existing methods for research reproducibility and experiment repeatability, and design and deploy the necessary solutions for providing SLICES-RI with an **easy to access scheme for users from different disciplines**.

A set of detailed research activities has been designed to materialize these efforts in tools for **providing transnational (remote and physical) access to the facility**, as well as virtual access to the data produced over the facilities. The respective networking activities of the project aspire in fostering the community around these infrastructures, as well as open up to new disciplines and industrial stakeholders.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No.101008468.
More info

SOMIRO

(Soft Milli-robots)

Funded by: European Union H2020-ICT-2020-2 (Information and Communication Technology)

Duration: January 2021 to June 2024

Precision agriculture for rice farming and smart methods such as aquaponics are vital to ensure a safe supply of fresh food for Europe while reducing our environmental footprint. In line with the Digitising European Industry initiative under their description of smart agriculture, the SOMIRO project will develop a flat-worm-inspired mm-scale swimming robot with month-long energy autonomy, local intelligence, and ability to continuously generate data and optically communicate to reduce farming's environmental impact in terms of carbon footprint, over fertilization, pesticide use, and overfeeding. Swimming robots would cover a much larger area than stationary systems and could be rapidly deployed and self-redistribute where most needed. They may serve as a stand-alone monitoring solution for indoor farming or complement drone-based remote sensing in outdoors scenarios.

Until today, no energy autonomous (untethered and with local intelligence) milli-robot capable of hours of continuous operation has been demonstrated. The major reason for this is power limitation: locomotion requires much power and small robots have very limited energy storage and energy harvesting. Our milli-robot will be less than 1 cm long and show how soft and stretchable systems, with undulating swimming like flat worms, require far less energy for locomotion than other systems of comparable size. For power, it will not rely on any dedicated infrastructure but only on ambient light.

The design of SOMIRO focuses on its industry transfer: industrial partners will use cutting-edge assembly technologies that can scale up to production volumes with no change in process. The bulk materials are low-cost elastomers and polymers and the electronic circuits will be based on commercial components. Throughout the project, all application scenarios and exploitation plans will be developed in close collaboration among the SOMIRO partner enterprises and end-users, and external industrial stakeholders.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No.101016411.

More info

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No.101016411.

DIME

(Distributed Inference for Energy-efficient Monitoring at the Network Edge Note)

Funded by: European Union HORIZON-MSCA-PF

Duration: June 2022 to May 2024

Today, Internet of Things (IoT) sensors are being extensively used for monitoring processes/phenomena in smart cities. The data samples generated by these IoT sensors are wirelessly transmitted to servers at the network edge where compute-intensive Machine Learning (ML) models, specifically Deep Neural Networks (DNNs), are used for providing inference. However, a large percentage of data samples are redundant because they do not (significantly) improve inference. This leads to an excessive and unjustified carbon footprint of these systems as each redundant data sample will contribute to the Total System Energy (TSE) consumption. However, there is a lack of research on the design of these systems to reduce the TSE by considering the redundancy in the data. In DIME, we explore the TSE energy savings in a distributed inference setup by envisaging the deployment of the emerging small DNN models on the IoT sensors. My objective is to maximize TSE energy savings by answering two key questions: 1) when should an IoT sensor sample the process (to reduce redundant samples) and 2) where to do the inference on the sample, on the IoT sensor or at the edge server (to reduce TSE)? I will develop a general modelling framework and subsequently design and validate scheduling algorithms and sampling techniques that minimize the TSE by reducing the redundant data and maximize accuracy in ML-based monitoring systems. To achieve the objective, I will leverage my theoretical research experience on modelling and design and analysis of algorithms and the expertise of IMDEA Networks in applied machine learning and systems research. DIME directly contributes to reducing the carbon footprint of monitoring in smart cities, which is in line with the goal of Horizon Europe to achieve 100 climate-neutral smart cities by 2030

More info

TRUST aWARE

(Enhancing Digital Security, Privacy and TRUST in softWARE)

Funded by: European Union H2020-SU-DS-2020 (Digital Security)

Duration: June 2021 to May 2024

Users often get exposed to security and privacy (S&P) threats when they use digital services for social networking, entertainment, banking, education, health, or home security. The factors behind digital S&P threats are numerous and interconnected, as a combined result of inappropriate software practices, bad user habits, and lack of regulatory enforcement and certification methods, among others. To define effective digital S&P policies and to establish a long-term vision, it is needed to have data, information, and a body of knowledge on privacy, data protection and the associated ethical, legal and socio-economic aspects.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101021377.

TRUST aWARE aims to address this situation by providing actionable intelligence and tools for the different connected stakeholders, to offer effective mechanisms to protect the freedom, security, and privacy of citizens, enhancing TRUST on SoftWARE, cybersafety, and EU's market position. TRUST aWARE will facilitate this by delivering:

- User-friendly tools to protect consumers against S&P cyberthreats (attacks, abusive practices, inappropriate behaviours of digital services) to enable them to better understand, control, detect and respond to S&P threats in a timely manner, and configuring their own S&P protection settings.

- Collective intelligence for CERTs and Authorities in collaboration with citizens, CISOs and DPOs to ensure and audit that digital products and their S&P practices are transparent, secure and compliant with regulation.

- Knowledge to foster S&P-by-design in software engineering by supporting developers and operators with standards and certification methods for compliance with S&P regulations.

By providing tools for key stakeholders along the whole cycle (TRUST aWARE virtuous cycle), and supporting cooperation and intelligence sharing, TRUST aWARE will minimize the impact of cyberthreats, empowering users, promoting collective awareness, and encouraging trustworthy S&P-preserving digital products in compliance with regulation.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101021377.
More info

BANYAN

(Big dAta aNalYtics for radio Access Networks)

Funded by: European Union H2020-MSCA-ITN-2019 (Marie Skłodowska-Curie Innovative Training Networks)

Duration: April 2020 to April 2024

As mobile services consumed by people and machines become increasingly diversified and heterogeneous, 4G/5G networks are asked to meet a growing variety of Quality of Service (QoS) requirements. Network slicing, enabled by Network Function Virtualization (NFV), is a promising paradigm to increase the agility and elasticity of the mobile network via logical slices that can be formed and composed dynamically, so as to adapt to the fluctuations in the demands for different mobile services. BANYAN pursues a tight academic-industrial cooperation, which will allow developing key tools for data-driven 5G RAN, as well as properly training early-stage researchers who are urgently needed by industry, academia, etc.
More info

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Marie Sklodowska-Curie grant agreement No.860239.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Marie Sklodowska-Curie grant agreement No.861222.

MINTS

(Millimeter-wave Networking and Sensing for Beyond 5G)

Funded by: European Union H2020-MSCA-ITN-2019 (Marie Skłodowska-Curie Innovative Training Networks)
Duration: November 2019 to April 2024

The global telecommunications market has become tremendously competitive due to the emergence of new Asian players and saturation of traditional products (e.g., mobile broadband), which has decelerated the growth of the EU's telecommunications market. Thus, without dramatic innovation to open up new markets, EU's telecommunications industry is at risk. However, new markets such as industry 4.0 and autonomous driving demands extremely high data rates which can only be provided at mmWave frequen- cies. To successfully overcome mmWave challenges, a closely integrated, skilled and multi-disciplinary team is needed to co-create innovative technology and applications. The ETN for MIllimeter-wave NeTworking and Sensing for Beyond 5G (MINTS) offers the first training program on mmWave networks that covers the full stack from physical layer to application.
More info

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No.101017109.

DAEMON

(Network intelligence for aDAptive and sElf-Learning MObile Networks)

Funded by: European Union H2020-ICT-2020-2 (Information and Communication Technology)
Duration: January 2021 to March 2024

The success of Beyond 5G (B5G) systems will largely depend on the quality of the Network Intelligence (NI) that will fully automate network management. Artificial Intelligence (AI) models are commonly regarded as the cornerstone for NI design; indeed, AI models have proven extremely successful at solving hard problems that require inferring complex relationships from entangled and massive (e.g., traffic) data. However, AI is not the best solution for every NI task; and, when it is, the dominating trend of plugging 'vanilla' AI into network controllers and orchestrators is not a sensible choice.

Departing from the current hype around AI, DAEMON will set forth a pragmatic approach to NI design. The project will carry out a systematic analysis of which NI tasks are appropriately solved with AI models, providing a solid set of guidelines for the use of machine learning in network functions. For those problems where AI is a suitable tool, DAEMON will design tailored AI models that respond to the specific needs of network functions, taking advantage of the most recent advances in machine learning. Building on these models, DAEMON will design an end-to-end NI-native architecture for B5G that fully coordinates NI-assisted functionalities.

The advances to NI devised by DAEMON will be applied in practical network settings to: (i) deliver extremely high performance while making an efficient use of the underlying radio and computational resources; (ii) reduce the energy footprint of mobile networks; and (iii) provide extremely high reliability beyond that of 5G systems. To achieve this, DAEMON will design practical algorithms for eight concrete NI-assisted functionalities, carefully selected to achieve the objectives above. The performance of the DAEMON algorithms will be evaluated in real-world conditions via four experimental sites, and at scale with data-driven approaches based on two nationwide traffic measurement datasets, against nine ambitious yet feasible KPI targets.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No.101017109.
More info

ENLIGHT'EM

(European Training Network in Low-energy Visible Light IoT Systems)

Funded by: European Union H2020-MSCA-ITN-2018 (Marie Skłodowska-Curie Innovative Training Networks) Grant
Duration: June 2019 to December 2023

An Innovative Training Networks (ITN) project, type which aims to train a new generation of creative, entrepreneurial and innovative early-stage researchers, able to face current and future challenges and to convert knowledge and ideas into products and services for economic and social benefit. Light Emitting Diodes (LEDs) are driving a revolution in lighting systems (superior energy efficiency), and are already entering the Internet of Things (IoT) market with embedded sensory functionalities. By bringing connectivity to every LED bulb, Visible Light Communication (VLC) offers the opportunity to write the next chapter of the LED revolution with the language of ubiquitous networks VLC systems for the IoT to design and demonstrate sustainable networking solutions. ENLIGHT'EM will train a new generation of innovators and provide them with the know-how to contribute to the development of the IoT in the world of 5G and beyond.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Marie Sklodowska-Curie grant agreement No.814215.
More info

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Marie Sklodowska-Curie grant agreement No.814215.

DISCOLEDGER

(DiStributed COmputation by LEarning from Data and Gathering Edge-Cloud Resources)

Funded by: Spanish Ministry of Science and Innovation (MICINN) and the European Union through the Next GenerationEU / PRTR program (Proof-of-Concept call 2021)
Duration: December 2021 to November 2023

Funded by the European Union
NextGenerationEU

In DiscoLedger, we build on top of the results of the DiscoEdge project. There, we have studied how to share resources in today's mobile networks that are populated by all sorts of devices that offer ubiquitous sensing capabilities and disparate categories of online services to mobile users, as well as a wealth of processing power, inexpensive storage and a wide range of computational and networking resources. In contrast with the traditional Cloud computing model in which the vast majority of online services and applications offload computationally expensive tasks to centralised and large-scale Cloud infrastructure services, we have shown the convenience of relying on network, storage and computational resources available in the proximity of users, i.e., in the Edge. These novel paradigms can effectively leverage an ecosystem of resources distributed all over the communication devices at the edge of the network (e.g., base stations and MEC hosts) and in the user devices (e.g., smartphones and IoT devices). In that context, we also explored economic and sociological challenges to guarantee user trust, fairness and security when accessing resources from third-party services.

How to concretely use Cloud/Edge resources efficiently within a communication network framework represents the next challenge. Indeed, little has been said about how to deploy, access and manage such resources in operational scenarios where the complexity of network, storage and computer systems imposes many operational and functional constraints. In addition, with the advent of machine learning, the need to integrate resource management interfaces and automatic intelligent decision processes has become of paramount importance and promises to offer novel classes of solutions to the resource efficiency problem. A major problem of applying machine learning to Cloud/Edge networked environments is that making and enforcing decisions automatically needs to be tracked and logs need to be secured. The rationale is twofold: (i) provisioning online services needs to be monitored towards the need of maintaining the service level high, according to service-level agreements, and (ii) the legal and economic responsibility of users, network and service operators needs to be determined in case of disputes, which might be cumbersome in case of applying machine learning decision making algorithms. Therefore, proposing the DiscoLedger project, we have identified the need of making the use of Cloud/Edge resources traceable and auditable in a framework in which the different players are not necessarily trustable. The deployment of distributed ledger technologies will be therefore explored. In particular, we consider that lightweight ledgers need to be provided in the Cloud/Edge as virtual network functions, which we call microledgers.

Specifically, in DiscoLedger, we will tackle both efficiency and traceability/auditability of services in the Cloud/Edge in a cellular network context, with network slicing features. To do so, we will evolve the results of DiscoEdge and build a proof of concept on (a) scaling/migrating online services in the Cloud/Edge by means of self-tuning and possibly interpretable machine learning algorithms and (b) embedding distributed ledgers technologies in the architecture, in the form of microledgers, with the associated support for their virtualization and management through intelligent algorithms.

More info

MAESTRO

(Novel machine learning techniques to improve the forecasting of stroke post-interventive outcomes)

Funded by: European Commission, H2020 MSCA Individual Fellowship – Global Fellowship 2020

Duration: March 2022 to July 2023

Strokes are acute medical conditions in which poor blood flow to a part of the brain results in neuronal death. According to the stroke alliance for Europe (SAFE), there were over 600,000 strokes in the EU in 2015. The same study indicates that strokes, as well as their associated medical costs, will significantly increase in the future. Without action, this will immensely exacerbate an existing problem. Worldwide, stroke is the second most common cause of death, and the leading cause of physical disability.

There are long-term risks associated with stroke: Inability to move, or feel, one side of the body, problems in verbal expression, or loss of vision, among others. Two lines of action must be applied to minimize these long-term risks. Firstly, an urgent intervention in the first hours after the stroke is critical. Secondly, the continuous monitoring during the rehabilitation phase is also critical, to ensure a positive outcome and minimize risks. According to the same SAFE report, only 30% of the survivors receive unit care, and despite its importance, access to rehabilitation and long-term support is a known problem.

The goal of MAESTRO was to explore wearable sensors and deep learning technologies to improve the effectiveness of monitoring during the rehabilitation phase after stroke. The expected result of MAESTRO was an algorithm, combined with sensors, that predicts the response to rehabilitation of stroke patients. Its novelty lies in the use of deep learning techniques and off-the-shelf hardware to predict rehabilitation effectiveness and monitor patient adherence.

The target of MAESTRO was to explore data acquisition and classification procedures and provide meaningful information that could then be sent to neurologists with minimal-to-no intervention on the part of the patient, and no direct intervention by the software developer. This will be used to predict post-stroke outcomes by using novel machine learning algorithms which allow a classification of patients based on their rehabilitation adherence and effectiveness.

In MAESTRO, we explored data sources and sensor methods to monitor stroke patients in order to improve quality of care and outcome prediction accuracy. To do so, we conducted a systematic review of methods and data sources in 3- and 6-month stroke outcome prediction based on the modified Rankin scale (mRS). We observed that free-text notes, processed through pretrained large language models such as ClinicalBERT, show great

promise in improving outcome prediction quality with minimal invasiveness. We conducted an early study on the limitations of ClinicalBERT leveraging ICU notes from the publicly available MIMIC-III dataset and found key limitations that should be addressed in the future to make the output for this task clinically actionable. Separately, we acquired a corpus of actigraph data from stroke inpatients that were experiencing delirium. Using extreme gradient boosting classifiers and dynamic time warping, we observed an increase in delirium detection prediction accuracy compared to using other forms of clinical structured data exclusively.

The MAESTRO project has advanced beyond the state of the art in two key areas:

- Firstly, we have proven that actigraph sensors, combined with extreme gradient boosting classifiers and dynamic time warping combined with other signal preprocessing methods, significantly increases classification accuracy when monitoring delirium in stroke inpatients.

- Secondly, we have identified large language models (LLMs) as a key element of improving post-rehabilitative stroke outcome prediction.

These two advances show great promise to increase quality of care for stroke patients during both the acute and chronic phase of the disease. In the future, we will aim to train large language models across international datasets, leveraging methods such as federated learning and multilingual modeling, to produce highly functional LLMs that will enhance clinical decision support and reduce healthcare spending and documentation burden.
More info

ECID

(Edge Computing for Intelligent Driving)

Funded by: Spanish Ministry of Science and Innovation MICINN (2019 Call «Proyectos I+D+i», modality «Retos Investigación»)
Duration: June 2020 to May 2023

Assisted driving encompasses a number of technical challenges, from requiring connectivity with ultra-high reliability and imperceptible delays, and disposing of powerful and flexible (migrable) storage and computing engines for coordinated and distributed road traffic control, to imposing legal privacy-preserving attributes and the possibility of logging traffic events and assisted driving decisions in an auditable way (for instance, in case of legal disputes upon traffic accidents). Considering the complexity of making assisted driving control decisions for several coordinated players, and the need to actuate them at sub-second timescales, ECID proposes to leverage on edge/cloud computing and artificial

intelligence spread and federated in the context of wireless access network infrastructures, and will develop decentralized and secure architectures of distributed ledgers (offer the capability of logging events and the responsibility of actions in a trustworthy way and with minimum risk of malicious tampering).
More info

ODIO

(The Open Digital Identity Observatory)

Funded by: Spanish Ministry of Science and Innovation MICINN (2019 Call «Proyectos I+D+i», modality «Retos Investigación»)
Duration: June 2020 to May 2023

The ODIO coordinated project aims at addressing the challenge posed by the widespread access, dissemination and abuse of users' personal attributes and behavioral data in Internet services. The risks of such practices go beyond privacy issues and include identity theft, discrimination, fraud, extortion, and manipulation. The MOOSE subproject focuses on assessing the privacy and security risks associated to the use and abuse of end-users' digital identity in the web and mobile devices. The project aims to develop transparency tools to perform a multi-dimensional characterization of the online tracking industry present in these services, and the dynamics and relationships between companies for the creation and dissemination of user profiles and identities for advertising purposes and data brokerage.
More info

scientific activities

annual report 2023

www.networks.imdea.org

IMDEA Networks Institute monitors and evaluates its scientific results in order to obtain a sound appraisal of the degree of fulfillment of its strategy and objectives, optimizing the management of its resources and maximizing its impact. The pursuit of excellence is at the core of all of our activities.

5.1. Awards

5.1.1. Paper Awards

BEST PAPER AWARD
IEEE Global Communications Conference (December 2023)
Duschia Bodet, Phuc Dinh, Milica Stojanovic, Joerg Widmer, Dimitrios Koutsonikolas, Josep Miquel Jornet
Characterizing Sub-THz MIMO Channels in Practice: A Novel Channel Sounder with Absolute Time Reference

BEST PAPER AWARD
ACM MobiHoc 2023 (October 2023)
Kun Woo Cho, Marco Cominelli, Francesco Gringoli, Joerg Widmer, Kyle Jamieson
Scalable multi-modal learning for cross-link channel prediction in massive IoT networks

BEST PAPER RUNNER-UP AWARD
ACM WiNTECH 2023 (October 2023)
Pablo Fernández, Claudio Fiandrino, Joerg Widmer
Characterizing and Modeling Mobile Networks User Traffic at Millisecond Level

BEST POSTER AWARD
Summer School "Breaking the Bias: Inspire Diversity in R&I (July 2023)
Devriş Işler, Johanna Gunawan
Privacy Behaviors and Perceptions of LGBTQ+ Community in Turkey

BEST DEMO AWARD
IEEE NetSoft 2023 (June 2023)
Aristide Tanyi-Jong Akem, Beyza Bütün, Michele Gucciardo, Marco Fiore
Showcasing In-Switch Machine Learning Inference

BEST PAPER AWARD
IEEE Vehicular Networking Conference (VNC) 2023 (April 2023)
V. Cislaghi, C. Quadri, V. Mancuso, M. Ajmone Marsan
Simulation of Tele-Operated Driving over 5G Using CARLA and OMNeT++

5.1.2. Researcher Awards

MEDALS TO YOUNG RESEARCHERS" OF THE ROYAL ACADEMY OF ENGINEERING
Narseo Vallina Rodríguez (November 2023)
IMDEA Networks' Research Associate Professor has been honored with one of the prestigious "Medals to Young Researchers" awarded by the Royal Academy of Engineering, in recognition of his outstanding work as a Young Researcher in the 2023 edition.

5.1.3. R&D Awards

DISTINGUISHED REVIEWER AWARD

Narseo Vallina Rodríguez (August 2023)

Our Research Associate Professor Narseo Vallina-Rodríguez received the Distinguished Reviewer Award at USENIX Security'23 in recognition of the quality of his reviews.

EXCELLENCE IN REVIEWING AWARD

Guillermo Suárez-Tangil (August 2023)

Our Research Assistant Professor Guillermo Suárez-Tangil received the Excellence in Reviewing Award at KDD'2023 in recognition of the quality of his reviews.

DISTINGUISHED TPC MEMBER AWARD AT IEEE INFOCOM 2023

Sergey Gorinsky, Marco Fiore (March 2023)

IMDEA Networks Faculty Marco Fiore, and Sergey Gorinsky are among a select few of the TPC members whom the TPC chairs awarded as Distinguished Members of the committee. The TPC chairs recognized the Distinguished Members based upon ratings by peer TPC members, fairness in review scores, and promptness in meeting various deadlines during the review process.

5.2. Publications

IMDEA Networks presented its scientific work in various formats and venues during 2023. There were 118 publications, out of which 110 were peer reviewed. This is how they are structured:

1 Book chapter| 44 Journal Articles | 3 Magazine Articles | 55 Conference and Workshop Papers | 7 Conference and Workshop Posters & Demos | 2 Invited Papers, Keynotes, Invited Talks, Tutorials, Lectures, etc.

As well as the previous there were:

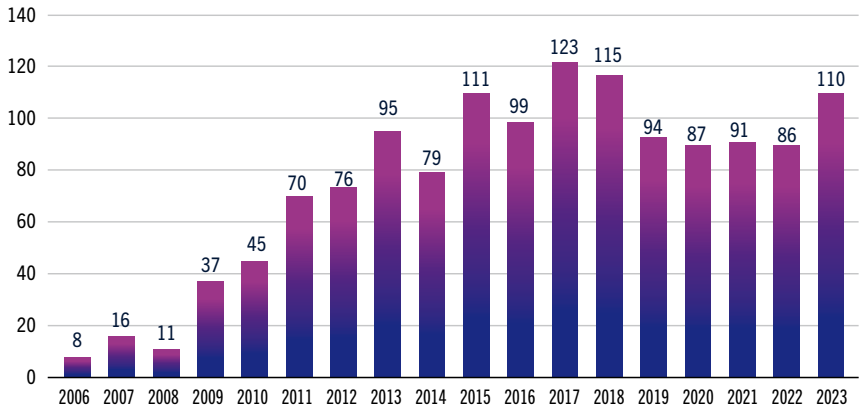
2 PhD Theses

According to **Google Scholar**, IMDEA Networks' researchers have received around **109.945 citations in total** along their research career, which corresponds to **an aggregated H-index of 143.**

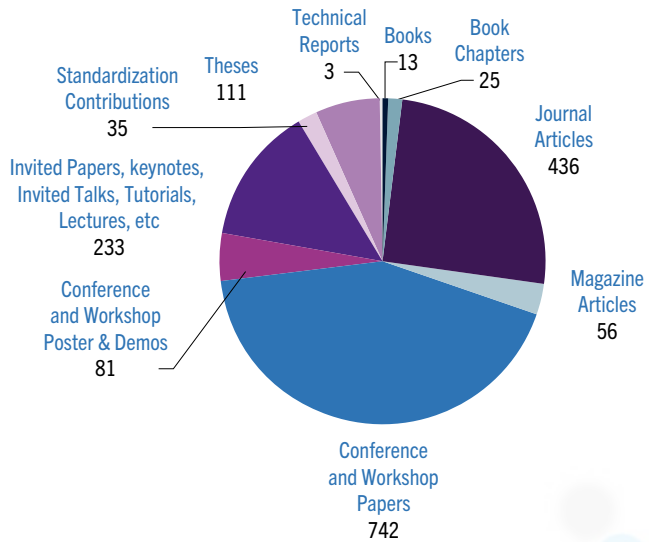
publications

2006-2023

number of publications (peer-reviewed)

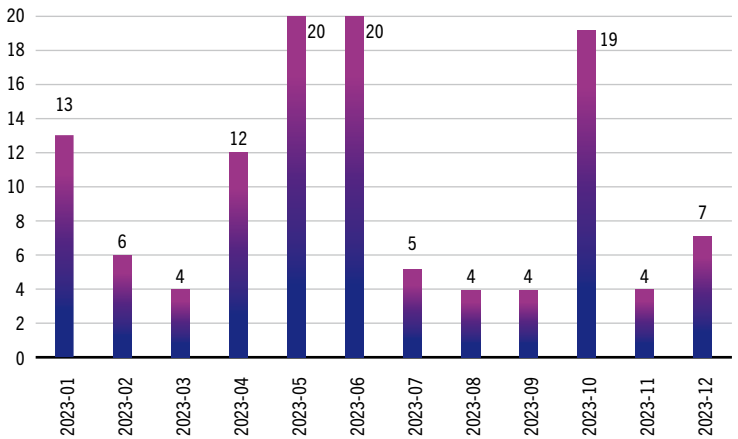


all publications by type



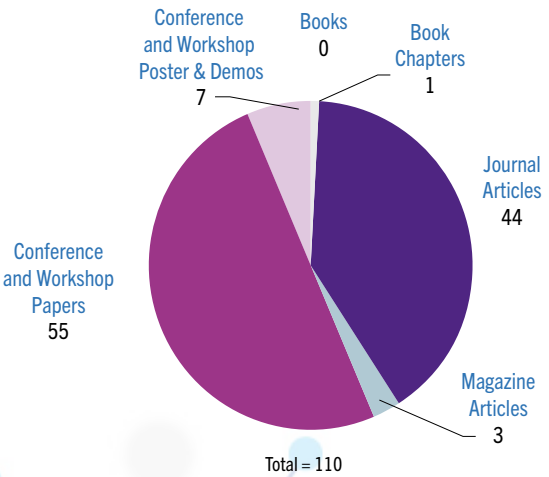
2023

total number of publications per month

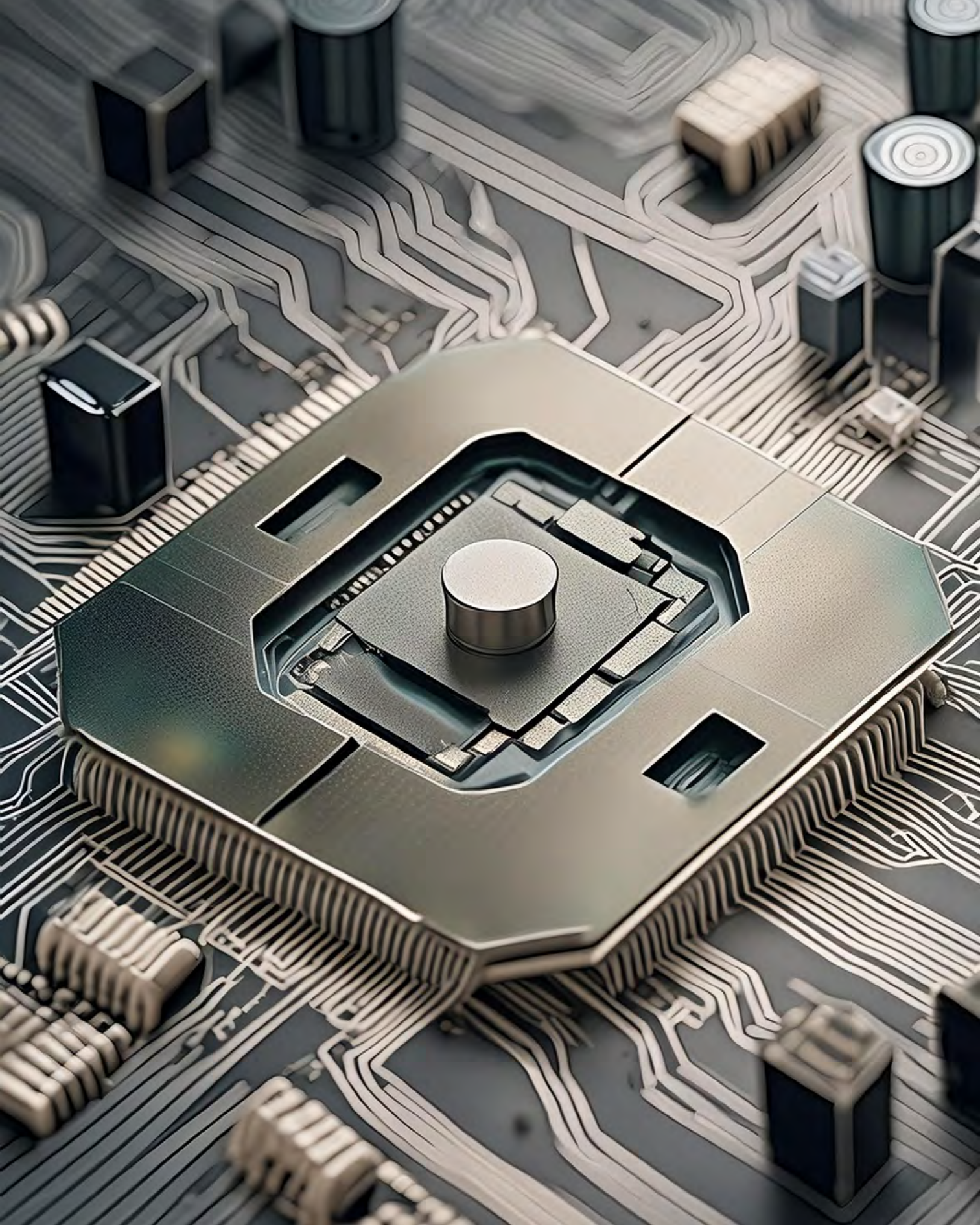


Total = 118

publications by type (peer reviewed)



Total = 110



Publications 2023

Book Chapters [1]

1. **Jose M. Alcaraz-Calero, Anttonen Antti, Marco Araújo, Raul Barbosa, Sokratis Barmpounakis, Sergio Barrachina-Muñoz, Riccardo Bassoli, Giacomo Bernini, Luis Blanco, Anne-Marie Bosneag, Ashima Chawla, Loizos Christofi, Dilin Dampahalage, Panagiotis Demestichas, Marten Ericson, Hamed Farhadi, Marco Fiore, Frank H.p. Fitzek, Hannu Flinck, João Fonseca, Martti Forsell, Victor Gabillon, Ginés García-Avilés, Andres Garcia-Saavedra, Marco Gramaglia, Bin Han, Mikko Honkala, Alexandre Kazmierowski, Charalambos Klitis, Dani Korpi, Slawomir Kuklinski, Ignacio Labrador Pavón, Vasiliki Lamprousi, Giada Landi, Haeyoung Lee, Xi Li, Josep Mangues-Bafalluy, Bahare Masood Khorsandi, Mattia Merluzzi, Jafar Mohammadi, Cédric Morin, José Antonio Ordoñez Lucena, Petteri Pöyhönen, Nuwanthika Rajapaksha, Premanandana Rajatheva, Farhad Rezazadeh, Roberto Riggio, Lucas Scheuvens, Merve Seimler, Janne Tuononen, Ricard Vilalta, Qi Wang, Stefan Wunderer, Lanfranco Zanzi, Engin Zeydan, Xun Zhang (January 2023)**
Towards Natively Intelligent Networks
NOW Publishers. ISBN: 978-1-63828-239-6.

Journal Articles [44]

1. **Muhammad Sarmad Mir, Borja Genovés Guzmán, Ambuj Varshney, Domenico Giustiniano (December 2023)**
LiFi for Low-Power and Long-Range RF Backscatter
IEEE Transactions on Networking. 10.1109/TNET.2023.3344316.

2. **Jesús Rufino, Juan Marcos Ramirez, Jose Aguilar, Carlos Baquero, Jaya Prakash Champati, Davide Frey, Rosa Elvira Lillo, Antonio Fernández Anta (December 2023)**
Performance and Explainability of Feature Selection-Boosted Tree-based Classifiers for COVID-19 Detection
Heliyon. 10.1016/j.heliyon.2023.e23219. Elsevier.

3. **Juan Lopera, Jose Aguilar (December 2023)**
Explainability Analysis in Predictive Models Based on Machine Learning Techniques on the Risk of Hospital Readmissions
Health and Technology. 10.1007/s12553-023-00794-8. Springer. ISSN: 2190-7196.

4. **Claudio Fiandrino, Leonardo Bonati, Salvatore D'oro, Michele Polese, Tommaso Melodia, Joerg Widmer (December 2023)**
EXPLORA: AI/ML EXPLainability for the Open RAN
ACM Networking. Volume 1, ACM.

5. **Leonardo Peroni, Sergey Gorinsky, Farzad Tashtarian, Christian Timmerer (December 2023)**
Empowerment of atypical viewers via low-effort personalized modeling of video streaming quality
Proceedings of the ACM on Networking. 10.1145/3629139. Volume 1, ACM. ISSN: 2834-5509.

6. **Vicent Cholvi, Antonio Fernández Anta, Chryssis Georgiou, Nicolas Nicolaou, Antonio Russo (December 2023)**
Atomic Appends in Asynchronous Byzantine Distributed Ledgers
Journal of Parallel and Distributed Computing. 10.1016/j.jpdc.2023.104748. Volume 182, Elsevier. ISSN: 0743-7315.

7. **William Hoyos, Jose Aguilar, Mayra Raciny, Mauricio Toro (November 2023)**
Case studies of clinical decision-making through prescriptive models based on machine learning
Computer Methods and Programs in Biomedicine. 10.1016/j.cmpb.2023.107829. Volume 242, Elsevier.

8. **Nikolaos Apostolakis, Marco Gramaglia, Livia Elena Chatzieleftheriou, Tejas Subramanya, Albert Banchs, Henning Sanneck (November 2023)**
ATHENA: Machine Learning and Reasoning for Radio Resources Scheduling in vRAN systems
IEEE Journal on Selected Areas in Communications. 10.1109/JSAC.2023.3336155.

9. **Margarita Capretto, Martín Ceresa, Antonio Fernández Anta, Antonio Russo, César Sánchez (October 2023)**
Improving Blockchain Scalability with the Setchain Data-type
Distributed Ledger Technologies: Research and Practice. 10.1145/3626963. ACM. ISSN: 2769-6472

10. **Yago Lizarribar, Domenico Giustiniano, Gerome Bovet, Vincent Lenders (October 2023)**
SkyPos: Real-world evaluation of self-positioning with aircraft signals for IoT devices
Journal on Selected Areas in Communications (JSAC). 10.1109/JSAC.2023.3322829. IEEE.

11. **Emanuele Parrinello, Antonio Bazco-Nogueras, Petros Elia (October 2023)**
Fundamental Limits of Topology-Aware Shared-Cache Networks
IEEE Transactions on Information Theory. 10.1109/TIT.2023.3321918. IEEE. ISSN: 1557-9654.

12. **Claudio Fiandrino, David Juarez Martinez-Villanueva, Joerg Widmer (September 2023)**
A Study on 5G Performance and Fast Conditional Handover for Public Transit Systems
Computer Communications. Elsevier.

13. **Benoit Matet, Angelo Furno, Marco Fiore, Etienne Côme, Latifa Oukhellou (September 2023)**
Adaptative generalisation over a value hierarchy for the k-anonymisation of Origin-Destination matrices
Transportation Research Part C: Emerging Technologies. Elsevier.

14. **Jesús Rufino, Juan Marcos Ramirez, Jose Aguilar, Carlos Baquero, Jaya Prakash Champati, Rosa Elvira Lillo, Antonio Fernández Anta (September 2023)**
Consistent Comparison of Symptom-based Methods for COVID-19 Infection Detection
International Journal of Medical Informatics. 10.1016/j.ijmedinf.2023.105133. Volume 177, Elsevier.

15. **Marco Fiore (September 2023)**
Full Network Sensing: Architecting 6G beyond Communications
IEEE Network. IEEE.

16. **Juan Salazar, Jose Aguilar, Julian Monsalve, Edwin Montoya (August 2023)**
A generic architecture of an affective recommender system for e-learning environments
Universal Access in the Information Society. 10.1007/s10209-023-01024-8. Springer. ISSN: 1615-5289.

17. **Jacopo Pegoraro, Jesus Omar Lacruz, Francesca Meneghello, Enver Bashirov, Michele Rossi, Joerg Widmer (July 2023)**
RAPID: Retrofitting IEEE 802.11ay Access Points for Indoor Human Detection and Sensing
IEEE Transactions on Mobile Computing. DOI 10.1109/TMC.2023.3291882. IEEE.

18. **Jesús Pérez-Valero, Albert Banchs, Pablo Serrano, Jorge Ortin, Jaime García-Reinoso, Xavier Costa-Perez (June 2023)**
Energy-Aware Adaptive Scaling of Server Farms for NFV with Reliability Requirements
IEEE Transactions on Mobile Computing. 10.1109/TMC.2023.3288604.

19. **William Hoyos, Jose Aguilar, Mauricio Toro (June 2023)**
PRV-FCM: An extension of fuzzy cognitive maps for prescriptive modeling
Expert Systems with Applications. 10.1016/j.eswa.2023.120729. Volume 231, Elsevier. ISSN: 0957-4174.

20. **Abdullah Ahmed, Augusto Garcia-Agundez, Ivana Petrovic, Fatemeh Radaei, James Fife, John Zhou, Hunter Karas, Scott Moody, Jonathan Drake, Richard N. Jones, Carsten Eickhoff, Michael E. Reznik (June 2023)**
Delirium detection using wearable sensors and machine learning in patients with intracerebral hemorrhage
Frontiers in Neurology. 10.3389/fneur.2023.1135472. Volume 14, June 2023

21. **Julien Gamba, Álvaro Feal, Eduardo Blázquez, Vinuri Bandara, Abbas Razaghpanah, Juan Tapiador, Narseo Vallina-Rodríguez (June 2023)**
Mules and Permission Laundering in Android: Dissecting Custom Permissios in the Wild
IEEE Transactions on Dependable and Secure Computing. 10.1109/TDSC.2023.3288981. IEEE.

22. **William Hoyos, Jose Aguilar, Toro Mauricio (May 2023)**
Federated learning approaches for fuzzy cognitive maps to support clinical decision-making in dengue
Engineering Applications of Artificial Intelligence. 10.1016/j.engappai.2023.106371. Volume 123, Elsevier. ISSN: 1873-6769.

23. **Andrea Fresa, Jaya Prakash Champati (April 2023)**
Offloading Algorithms for Maximizing Inference Accuracy on Edge Device in an Edge Intelligence System
IEEE Transactions on Parallel and Distributed Systems. 10.1109/TPDS.2023.3267458. Volume 34, IEEE. ISSN: 1045-9219.

24. **Edgar Arribas, Vicent Cholvi, Vincenzo Mancuso (April 2023)**
Optimizing UAV Resupply Scheduling for Heterogeneous and Persistent Aerial Service
IEEE Transactions on Robotics.

25. **Constantine Ayimba, Valerio Cislaghi, Christian Quadri, Paolo Casari, Vincenzo Mancuso (April 2023)**
Copy-CAV: V2X-Enabled wireless towing for emergency transport
Computer Communications. Elsevier.

26. **Marcel García, Jose Aguilar (April 2023)**
A Bio-inspired Emergent Control Approach for Distributed Processes
Applied Soft Computing. 10.1016/j.asoc.2023.110318. Elsevier. ISSN: 1568-4946.

27. **Sachit Mishra, Rajat Srivastava, Atta Muhammad, Amit Amit, Eliodoro Chiavazzo, Matteo Fasano, Pietro Asinari (April 2023)**
The impact of physicochemical features of carbon electrodes on the capacitive performance of supercapacitors: a machine learning approach
Nature (Scientific Reports). 10.1038/s41598-023-33524-1.

28. **Domenico Scotece, Claudio Fiandrino, Luca Foschini (April 2023)**
Handling Data Handoff of AI-based Applications in Edge Computing Systems
IEEE Transactions on Network and Service Management. 10.1109/TNSM.2023.3267942. ISSN: 1932-4537.

29. **Edgar Arribas, Vincenzo Mancuso, Vicent Cholvi (April 2023)**
Optimizing Fairness in Cellular Networks with Mobile Drone Relays
Computer Networks.

30. **Crisóstomo Barajas, Juan Marcos Ramirez, Jose Ignacio Martinez Torre, Henry Arguello (April 2023)**
Compressive Spectral Video Sensing Using the Convolutional Sparse Coding Framework CSC4D
Journal of Visual Communication and Image Representation. 10.1016/j.jvcir.2023.103782. Volume 92, Elsevier.

31. **Oluwasegun Ojo, Antonio Fernández Anta, Marc G. Genton, Rosa Elvira Lillo (March 2023)**
Multivariate Functional Outlier Detection using the FastMUOD Indices
Stat. 10.1002/sta4.567.

32. **Juan Viera, Jose Aguilar, Maria Rodríguez-Moreno, Carlos Quintero (March 2023)**
Analysis of the Behavior Pattern of Energy Consumption through Online Clustering Techniques
Energies. 10.3390/en16041649. Volume 16, ISSN: 1996-1073.

33. **Juan Marcos Ramirez, Fernando Díez, Pablo Rojo, Vincenzo Mancuso, Antonio Fernández Anta (February 2023)**
Explainable Machine Learning for Performance Anomaly Detection and Classification in Mobile Networks
Computer Communications. Elsevier.

34. **Cayetano Valero, Jaime Pérez, Sonia Solera-Cotanilla, Mario Vega-Barbas, Guillermo Suarez-Tangil, Manuel Alvarez-Campana, Gregorio López (February 2023)**
Analysis of security and data control in smart personal assistants from the user's perspective
Future Generation Computer Systems. 10.1016/j.future.2023.02.009.

35. **Panagiota Katsikouli, Diego Madariaga, Aline Viana, Alberto Tarable, Marco Fiore (February 2023)**
DuctiLoc: Energy-efficient Location Sampling with Configurable Accuracy
IEEE Access. 10.1109/ACCESS.2023.3243731. IEEE.

36. **Marcel García, Jose Aguilar, Maria Rodríguez-Moreno (February 2023)**
A Bioinspired Emergent Control for Smart Grids
IEEE Access. 10.1109/ACCESS.2023.3238572. Volume 11, IEEE Society. ISSN: 2169-3536.

37. **Yijing Zeng, Roberto Calvo-Palomino, Domenico Giustiniano, Gerome Bovet, Suman Banerjee (January 2023)**
Adaptive Uplink Data Compression in Spectrum Crowdsensing Systems
IEEE/ACM Transactions on Networking. 10.1109/TNET.2023.3239378. ISSN: 1063-6692.

38. **Gabriel O. Ferreira, Chiara Ravazzi, Fabrizio Dabbene, Giuseppe C. Calafiore, Marco Fiore (January 2023)**
Forecasting Network Traffic: A Survey and Tutorial with Open-Source Comparative Evaluation
IEEE Access. 10.1109/ACCESS.2023.3236261. Volume 11, IEEE. ISSN: 2169-3536.

39. **Kaspar Hageman, Álvaro Feal, Julien Gamba, Aniketh Girish, Jakob Bleier, Martina Lindorfer, Juan Tapiador, Narseo Vallina-Rodríguez (January 2023)**
Mixed Signals: Analyzing Software Attribution Challenges in the Android Ecosystem
IEEE Transactions on Software Engineering.

40. **Javier Carrillo-Mondejar, José Roldán-Gómez, Juan Manuel Castelo Gómez, Sergio Ruiz Villafranca, Guillermo Suarez-Tangil (January 2023)**
Stories from a Customized Honeypot for the IoT
Journal of Information Technology.

41. **David Nevado-Catalán, Sergio Pastrana, Narseo Vallina-Rodríguez, Juan Tapiador (January 2023)**
An analysis of fake social media engagement services
Computers & Security. Volume 124, Elsevier.

42. **Jide Edu, Xavier Ferrer-Aran, Jose Such, Guillermo Suarez-Tangil (January 2023)**
SkillVet: Automated Traceability Analysis of Amazon Alexa Skills
IEEE Transactions on Dependable and Secure Computing. 10.1109/TDSC.2021.3129116. Volume 20, ISSN: 1941-0018.

43. **Rodrigo García, Jose Aguilar, Mauricio Toro, Nelson Pérez, Angel Pinto, Paul Rodríguez (January 2023)**
Autonomic Computing in a Beef-Production Process for Precision Livestock Farming
Journal of Industrial Information Integration. 10.1016/j.jii.2022.100425. Volume 31, Elsevier.

44. **Jesús Rufino, Carlos Baquero, Davide Frey, Christin Glorioso, Antonio Ortega, Nina Reščič, Julian C Roberts, Rosa Elvira Lillo, Raquel Menezes, Jaya Prakash Champati, Antonio Fernández Anta (January 2023)**
Using Survey Data to Estimate the Impact of the Omicron Variant on Vaccine Efficacy against COVID-19 Infection
Scientific Reports. DOI: 10.1038/s41598-023-27951-3. Springer Nature. ISSN: 2045-2322.

Magazine Articles [3]

1. Borja Genovés Guzmán, Muhammad Sarmad Mir, Dayrene Frómeta, Ander Galisteo, Qing Wang, Domenico Giustiniano (May 2023)
Prototyping Visible Light Communication for the Internet of Things Using OpenVLC
IEEE Communications Magazine. IEEE.

2. Nikolaos Apostolakis, Livia Elena Chatzieleftheriou, Dario Bega, Marco Gramaglia, Albert Banchs (May 2023)
Digital Twins for Next-Generation Mobile Networks: Applications and Solutions
IEEE Communications Magazine. 10.1109/MCOM.001.2200854. IEEE. ISSN: 1558-1896.

3. Borja Genovés Guzmán, Javier Talavante, Dayrene Frómeta, Muhammad Sarmad Mir, Domenico Giustiniano, Katia Obraczka, Michael E. Loik, Sylvie Childress, Darryl G. Wong (May 2023)
Towards sustainable greenhouses using battery-free LiFi-enabled Internet of Things
IEEE Communications Magazine. 10.1109/MCOM.001.2200489. IEEE.

Conference and Workshop Papers [55]

1. Duschia Bodet, Phuc Dinh, Milica Stojanovic, Joerg Widmer, Dimitrios Koutsonikolas, Josep Jornet (December 2023)
Characterizing sub-THz MIMO channels in practice: a novel channel sounder with absolute time reference
IEEE Global Communications Conference. Kuala Lumpur, Malaysia.

2. Marco Canil, Jacopo Pegoraro, Jesus Omar Lacruz, Marco Mezzavilla, Michele Rossi, Joerg Widmer, Sundeep Rangan (November 2023)
An Experimental Prototype for Multistatic Asynchronous ISAC
mmWave '23: Proceedings of the First ACM Workshop on mmWave Sensing Systems and Applications. Istambul, Turkey.

3. Jairo Fuentes, Jose Aguilar, William Hoyos, Edwin Montoya (October 2023)
Evaluation of the Level of Digital Transformation in MSMEs Using Fuzzy Cognitive Maps Based on Experts
Latin American Computer Conference. La Paz, Bolivia.

4. Francesco Spinelli, Antonio Bazco-Nogueras, Vincenzo Mancuso (October 2023)
Offloading Augmented Reality Tasks with Smart Energy Source-Aware Algorithms at the Edge
ACM/IEEE International Conference on Modelling, Analysis and Simulation of Wireless and Mobile Systems. Montreal, Canada.

5. Nina Grosheva, Rizqi Hersyandika, Joerg Widmer, Sofie Pollin (October 2023)
In-band multi-connectivity with local beamtraining for improving mmWave network resilience
ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems. Montreal, Canada.

6. Vahid Ghafouri, Vibhor Agarwal, Yong Zhang, Nishanth Sastry, Jose Such, Guillermo Suarez-Tangil (October 2023)
AI in the Gray: Exploring Moderation Policies in Dialogic Large Language Models vs. Human Answers in Controversial Topics
ACM International Conference on Information and Knowledge Management. Birmingham, UK.

7. Aniketh Girish, Tianrui Hu, Vijay Prakash, Daniel J. Dubois, Srdjan Matic, Danny Yuxing Huang, Serge Egelman, Joel Reardon, Juan Tapiador, David Choffnes, Narseo Vallina-Rodríguez (October 2023)
In the Room Where It Happens: Characterizing Local Communication and Threats in Smart Homes
Internet Measurement Conference. Montreal, Canada.

8. **Stefanos Bakirtzis, André Felipe Zanella, Stefania Rubrichi, Cezary Ziemlicki, Zbigniew Smoreda, Ian Wassell, Jie Zhang, Marco Fiore (October 2023)**
Characterizing Mobile Service Demands at Indoor Cellular Networks
Internet Measurement Conference. Montreal, QC, Canada.

9. **André Felipe Zanella, Antonio Bazco-Nogueras, Cezary Ziemlicki, Marco Fiore (October 2023)**
Characterizing and Modeling Session-Level Mobile Traffic Demands from Large-Scale Measurements
Internet Measurement Conference. Montreal, QC, Canada.

10. **Kun Woo Cho, Marco Cominelli, Francesco Gringoli, Joerg Widmer, Kyle Jamieson (October 2023)**
Scalable multi-modal learning for cross-link channel prediction in massive IoT networks
ACM International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing. Washington DC, USA.

11. **Sergi Alcalá-Marín, Antonio Bazco-Nogueras, Albert Banchs, Marco Fiore (October 2023)**
kaNSaaS: Combining Deep Learning and Optimization for Practical Overbooking of Network Slices
ACM International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing. Washington D.C, USA.

12. **Pablo Picazo, Milan Groshev, Alejandro Blanco, Claudio Fiandrino, Antonio De La Oliva, Joerg Widmer (October 2023)**
waveSLAM: Empowering accurate indoor mapping using off-the-shelf millimeter-wave self-sensing
IEEE Vehicular Technology Conference. Hong Kong, China.

13. **Dayrene Frómeta, Borja Genovés Guzmán, Domenico Giustiniano, Joerg Widmer (October 2023)**
A System Architecture for Battery-free IoT Networks
IEEE International Conference on Network Protocols. Reykjavik, Iceland.

14. **Pablo Férnandez Pérez, Claudio Fiandrino, Joerg Widmer (October 2023)**
Characterizing and Modeling Mobile Networks User Traffic at Millisecond Level
ACM Workshop on Wireless Network Testbeds, Experimental evaluation & Characterization (WiNTECH), co-located with ACM MobiCom. Madrid, Spain.

15. **Mohammad Mazaheri, Rafael Ruiz, Domenico Giustiniano, Joerg Widmer, Omid Abari (October 2023)**
Bringing millimeter wave technology to any IoT device
ACM International Conference on Mobile Computing and Networking. Madrid, Spain.

16. **Muhammad Sarmad Mir, Minhao Cui, Borja Genovés Guzmán, Qing Wang, Jie Xiong, Domenico Giustiniano (October 2023)**
LeakageScatter: Backscattering LiFi-leaked RF Signals
International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing. Washington, USA.

17. **Ahmad Khalil, Aidmar Wainakh, Ephraim Zimmer, Javier Parra-Arnau, Antonio Fernández Anta, Tobias Meuser, Ralf Steinmetz (September 2023)**
Label-Aware Aggregation for Improved Federated Learning
IEEE International Conference on Fog and Mobile Edge Computing. Tartu, Estonia.

18. **Allan Lyons, Julien Gamba, Austin Shawaga, Joel Reardon, Juan Tapiador, Serge Egelman, Narseo Vallina-Rodríguez (August 2023)**
Log: It's Big, It's Heavy, It's Filled with Personal Data! Measuring the Logging of Sensitive Information in the Android Ecosystem
Usenix Security Symposium. Anaheim, CA, USA.

19. **Mary Bispham, Suliman Kalim Sattar, Clara Zard, Xavier Ferrer-Aran, Jide Edu, Guillermo Suarez-Tangil, Jose Such (July 2023)**
Misinformation in third-party voice applications International Conference on Conversational User Interfaces. Eindhoven, The Netherlands.

20. **Jose Miguel Moreno, Juan Tapiador, Narseo Vallina-Rodríguez (July 2023)**
Chrowned by an Extension: Abusing the Chrome DevTools Protocol through the Debugger API
10.48550/arXiv.2305.11506. IEEE European Symposium on Security and Privacy. Delft, Netherlands.

21. **Amogh Pradeep, Álvaro Feal, Julien Gamba, Ashwin Rao, Martina Lindorfer, Narseo Vallina-Rodríguez, David Choffnes (July 2023)**
Not Your Average App: A Large-scale Privacy Analysis of Android Browsers
Privacy Enhancing Technologies Symposium (was International Workshop of Privacy Enhancing Technologies). Laussane, Switzerland.

22. **Beyza Bütün, Aristide Tanyi Jong Akem, Michele Gucciardo, Marco Fiore (June 2023)**
Fast Detection of Cyberattacks on the Metaverse through User-plane Inference
International Conference on Metaverse Computing, Networking and Applications. Kyoto, Japan.

23. **Francesca Meneghello, Alejandro Blanco, Antonio Cusano, Joerg Widmer, Michele Rossi (June 2023)**
Wi-Fi Multi-Path Parameter Estimation for Sub-7 GHz Sensing: A Comparative Study
IEEE International Conference on Wireless and Mobile Computing, Networking and Communications. Montreal, Canada.

24. **Ghina Al Atat, Andrea Fresa, Adarsh Prasad Behera, Vishnu Narayanan Moothedath, James Gross, Jaya Prakash Champati (June 2023)**
The Case for Hierarchical Deep Learning Inference at the Network Edge
NetAISys '23: Proceedings of the 1st International Workshop on Networked AI Systems. Helsinki, Finland.

25. **Tsvetomir Hristov, Devriş Işler, Nikolaos Laoutaris, Zekeriya Erkin (June 2023)**
Graph Database Watermarking Using Pseudo-Nodes
ACM Data Economy Workshop (DEC), co-located with ACM SIGCMOD 2023. Seattle, WA, USA.

26. **Palle Maesen, Devriş Işler, Nikolaos Laoutaris, Zekeriya Erkin**
Image Watermarking for Machine Learning Datasets
ACM Data Economy Workshop (DEC), co-located with ACM SIGCMOD 2023. Seattle, WA, USA. June 2023

27. **Leonardo Badia, Vincenzo Mancuso, Marco Ajmone Marsan (June 2023)**
Adversarial Obstruction of Millimeter Wave Links
Mediterranean Communication and Computer Networking Conference. Ponza, Italy.

28. **Vincenzo Mancuso, Leonardo Badia, Paolo Castagno, Matteo Sereno, Marco Ajmone Marsan (June 2023)**
Efficiency of Distributed Selection of Edge or Cloud Servers Under Latency Constraints
Mediterranean Communication and Computer Networking Conference. Ponza, Italy.

29. **Javier Talavante, Borja Genovés Guzmán, Domenico Giustiniano (June 2023)**
Rethinking LiFi for Carbon Neutral Sunlight-based Communication
Mediterranean Communication and Computer Networking Conference. Ponza, Italy.

30. **Iqbal Waleed, Vahid Ghafouri, Gareth Tyson, Guillermo Suarez-Tangil, Ignacio Castro (June 2023)**
Lady and the Tramp Nextdoor: Online Manifestations of Real-World Inequalities in the Nextdoor Social Network
International Conference on Web and Social Media.

31. **Livia Elena Chatzieleftheriou, Marco Gramaglia, Miguel Camelo, Andres Garcia-Saavedra, Evangelos Kosmatos, Michele Gucciardo, Paola Soto, George Iosifidis, Lidia Fuentes, Ginés García, Andra Lutu, Gabriele Baldoni, Marco Fiore (June 2023)**
Orchestration Procedures for the Network Intelligence Stratum in 6G Networks
2023 EuCNC & 6G Summit. Gothenburg, Sweden.

32. **Jose Miguel Moreno, Srdjan Matic, Narseo Vallina-Rodríguez, Juan Tapiador (June 2023)**
Your Code is 0000: An Analysis of the Disposable Phone Numbers Ecosystem
Network Traffic Measurement and Analysis Conference. Naples, Italy.

33. **Ivan Palamà, Giuseppe Santaromita, Yago Lizarribar, Lorenzo Maria Monteforte, Stefania Bartoletti, Domenico Giustiniano, Giuseppe Bianchi, Nicola Blefari Melazzi (June 2023)**
From Experiments to Insights: A Journey in 5G New Radio Localization
Mediterranean Communication and Computer Networking Conference. Ponza, Italy.

34. **Nina Grosheva, Sai Pavan Deram, Jesus Omar Lacruz, Joerg Widmer (June 2023)**
SIGNiPHY: Reconciling Random Access with Directional Reception for Efficient mmWave WLANs
ACM SIGMOBILE International Conference on Mobile Systems, Applications and Services. Helsinki, Finland.

35. **Vincenzo Mancuso, Paolo Castagno, Matteo Sereno, Marco Ajmone Marsan (June 2023)**
Equalizing Access to Latency-Critical Services Based on In-Network Computing
IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks. Boston, Massachusetts.

36. **Waleed Iqbal, Vahid Ghafouri, Gareth Tyson, Guillermo Suarez-Tangil, Ignacio Castro (June 2023)**
Lady and the Tramp Nextdoor: Online Manifestations of Real-World Inequalities in the Nextdoor Social Network
International Conference on Web and Social Media.

37. **Giovanni Luca Martena, Janis Sperga, Dayrene Frómeta, Rui Bian, Borja Genovés Guzmán, Mohamed Sufyan Islim, John Kosman, Harald Haas (May 2023)**
A Simulation Tool for Interference Analysis in MIMO Wavelength Division LiFi Indoor Networks
IEEE International Conference on Communications - Workshop on Industrial Private 5G-and-beyond Wireless Network. Rome, Italy.

38. **Orlando E. Martínez-Durive, Sachit Mishra, Cezary Ziemlicki, Stefania Rubrichi, Zbigniew Smoreda, Marco Fiore (May 2023)**
France Through the Lens of Mobile Traffic Data
IEEE Network Traffic Measurement and Analysis Conference. Naples, Italy.

39. **Alessio Scalingi, Domenico Giustiniano, Roberto Calvo-Palomino, Nikolaos Apostolakis, Gerome Bovet (May 2023)**
A Framework for Wireless Technology Classification using Crowdsensing Platforms
IEEE International Conference on Computer Communications. New York, United States.

40. **Dolores Garcia Marti, Rafael Ruiz, Jesus Omar Lacruz, Joerg Widmer (May 2023)**
High-speed Machine Learning-enhanced Receiver for Millimeter-Wave Systems
IEEE International Conference on Computer Communications. New York, United States.

41. **Jayaram Raghuram, Yijing Zeng, Dolores Garcia Marti, Rafael Ruiz, Somesh Jha, Joerg Widmer, Suman Banerjee (May 2023)**
Few-Shot Domain Adaptation for End-to-End Communication
International Conference on Learning Representations. Kigali, Rwanda.

42. **Dolores Garcia Marti, Rafael Ruiz, Jesús Omar Lacruz, Joerg Widmer (May 2023)**
High-speed Machine Learning-enhanced Receiver for Millimeter-Wave Systems
IEEE International Conference on Computer Communications. New York, United States.

43. **Aristide Tanyi Jong Akem, Michele Gucciardo, Marco Fiore (May 2023)**
Flowrest: Practical Flow-Level Inference in Programmable Switches with Random Forests
IEEE International Conference on Computer Communications. New York, United States.

44. **Alan Collet, Antonio Bazco-Nogueras, Albert Banchs, Marco Fiore (May 2023)**
AutoManager: a Meta-Learning Model for Network Management from Intertwined Forecasts
IEEE International Conference on Computer Communications. New York, United States.

45. **Gianluca Rizzo, Noelia Pérez Palma, Marco Ajmone Marsan, Vincenzo Mancuso (May 2023)**
On the Limit Performance of Floating Gossip
IEEE International Conference on Computer Communications. New York, United States.

46. **Serly Moghadas Gholian, Claudio Fiandrino, Alan Collet, Giulia Attanasio, Marco Fiore, Joerg Widmer (May 2023)**
Spotting Deep Neural Network Vulnerabilities in Mobile Traffic Forecasting with an Explainable AI Lens
IEEE International Conference on Computer Communications. New York, United States.

47. **Syed Waqas Haider Shah, Sai Pavan Deram, Joerg Widmer (May 2023)**
On the Effective Capacity of RIS-enabled mmWave Networks with Outdated CSI
IEEE International Conference on Computer Communications. New York, United States.

48. **Pelayo Vallina, Ignacio Castro, Gareth Tyson (April 2023)**
Cashing in on Contacts: Characterizing the OnlyFans Ecosystem
International World Wide Web Conference. Austin, Texas, USA.

49. **Santiago Andrés, Costas Iordanou, Nikolaos Laoutaris (April 2023)**
Understanding the Price of Data in Commercial Data Marketplaces
IEEE International Conference on Data Engineering. Los Angeles, California, USA.

50. **Valerio Cislaghi, Christian Quadri, Vincenzo Mancuso, Marco Ajmone Marsan (April 2023)**
Simulation of Tele-Operated Driving over 5G Using CARLA and OMNeT++
IEEE Vehicular Networking Conference. Istanbul, Turkey.

51. **Mohammad Asif Habibi, Adrián Gallego Sánchez, Ignacio Labrador Pavón, Bin Han, Giada Landi, Bessem Sayadi, Christos Ntogkas, Ioannis-Prodromos Belikaidis, Hans D Schotten, Pablo Serrano, Jesús Pérez-Valero, Antonio Virdis (March 2023)**
Enabling Network and Service Programmability in 6G Mobile Communication Systems
IEEE Future Networks World Forum.

52. **Tianyue Chu, Álvaro García-Recuero, Costas Iordanou, Georgios Smaragdakis, Nikolaos Laoutaris (February 2023)**
Securing Federated Sensitive Topic Classification against Poisoning Attacks
Usenix Network and Distributed System Security Symposium. San Diego, California.

53. **Muhammad Sarmad Mir, Wenqing Yan, Prabal Dutta, Domenico Giustiniano, Ambuj Varshney (February 2023)**
TunnelLiFi: Bringing LiFi to Commodity Internet of Things Devices
Workshop on Mobile Computing Systems and Applications. Orange County, California, USA.

54. **Dayrene Frómeta, Muhammad Sarmad Mir, Borja Genovés Guzmán, Domenico Giustiniano (January 2023)**
Visible Light or Infrared? Modulating LiFi for Dual Operation in the Visible and Infrared Spectra
IEEE Wireless On-demand Network Systems and Services. Madonna di Campiglio, Italy.

55. **Jesús Pérez-Valero, Antonio Virdis, Adrián Gallego Sánchez, Christos Ntogkas, Pablo Serrano, Giada Landi, Sławomir Kukliński, Céedric Morin, Ignacio Labrador Pavón, Bessem Sayadi (January 2023)**
AI-driven Orchestration for 6G Networking: the Hexa-X vision
IEEE Globecom Workshops (GC Wkshps). Rio de Janeiro, Brazil.

Conference and Workshop Posters & Demos [7]

1. **Adarsh Prasad Behera, Roberto Morabito, Joerg Widmer, Jaya Prakash Champati (October 2023)**
Improved Decision Module Selection for Hierarchical Inference in Resource-Constrained Edge Devices (Poster)
ACM International Conference on Mobile Computing and Networking. Madrid.

2. **Dayrene Frómeta, Muhammad Sarmad Mir, Borja Genovés Guzmán, Ambuj Varshney, Domenico Giustiniano (October 2023)**
PassiveLiFi Demonstration: Rethinking LiFi for Low-Power and Long-Range RF Backscatter (Demo)
ACM International Conference on Mobile Computing and Networking. Madrid, Spain.

3. **Juan Marcos Ramirez, Sergio Díaz Aranda, Jose Aguilar, Oluwasegun Ojo, Rosa Elvira Lillo, Antonio Fernández Anta (August 2023)**
A Snapshot of COVID-19 Incidence, Hospitalizations, and Mortality from Indirect Survey Data in China in January 2023 (Extended Abstract) (Poster)
epiDAMIK 6.0: The 6th International workshop on Epidemiology meets Data Mining and Knowledge discovery. Long Beach, California, United States.

4. **Jesús Rufino, Juan Marcos Ramirez, Jose Aguilar, Carlos Baquero, Jaya Prakash Champati, Davide Frey, Rosa Elvira Lillo, Antonio Fernández Anta (August 2023)**
Consistent Comparison of Symptom-based Methods for COVID-19 Infection Detection (Extended Abstract) (Poster)
epiDAMIK 6.0: The 6th International workshop on Epidemiology meets Data Mining and Knowledge discovery. Long Beach, California, United States.

5. **Aristide Tanyi Jong Akem, Beyza Bütün, Michele Gucciardo, Marco Fiore (June 2023)**
Showcasing In-Switch Machine Learning Inference (Demo)
IEEE International Conference on Network Softwarization. Madrid, Spain.

6. **Michele Gucciardo, Aristide Tanyi Jong Akem, Beyza Bütün, Marco Fiore (May 2023)**
Demonstrating Flow-Level In-Switch Inference (Demo)
IEEE International Conference on Computer Communications. New York, United States.

7. **Mohammad Asif Habibi, Adrián Gallego Sánchez, Ignacio Labrador Pavón, Bin Han, Pablo Serrano, Jesús Pérez-Valero, Antonio Virdis, Hans Dieter Schotten (May 2023)**
The Architectural Design of Service Management and Orchestration in 6G Communication Systems (Poster)
IEEE International Conference on Computer Communications. New York, United States.

Invited Papers, Keynotes, Invited Talks, Tutorials, Lectures, etc. [2]

1. **Antonio Bazco-Nogueras (November 2023)**
Hacia una red 5G/6G con inteligencia nativa: oportunidades e integración en los nuevos desarrollos de redes móviles (Keynote)
III Jornada 5G. Escuela Politécnica de Ingeniería de Gijón, Universidad de Oviedo.

2. **Livia Elena Chatzieleftheriou (May 2023)**
A Primer on Online Convex Optimization (Invited Talk)
Data-driven 5G RANs Summer School. IMDEA Networks Institute.

PhD Theses [2]

1. **Santiago ANDRÉS (May 2023)**
"Towards a Human-Centric Data Economy"
PhD thesis: Departmento de Ingeniería Telemática – Universidad Carlos III de Madrid, Spain
Director: Nikolaos Laoutaris, IMDEA Networks Institute, Madrid, Spain

2. **Pelayo VALLINA (January 2023)**
"Advanced Methods to Audit Online Web Services"
PhD thesis: Departamento de Ingeniería Telemática – Universidad Carlos III de Madrid, Spain
Director: Antonio Fernández Anta, IMDEA Networks Institute, Madrid, Spain

5.3. Scientific service

IMDEA Networks conducts its scientific activities with the final objective of ensuring the widest possible dissemination of the results of the work carried out by the Institute, both within the scientific community and towards the general public. Our scientific service includes participation by our researchers at different levels of involvement in leading conferences and journals in the field, R&D committees, standardization bodies, awards, publications, projects or sponsorships.

José AGUILAR

Professional posts and activities
- President: Centro Latino-Americano de Estudios en Informática (clei.org)
- Member of the Telecommunications and Informatics Commission, National Academy of Engineering and Habitat

Journal editorial boards
- CLEI Electronic Journal
- Revista Ciencia e Ingeniería
- International Journal of Advanced Information Science and Technology

Organization committees
- Chair of the Scientific Committee of the Conference on Advanced Computer Theory and Engineering (ICACTE 2023), 15-17 September 2023, Hefei, Anhui, China

TPC memberships
- Latin American Doctoral Thesis Competition
- IEEE International Conference on Fuzzy Systems, FUZZ-IEEE 2023, 13-17 August 2023, Songdo Incheon, Korea
- Latin American Computer Science Conference, 16-20 October 2023, La Paz, Bolivia

Marco AJMONE

Professional posts & activities

- Scientific Committee Member: LINCS - Paris, France
- Scientific Committee of the NetworkingChannel

Journal editorial boards

- Advisory Board member: Performance Evaluation Journal (Elsevier)
- Editorial Board member: The ACM Transactions on Modeling and Performance Evaluation of Computing Systems Journal (ACM ToMPECS)

Organization committees

- General Chair: IEEE International Conference on Communications (IEEE ICC 2023), 28 May – 1 June, Rome, Italy

TPC memberships

- IEEE International Conference on Network Protocols (IEEE ICNP 2024), 28-31 October 2024, Charleroi, Belgium
- IEEE Wireless Communications and Networking Conference (IEEE WCNC 2024), 21-24 April 2024, Conrad Hotel in Dubai, United Arab Emirates
- IEEE International Conference on Communications (IEEE ICC 2023), 28 May – 1 June, Rome, Italy
- IEEE Virtual Conference on Communications 2023 (IEEE VCC 2023), 28-30 November 2023, Virtual
- Mediterranean Communication and Computer Networking Conference (MedHocNet 2023), 13-15 June, Ponza Island, Italy

Constantine AYIMBA

TPC memberships

- IEEE International Conference on Sensing, Communication, and Networking (IEEE SECON 2023), 11-14 September 2023, Madrid, Spain

Albert BANCHS

TPC memberships

- IEEE International Conference on Computer Communications (IEEE INFOCOM 2023), 17-20 May, New York, USA
- IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM), 12-15 June 2023, Boston, Massachusetts, USA
- IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC), 5–8 September 2023, Toronto, ON, Canada

Antonio BAZCO-NOGUERAS

Professional posts & activities

- Invited Talk: “Hacia una red 5G/6G con inteligencia nativa: oportunidades e integración en los nuevos desarrollos de redes móviles”, at III Jornada 5G Universidad Oviedo, March 2023, Oviedo, Spain
- Seminar: “Hands on latency measurements and analysis”, at First International B5G Student Workshop, 3 July, Madrid, Spain
- Talk “¿Dónde vamos cuando estamos en la nube?”, at the Science and Innovation Week 2023, 14 November, Madrid, Spain

Organizing Committee

- EDAS, web and virtualization chair: 21st International Symposium on Modeling and Optimization in Mobile, Ad hoc, and Wireless Networks (WiOpt), 24-27 August 2023, Singapore
- Virtual Arrangement Chair: Passive and Active Measurement Conference (PAM), 21-23 March 2023, Madrid, Spain
- Local arrangement chair: 20th Annual IEEE International Conference on Sensing, Communication, and Networking (IEEE SECON), 11-14 September 2023, Madrid, Spain

TPC memberships

- International Workshop on Autonomous Network Management in 5G and Beyond Systems (ANMS 2023), May 2023, Miami, USA
- IEEE Virtual Conference on Communications, 28-30 November 2023, online

Jaya Prakash Varma CHAMPATI

Professional posts & activities

- Organization of IMDEA Networks Seminars (internal and external).

Organization committees

- TPC Co-Chair: Workshop on Trustworthy Edge Computing (TEC), organized in conjunction with ACM SEC 2023, 9 December 2023, Wilmington, DE, USA
- Organizing committee member: IEEE International Conference on Communication Systems & Networks (COMSNET), 3-8 January 2023 | Hybrid Conference Chancery Pavilion Hotel, Residency Road, Bengaluru, India

TPC memberships

- IEEE International Conference on Computer Communications (IEEE INFOCOM 2023), 17-20 May 2023, New York, USA
- IEEE International Workshop on Network Science for Quantum Communication Networks (NetSciQCom), organized in conjunction with IEEE INFOCOM, 17-20 May 2023, New York area, USA

- Workshop on Age of Information (AoI), in conjunction with IEEE INFOCOM 2023, 20 May 2023, Virtual
- IEEE International Conference on Communications (IEEE ICC 2023), 28 May - 1 June 2023, Rome, Italy
- IEEE National Conference on Communications (NCC), 23-26 February 2023, IIT Guwahati

Livia Elena CHATZIELEFTHERIOU

Professional posts and activities

- 2023-2024: Part-time lecturer, Dept. of Telecommunications Engineering at UC3M. "Networks Theory" (Undergraduate course).
- A Primer on Online Convex Optimization, Invited talk in the "Data-driven 5G RANs Summer School" – Madrid, May 2023.
- Day of Women and Girls in Science: Invited talk, aiming at inspiring new generations to build a more equitable society and reflect on the obstacles faced by women researchers in STEM – Madrid, February 2023.
- Postdoc Representative, IMDEA Networks, May 2023-present.

TPC memberships

- IEEE Virtual Conference on Communications, 28-30 November 2023, online.
- International Workshop on Autonomous Network Management in 5G and Beyond Systems (ANMS), 8 May 2023, Miami, FL, USA
- International Workshop on Autonomous Network Management in 5G and Beyond Systems (ANMS), 06-10 May 2024, Seoul, South Korea
- IEEE Wireless Communications and Networking Conference, 26-29 March 2023, Glasgow, Scotland, UK
- IEEE Wireless Communications and Networking Conference, 21-24 April 2024, Conrad Hotel in Dubai, United Arab Emirates

Antonio FERNÁNDEZ ANTA

Professional posts and activities

- External member of the committee for the definition of Grado en Matemática Aplicada, UC3M.
- Member of the International Advisory Board of the Byblos project (BeYond BLOckchainS, Modular Building Blocks for Large-Scale Trustless Multi-user Apps), funded by ANR, the French Research Funding Agency, since February 2021.
- Reviewer for the following journals: Theoretical Computer Science, BMJ Open, ACM Transactions on Parallel Computing.
- Evaluator for Chinese Academy of Sciences and Croucher Foundation
- Committee member for the PhD Theses of Javier Martin (U. Politécnica de Madrid) and Alexandre Rapetti (Aix-Marseille Université, France).
- Collaboration with Leganes Activo for article on AI. https://leganesactivo.com/2023/04/26/inteligencia- artificial-analizada-por-expertos/

- Co-founder of Dama Energy4All SL, a start-up whose objective is to increase accessibility to medium and small users to technology for sharing energy and reduce energy consumption.
- Mercator Fellow at Collaborative Research Centre MAKI, TU Darmstadt, Germany, since November 2018.
- PI and coordinator of the CoronaSurveys project, https://coronasurveys.org/, in which we are tracking the evolution of the COVID-19 pandemic in all the countries of the world using open surveys, open data, and data analytics. The project has more than 30 researchers from more than 10 countries and more than 200 collaborators.

Journal editorial boards

- Deputy Editor of The Computer Journal, Oxford Journals

Organization committees

- General co-Chair: 30th International Colloquium on Structural information and Communication Complexity, SIROCCO 2023, 6-9 June, 2023, Alcalá de Henares, Spain
- Chair: 1st QSpain Workshop, IMDEA Networks, 24 April, 2023
- Chair: EdgeData-CM Workshop on Distributed Systems, IMDEA Networks, 2-8 March 2023
- Chair: Final Workshop EdgeData-CM, IMDEA Networks, April 25, 2023

TPC memberships

- 13th International Symposium on Algorithms and Complexity (CIAC 2023), 14 – 16 June, 2023, Larnaca, Cyprus
- 37th IEEE International Parallel & Distributed Processing Symposium (IPDPS 23), 15-19 May 2023, St. Petersburg, Florida, USA
- 29th International European Conference on Parallel and Distributed Computing (Euro-Par 2023), 28 August – 1 September 2023, Limassol, Cyprus

Claudio FIANDRINO

Professional posts and activities

- Chair of the IEEE ComSoc EMEA Awards Committee 2023

Journal editorial boards

- IEEE Networking Letters

Organization committees

- TPC Co-Chair: IEEE ICC CQRM Symposium, June 2023, Rome, Italy

TPC memberships

- IEEE CCNC - AI/ML for Communication and Networking track, January 2023, Las Vegas, NV, USA
- IEEE Global Communications Conference (GLOBECOM) – Communication QoS, Reliability and Modeling Symposium (CQRM), December 2023, Kuala Lumpur, Malaysia
- IEEE International Conference on Communications (ICC) – Communication QoS, Reliability and Modeling Symposium (CQRM), 28 May – 1 June 2023, Rome, Italy

Marco FIORE

Professional posts & activities

- Co-founder and CTO at Net AI Tech Ltd
- PhD defense committees:
  - Emanuel Lima (reviewer), University of Porto, 2024
  - Raphael Azorin (reviewer), Institut EURECOM / Sorbonne Université, 2024
  - Karim Boutiba (reviewer), Institut EURECOM / Sorbonne Université, 2024
  - Andrea Monterubbiano (reviewer), Università di Roma La Sapienza, 2024
- Invited talk on "Natively integrating AI in mobile networks", IEEE WF-IoT, Communications and Networking Topical Track, October 2023, Aveiro, Portugal (virtual)
- Panel on "Will AI dominate solutions in the SECON area?", IEEE SECON, September 2023, Madrid, Spain

Journal editorial boards

- Area Editor, Elsevier Computer Networks
- Editor, IEEE Transactions on Wireless Communications

Organization committees

- Steering Committee member: ACM Wireless of the Students, by the Students, and for the Students (S3) Workshop
- General Chair: NetMob 2023, 4-6 October, Madrid, Spain
- General Chair: Passive and Active Measurement Conference (PAM) 2023, 21-23 March 2023, Virtual Conference

TPC memberships

- ACM Internet Measurement Conference 2024, 4-6 November 2024, Madid, Spain
- IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (IEEE WoWMoM 2024), 4-7 June 2024, Perth, Australia
- IEEE International Conference on Computer Communications (IEEE INFOCOM 2024), 20-23- May 2023, Vancouver, Canada
- IEEE Vehicular Networking Conference (VNC), 26-28 April 2023, Istanbul, Türkiye
- IEEE International Conference on Computer Communications (IEEE INFOCOM 2023), 17-20 May 2023, New York, USA
- IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (IEEE WoWMoM 2023), 12-15 June 2023, Boston, Massachusetts, USA
- IEEE/IFIP Networking Conference 2023, 12-15 June 2023, Barcelona, Spain
- IEEE International Conference on Sensing, Communication, and Networking (IEEE SECON 2023), 11-14 September 2023, Madrid, Spain

Domenico GIUSTINIANO

Organization committees

- General vice-chair: the 29th Annual International Conference On Mobile Computing And Networking (ACM Mobicom), 2-6 October 2023, Madrid, Spain

Journal editorial boards

- Editorial Board of Computer Networks (Elsevier) as Area Editor

TPC memberships

- IEEE International Conference on Computer Communications (IEEE INFOCOM 2024), 20-23- May 2023, Vancouver, Canada
- ACM Annual International Conference on Mobile Computing and Networking (ACM MOBICOM 2024), 18-22 November 2024, Washington D.C., USA

Michele GUCCIARDO

Journal editorial boards

- Reviewer: IEEE Transactions on Network and Service Management (TNSM).

Sergey GORINSKY

Professional posts & activities

- Networking and Communication Subcommittee Member: ACM/IEEE Computing Curricula Task Force

Journal editorial boards

- Editorial Board Member: ACM SIGCOMM Computer Communication Review

Organization committees

- Steering Committee Member: COMSNETS Association

TPC memberships

- IEEE International Conference on Computer Communications (IEEE INFOCOM 2024), 20-23- May 2023, Vancouver, Canada
- USENIX Symposium on Networked Systems Design and Implementation (NSDI 2024), 16-18 April 204, Santa Clara, CA, USA
- International Conference on Emerging Networking Experiments and Technologies (CoNEXT 2023), 5-8 December 2023, Paris, France
- Review Task Force: ACM Internet Measurement Conference 2023 (IMC 2023), 24-26 October 2023, Montreal, Canada
- Area chair: IEEE International Conference on Network Protocols (IEEE ICNP 2023), 10-13 October 2023, Reykjavik, Iceland

Nikolaos LAOUTARIS

Organization committees

- Workshop Chair: ACM Data Economy Workshop co-located with SIGMOD 2023, 18 June 2023, Seattle, WA, USA

Vincenzo MANCUSO

Professional posts & activities

- IEEE Senior Member
- ACM Member
- IFIP WG 7.3 Member

Organization committees

- General Chair: IEEE International Conference on Sensing, Communication, and Networking (IEEE SECON 2023), 11-14 September 2023, Madrid, Spain

TPC memberships

- Wireless On-demand Network systems and Services Conference (WONS 2024), 29-31 January 2024, Chamonix, France
- IEEE International Conference on Computer Communications (IEEE INFOCOM 2024), 20-23- May 2023, Vancouver, Canada
- IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (IEEE WoWMoM 2024), 4-7 June 2024, Perth, Australia
- IEEE Wireless Communications and Networking Conference (IEEE WCNC 2023), 26–29 March 2023, Glasgow, Scotland, UK
- International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (ACM MSWiM), 29 October – 2 November 2023, Montreal, Canada
- IFIP Networking 2023, 12-15 June 2023, Barcelona, Spain
- International Conference on Computer Communications and Networks (ICCCN 2023), 24 – 26 July, 2023, Waikiki Beach, Honolulu, HI, USA
- ACM Workshop on 5G and Beyond Network Measurements, Modeling, and Use Cases (5G-MeMU), co-located with SIGCOMM 2023, 10 September 2023, New York, USA

Marius PARASCHIV

Journal editorial boards

- Reviewer: QIP 2023 (26th Conference on Quantum Information Processing)

Organization committees

- Organization of the IMDEA Networks Annual Workshop

TPC memberships

- Network Science and Quantum Communications Workshop, co-located with IEEE INFOCOM 2023, 17-20 May 2023, New York, USA

Guillermo SUÁREZ-TANGIL

Professional posts & activities

- Reviewer of a project for AENOR and INCIBE in 2023
- My lab represented IMDEA Networks at the Madrid is Science Fair

TPC memberships

- International World Wide Web Conference (WWW'23), 30 April – 4 May 2023, Austin, Texas, USA
- Usenix Security Symposium, 9-11 August 2023, Anaheim, CA, USA
- Privacy Enhancing Technologies Symposium (PETS'23), 10-15 July 2023, Lausanne, Switzerland and Online
- IEEE European Symposium on Security and Privacy (IEEE EuroSP'23), 3-7 July 2023, Delft, Netherlands

Narseo VALLINA-RODRÍGUEZ

Professional posts & activities

- Advisory Board Member - AppCensus

Organization committees

- General Chair: ACM Internet Measurement Conference (ACM IMC 2024), 4-6 November 2024, 2024
- Organizer Dagstuhl Seminar: "EU Cyber Resilience Act: Socio-Technical and Research Challenges" (202306036)

TPC memberships

- Usenix Security Symposium, 9-11 August 2023, Anaheim, CA, USA
- IEEE European Symposium on Security and Privacy (IEEE Euro S&P), 3-7 July 2023, Delft, Netherlands
- IEEE European Symposium on Security and Privacy (IEEE Euro S&P), 8-12 July 2024, Vienna, Austria
- CNIL-INRIA Privacy Research Award 2023
- Jornadas Nacionales de Investigacion en Ciberseguridad (JNIC), 21-23 junio, Vigo, Spain

Joerg WIDMER

Professional posts & activities

- Chair of the Selection Committee of Postdoctoral positions within the YUFE alliance (Young Universities for the Future of Europe) co-funded by Horizon Europe's Marie Sklodowska-Curie, 2023
- Member of the IEEE Infocom Best Paper Award Committee, 2023
- Member of the Sigmobile Test-of-Time (ToT) award committee, 2023

Journal editorial boards

- Associate Editor: IEEE Transactions on Mobile Computing
- Editor: Computer Networks Journal (Elsevier)

Organization committees

- General co-chair: ACM Annual International Conference on Mobile Computing and Networking (ACM MOBICOM), 2-6 Oct 2023, Madrid, Spain
- Steering committee member: IEEE ICC Workshop on Synergies of communication, localization, and sensing towards 6G, since 2023

TPC memberships

- Area Chair: IEEE International Conference on Computer Communications (IEEE INFOCOM 2024), 20-23- May 2023, Vancouver, Canada
- Area Chair: IEEE International Conference on Computer Communications (IEEE INFOCOM 2023), 17-20 May 2023, New York, USA
- ACM Annual International Conference on Mobile Computing and Networking (ACM MOBICOM 2024), 18-22 November 2024, Washington, D.C., USA
- Annual International Conference on Mobile Computing and Networking (ACM MOBICOM), 2-6 Oct 2023, Madrid, Spain
- ACM International Conference on Mobile Systems, Applications, and Services (MobiSys), 3-7 June 2024, Tokyo, Japan
- ACM International Conference on Mobile Systems, Applications, and Services (MobiSys), 18-22 June 2023, Helsinki, Finland
- ACM International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (MobiHoc), 14-17 October 2024, Athens, Greece
- ACM International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing (MobiHoc), 23-26 2023, Washington D.C., USA
- Wireless On-Demand Network Systems and Services (WONS), 29-31 January 2024, Chamonix, France
- Wireless On-Demand Network Systems and Services (WONS), 30 January - 1 February 2023, Madonna di Campiglio, Italy
- IEEE/IFIP Networking Conference 2023, 12-15 June 2023, Barcelona, Spain

dissemination events

dissemination events


Las cinco Misiones de la UE
vistas por los investigadores
de IMDEA (II)

5.4. Outreach

5.4.1 Major events

Science and Innovation Week of Madrid 2023

14 November 2023

NEWS

On November 14, we opened our doors, on the occasion of the Science and Innovation Week (a science outreach event organized by the Fundación para el Conocimiento madri+d), to around 80 students of the 1st year of Bachillerato and FP of Computer Science from IES Pedro Duque and the HEASE Center so that they could discover the world of telecommunications first hand.

The students initially received a talk from our postdoctoral researcher Antonio Bazco on basic concepts of the Internet and the cloud. They then took part in a virtual escape room, an initiative of Teleco Renta, the Telecommunications Studies Promotion Plan, which served to test their mental agility and solve challenges about telecommunications engineering.

The group of students also had the opportunity to visit three of our state-of-the-art laboratories: 5TONIC, LiFi and Millimeter-Wave Networking.
More info

European Research Council (ERC) Grants Event – Horizon Europe

16 October 2023

The Projects and Funding department at IMDEA Networks organized a training event, with the aim of improving excellence in ERC proposal writing in the field of Physical Sciences and Engineering (PE), in particular PE6 and PE7. This training event contributed to the objectives of the INCREASE-HE project funded by the Spanish Ministry of Science and Innovation (MICIN).

The program included institutional representation from the regional and national governance of Scientific Research and Technological Innovation, such as Fundación Española de Ciencia y Technología and Madri+d, researchers and academics from IMDEA Networks, Universidad Carlos III de Madrid, IMDEA Software and INRIA (France), and a consultancy specialized on national and international research funding acquisition, i.e., Yellow Research Consulting.
More info

NetMob 2023

4-6 October 2023

IMDEA Networks participated in the organization of the NetMob Conference. It was focused on the analysis of mobile phone datasets in social, urban, societal and industrial problems. It provided a platform for discussion of high technical quality and strong multidisciplinary nature in a very informal environment, around topics linked to mobile network data and its usages.
More info

NetMob is the primary conference on the analysis of mobile phone datasets in social, urban, societal and industrial problems.

SLICES National Roadshow

3 October 2023

IMDEA Networks and Universidad Carlos III de Madrid (UC3M) presented SLICES-ES, a European infrastructure for experimenting with future information and communication technologies that is based in Spain, at UC3M. This scientific instrument, operational throughout 2024 and with some initial services already in place since October 2023, is available to the research community to carry out complex experiments in the area of digital sciences.

In addition, a service was announced for international researchers to experiment with satellite communications devices for the Internet of Things, with coverage throughout Europe and compatible LoRa technology (a wireless technology that allows data to be sent over long distances) via the Echostar-XXI satellite.
More info

ACM MobiCom 2023

2-6 October 2023

Madrid hosted the twenty-ninth edition of the prestigious international ACM MobiCom 2023 conference, held at the Riu Plaza de España hotel from October 2-6, with IMDEA Networks as part of the event's organizing committee. IMDEA Networks' Research Director and Research Professor Joerg Widmer was the general chair of the conference and Domenico Giustiniano, Research Associate Professor, was the vice chair.

The MobiCom conference series is a highly selective international forum focusing on the networks, systems, algorithms and applications that support mobile computers and wireless networks. "In this edition, IMDEA Networks managed to convene 400 participants, in one of the most outstanding editions in recent years," says Giustiniano.
More info

The 5 EU missions as seen by IMDEA researchers (II) at the European Researchers' Night in Madrid 2023

29 September 2023

NEWS

Our professor Guillermo Suárez-Tangil participated on September 29th in the event organized within the framework of the European Researchers' Night at the Student Residence in Madrid together with his colleagues from the IMDEA Institutes. This annual event is coordinated by the Fundación para el Conocimiento madri+d and is part of an action within the framework of the European program Horizon Europe.

Guillermo explained why cybersecurity in smart city communication networks is essential. It must be considered that they rely heavily on the interconnection of devices and systems to improve the efficiency and quality of life of their inhabitants. However, this interconnectedness also creates vulnerabilities to cyberattacks. Protecting the infrastructure, security and privacy of citizens is crucial in the smart city environment.
More info

First International B5G Student Workshop

3 July 2023

The first international Madrid B5G Student Workshop was jointly organized by IMDEA Networks, UC3M, UPM, and UCM from July 3-7, 2023.

The program offered an immersive experience in advanced research topics related to 5G and 6G technologies, IoT applications and Artificial Intelligence.

The workshop was sponsored by the Spanish Ministry of Economic Affairs and Digital Transformation, in the frame of the 5G Networks Programme UNICO I+D. Teleco Renta is a program that promotes the studies of Telecommunications Engineering funded by the Spanish Ministry of Economy and Digital Transition.
More info

Data EConomy (DEC) Workshop 2023

18 June 2023

The Data Economy workshop, which took place with SIGMOD 2023 (in Seattle, on June 18, 2023), brought together researchers and practitioners, to clarify impactful research problems, describe solutions and ideas to the arising data management issues (and beyond) and novel data applications, and share findings and new ideas on real-world data markets. Our Research Professor Nikolaos Laoutaris was the Workshop Chair.
More info

13th IMDEA Networks Annual International Workshop

23 May 2023

IMDEA Networks once again brought together its research team with members of the scientific council in order to share current lines of research and jointly explore innovative concepts and research ideas.

On this occasion, the focus was on presenting the latest advances in the area of quantum networks and quantum communications.
More info

4ESO+Enterprise Program

29-30 March 2023

On March 29 and 30, 14 students from the IES Isaac Albéniz and IES Siglo XXI high schools in Leganés enjoyed an educational stay at IMDEA Networks. This was the sixth year that we participated in the 4ESO+Empresa program, promoted by the Community of Madrid with the aim of giving 16 year old students a first contact with the working world they will be part of in the future.
More info

XII Madrid is Science Fair: How much do you know about networks and how much does the Internet know about you?

23-25 March

IMDEA Networks participated in this science outreach event aimed at school communities and the general public and organized by the Madri+d Knowledge Foundation. Through dynamic workshops we showed how networks work, from an Internet server to millimeter wave technology, the promise of 5G wireless communications.

In addition, our research team taught practical examples of how to use networks for the benefit of society. He demonstrated how the indirect survey method (whose official name is Network Scale-up Method), used to monitor COVID19, works. Or a sign language translator using neural networks.

Finally, those who participated in our activities were able to find out if they were surfing the net safely and learn how to protect their privacy.
More info

PAM Conference 2023

21 March 2023

The Passive and Active Measurement (PAM) 2023 was organized by IMDEA Networks. The conference was organized as a virtual meeting with attendees only participating remotely.

PAM conference brought together researchers and operators to discuss novel and emerging work in the area of network measurement and analysis. PAM covered all areas of network measurement, but focused on systems-based research and real-world data.
More info

City and Science Biennial 2023

22 February 2023

IMDEA Networks participated for the first time, together with the other IMDEA institutes, in the City and Science Biennial, an event held from February 21st to 26th at the Círculo de Bellas Artes in Madrid. In this edition, we discussed about what it means to live on this planet, in the city, and how we can improve coexistence. Our research team shown that sustainable technology is possible.

On Wednesday, February 22nd, IMDEA Networks and IMDEA Agua shared the María Moliner room to disseminate the excellent science being done in the Community of Madrid. IMDEA Networks PhD students Dayrene Frómeta and Javier Talavante gave a demo showing the benefits of LiFi (Light-Fidelity) technology and radio-frequency backscattering,

low-power communication techniques that allow data to be delivered to battery-free IoT sensors that can simultaneously harvest energy from ambient light.
More info

Transfiere, European Forum for Science, Technology and Innovation 2023

15 February 2023

IMDEA Networks participated, together with the rest of IMDEA Institutes and Madrimasd, in Transfiere, the great European professional and multi-sectoral forum for knowledge and technology transfer held in Spain, within the Innovation Space of the Community of Madrid, together with several academic and scientific institutions, as well as the participation of numerous autonomous communities. During our stay, we were able to report on our projects and initiatives to transfer the results of our research to the industry.

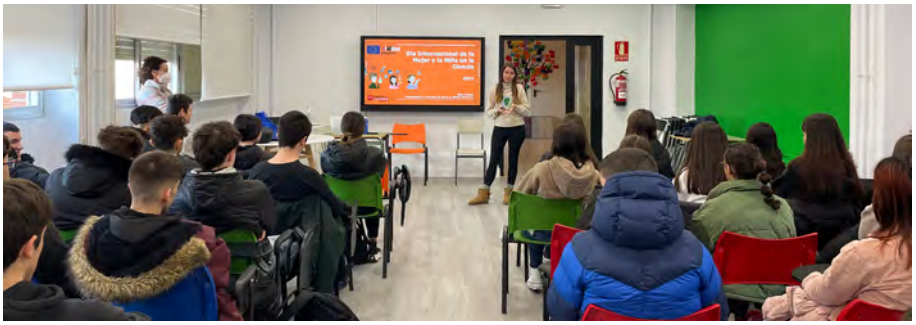
The event, held from February 15 to 17 at the Palacio de Ferias y Congresos (FYCMA) in Malaga, established itself as the main R&D&I meeting in Southern Europe to share scientific and technological knowledge, promote innovation and connect science and business.
More info

‘Inspiring Women Scientists’ - Day of Women and Girls in Science

10 February 2023

On Friday, February 10, we were at the IES José de Churriguera in Leganés on the occasion of the International Day of Women and Girls in Science. ‘Women scientists who inspire’ was an educational talk complementary to the round table held on February 8 with the aim of inspiring new generations to build a more equitable society. Both activities were in the framework of the Researchers at Schools initiative, funded by the European Union within the Horizon Europe Program and as part of the Marie Skłodowska-Curie actions.

Throughout the morning, our Postdoc researcher **Elisa Cabana** brought science and technology closer to more than 100 students of 3rd and 4th ESO, explaining concepts such as artificial intelligence, data science and “big data”. She also talked about her professional career and how she got into the world of research, while highlighting the work of important women scientists in history and in the present.
More info

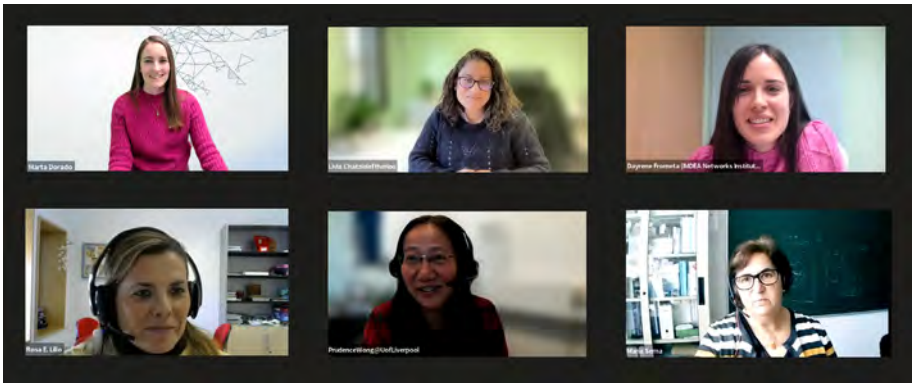


‘Conversation with women researchers: how to make your way in science’

8 February 2023

On Wednesday, February 8th, IMDEA Networks held one of the conferences organized on the occasion of the International Day of Girls and Women in Science (February 11th). Conversation with women researchers: how to make your way in science’ was a meeting, moderated by Marta Dorado, Head of Communication at IMDEA Networks, with Livia Elena Chatzieleftheriou (Postdoc Researcher at IMDEA Networks and UC3M), Dayrene Frómeta (PhD student at IMDEA Networks and UC3M), Prudence Wong (Professor of Computer Science at the University of Liverpool), Rosa E. Lillo (Director of IBiDat - Instituto Big Data UC3M-Santander) and María Serna (Professor of Computer Science at UPC).

Their examples served to motivate participants to pursue scientific careers and inspire new generations to build a more equitable society. In addition, they reflected on the obstacles faced by female researchers and whether the context is currently improving, the trends in the choice of STEM careers by students and the measures being taken by universities and research centers to promote gender equality in science.
More info



5.4.2. Workshops, seminars & lectures

Weekly seminars alternated invited talks with presentations by internal researchers. These events were organized together with prestigious institutions such as University Carlos III of Madrid, Northeastern University, Brown University, University of California, TU Berlin, Queen Mary University of London, and University of Padova. The topics ranged from scientific presentations to technology-transfer oriented talks. All events were held in Madrid. Out of the 48 total number of events in which the Institute participated during 2023, 21 of our events were conducted by invited speakers. We list the latter here:

Graph Constructions for Machine Learning Applications: New Insights and Algorithms
Antonio Ortega, Department of Electrical and Computer Engineering, University of Southern California
22 December 2023

Coded Caching in Heterogeneous Scenarios
Borja Peleato, Assistant Professor at the Universidad Carlos III de Madrid, Madrid, Spain
20 December 2023

Beyond Third-Party Cookies: Safeguarding User Data from Storage and Exfiltration with CookieGraph and PURL
Shaoor Munir, PhD Student at the University of California, Davis, USA
4 December 2023

Empowerment of Atypical Viewers via Low-Effort Personalized Modeling of Video Streaming Quality
Leonardo Peroni, PhD Student at IMDEA Networks Institute, Madrid, Spain
29 November 2023

In the Room Where It Happens: Characterizing Local Communication and Threats in Smart Homes
Aniketh Girish, PhD Student at IMDEA Networks Institute, Madrid, Spain
22 November 2023

French Parliamentary election and mobile traffic
Orlando E. Martínez-Durive, PhD Student, IMDEA Networks Institute, Madrid, Spain
8 November 2023

From Quantum Algorithms to Quantum Services with PlanQK
Sebastian Wagner, Head of Quantum Service Integration at Anaqor, Berlin, Germany
7 November 2023

ARES: A God of War to Bring "Peace" to Heterogeneous Robots
Dr. Nicolas Nicolaou, Algolysis Ltd., Cyprus
19 October 2023

Global IoT testbed for security and privacy research in the real world
Danny Y. Huang, Assistant Professor at New York University's Center for Cyber Security
17 October 2023

AI in the Gray: Exploring Moderation Policies in Dialogic Large Language Models vs. Human Answers in Controversial Topics
Vahid Ghafouri, PhD Student at IMDEA Networks Institute, Madrid, Spain
11 October 2023

Rods with Laser Beams: Understanding Browser Fingerprinting on Phishing Pages
Iskander Sanchez-Rola, Director of Privacy Innovation at Gen
3 October 2023

In-depth analysis of the Android supply chain: Vendor customizations on critical networking components
Vinuri Bandara, PhD Student at IMDEA Networks Institute, Madrid, Spain
13 September 2023

Distributed Computing: A Guided Tour
Timothé Albouy, PhD Student, University of Rennes, France
6 September 2023

Simulation-based Comparison of Network Scale-Up Methods
Sergio Díaz, PhD Student at IMDEA Networks Institute, Madrid, Spain
19 July 2023

Rethinking LiFi for Carbon Neutral Sunlight-based Communication
Javier Talavante, PhD Student at IMDEA Networks Institute, Madrid, Spain
28 June 2023

IoT Human-in-the-Loop Sensing – Use Cases, Challenges, and Approaches
Fernando Boavida, Full Professor at the Department of Informatics Engineering (DEI) of the Faculty of Sciences and Technology of the University of Coimbra
27 June 2023

Prediction of User Privacy Preferences in Mobile Devices via Federated Learning
João P. Vilela, Professor at the Department of Computer Science of the University of Porto and a Senior Researcher at INESC TEC and CISUC, Portugal
22 June 2023

Innovating in computer networks one data-plane program at a time
Dr. Israat Haque, Associate Professor at the Faculty of Computer Science, Dalhousie University, Canada
19 June 2023

SIGNiPHY: Reconciling Random Access with Directional Reception for Efficient mmWave WLANs
Nina Grosheva, PhD Student at IMDEA Networks Institute, Madrid, Spain
14 June 2023

Statistical Age-of-Information Bounds for Parallel Systems: When Do Independent Channels Make a Difference?
Jaya Prakash Champati, Research Assistant Professor at IMDEA Networks Institute, Madrid, Spain
12 June 2023

Telecom cloud-native development: an industry point of view
Jose Castillo Lema, Research Engineer in the Telco 5G Performance & Scale team at Red Hat, Madrid, Spain
9 June 2023

DOTE: Rethinking (Predictive) Traffic Engineering
Michael Schapira, Hebrew University of Jerusalem, Israel
8 June 2023

The Case for Hierarchical Deep Learning Inference at the Network Edge
Ghina Al Atat, PhD Student at IMDEA Networks Institute, Madrid, Spain
7 June 2023

Fast Detection of Cyberattacks on the Metaverse through User-plane Inference
Beyza Butün, PhD Student at IMDEA Networks Institute, Madrid, Spain
31 May 2023

Flowrest: Practical Flow-Level Inference in Programmable Switches with Random Forests
Aristide Tanyi-Jong Akem, PhD Student at IMDEA Networks Institute, Madrid, Spain
3 May 2023

Analyzing Mobility Open Data and Human Behavior on Online Social Networks for Creating and Improving AI Applications
Humberto Marques, researcher and professor in Pontifical Catholic University of Minas Gerais (PUC Minas) in Belo Horizonte – Brazil
29 March 2023

Sensing the Physical World in Unprecedented Ways
Fadel Adib, Associate Professor in the MIT Media Lab, USA
22 March 2023

Predicting Customer Quality of Service and Classifying Customer Complaints of a Large Fixed Broadband Service Provider using Machine Learning
Antonio Rocha, Associate Professor at the Institute of Computing at the Fluminense Federal, Brazil
21 March 2023

Try IT! congress 2023
Juan Marcos Ramírez, Postdoc Researcher at IMDEA Networks Institute, Madrid, Spain
14 March 2023

Path Aware QoS Systems
Juan A. García-Pardo, Research Programmer at ETH Zurich, Switzerland
7 March 2023

Protecting privacy through metadata analysis
Sandra Siby, Research Associate at Imperial College London, UK
6 March 2023

A high-resolution service-level traffic dataset
Sachit Mishra, PhD Student at IMDEA Networks Institute, Madrid, Spain
1 March 2023

Graph reconstruction in the congested clique
Ivan Rapaport, Associate Professor at Universidad de Chile
24 February 2023

Swarm Robotics: a new "swiss knife" framework for designing, modeling, and experimenting with networks
Dr. Eduardo Castello, Affiliated Researcher at Massachusetts Institute of Technology, USA
23 February 2023

Quantum Networks: A stepping stone towards the Quantum Internet
Marius Paraschiv, Post-Doc researcher at IMDEA Networks Institute, Madrid, España
22 February 2023

Data-driven Approaches for Assessing the Security and Privacy of Digital Infrastructures
Srdjan Matic, Post-Doc researcher at IMDEA Sofware Institute, Madrid, Spain
16 February 2023

AutoManager: a Meta-Learning Model for Network Management from Intertwined Forecasts
Alan Collet, PhD Student at IMDEA Networks Institute, Madrid, Spain
15 February 2023

kaNSaaS: Joint Admission Control and Resource Allocation of Network Slices with Overbooking
Sergi Alcalá, PhD Student at IMDEA Networks Institute, Madrid, Spain
1 February 2023

A new methodology to measure faultlines at scale leveraging digital traces
Amir Mehrjoo, PhD Student at IMDEA Networks Institute, Madrid, Spain
25 January 2023

What we measure when we measure
Javier Bustos, Director of NIC Labs Chile
13 January 2023

5.4.3 Media impact

Media impact 2023

28
Web news

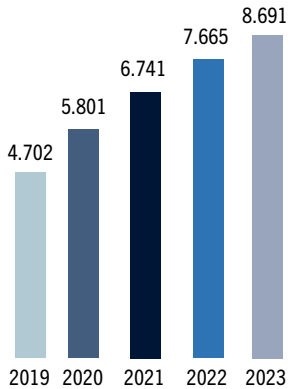
10
Press releases

556
Social networks posts

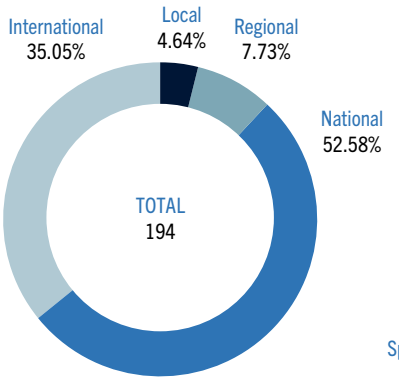
8.691
Social networks followers 2023

1.993	343	617	5.137	601

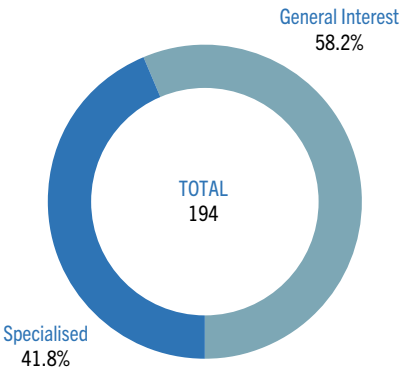
community growth



Impacts by coverage



Impacts by content



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total telecom

Newtral

ABC

Tech Xplore

laSexta

EL PAÍS

Science X

LA VANGUARDIA

R&T REDES&TELECOM

fundación para el conocimiento madrid

EFE

ZONA MOVILIDAD

ACTIVO LEGANÉS

europa press

LA RAZÓN

D+I invertia EL ESPAÑOL

Some media impacts

LA RAZÓN

Europa premia a IMDEA Networks de Madrid por sus propuestas frente a la escasez de alimentos

More info

LA RAZÓN 25

MADRID VIVIR

PLANES EN MADRID

Europa premia a IMDEA Networks de Madrid por sus propuestas frente a la escasez de alimentos

Los científicos pretenden hacer frente al reto de la escasez de alimentos promoviendo su producción en instalaciones de alta tecnología como granjas verticales, invernaderos y acuaponía

R&T REDES&TELECOM

“España ha adoptado una posición puntera en investigación e innovación en 5G”

More info

REDES&TELECOM Operadoras Seguridad Mercado Infraestructuras Comunicaciones Conectividad Guía LBC

“España ha adoptado una posición puntera en investigación e innovación en 5G”

Home > Comunicaciones

Redes&Telecom entrevista a Albert Banchs, director de Imdea Networks, que nos cuenta los últimos proyectos en los que trabaja el laboratorio, el papel de nuestro país en redes móviles y las tendencias que marcarán el futuro de las comunicaciones, como la tecnología cuántica.

Publicado el 20 Ene 2023

Cristina Albarrán

SER

“No valen nada”: el mayor error que cometemos todos con nuestros datos personales en Internet

More info

SER 100 Elige tu emisora

Sociedad FUENLABRADA

"No valen nada": el mayor error que cometemos todos con nuestros datos personales en Internet

Narseo Vallina-Rodríguez, profesor de Investigación de IMDEA Networks, habla sobre el valor de los datos que manejamos en nuestros dispositivos conectados y la importancia de la concienciación en ciberseguridad

14:12

En la Ciberseguridad: Con Narseo Vallina Rodríguez, profesor de Investigación de IN...

— Pilar García SER Madrid Norte 07/02/2023 - 10:47 CET

PUBLICIDAD

PUBLICIDAD

Lo más leído

La Policía Nacional detiene en Madrid a un hombre con un fusil de asalto y armamento de guerra

10/04/2024

Rescate de un trofeo en el Retiro y ahora subvención millonaria: Almeida concede 3 millones de euros a la Federación Española de Rugby para la celebración de la final de las Series Mundiales en Madrid

09/04/2024

Una experta en chotis pone nota al baile de

laSexta

1000 ‘likes’ por 1,3 euros y 1.000 visualizaciones por 2 euros: un estudio desvela el coste de engordar redes sociales

More info

laSexta EN DIRECTO PROGRAMACIÓN atresplay

PROGRAMAS ESPAÑA ELECCIONES INTERNACIONAL DEPORTES ECONOMÍA SOCIEDAD CULTURA CIENCIA Y TECNOLOGÍA BIENESTAR EL TIEMPO

CIENCIA Y TECNOLOGÍA Redes sociales Móviles Aplicaciones Gadgets WhatsApp Facebook Google

En Instagram, YouTube...

1.000 'likes' por 1,3 euros y 1.000 visualizaciones por 2 euros: un estudio desvela el coste de engordar redes sociales

Una investigación de la UC3M y el instituto IMDEA Networks ha analizado las tarifas para conseguir interacciones falsas en redes sociales y el grado de personalización: pueden elegir la procedencia e incluso el género.

Telefonica-backed IMDEA Networks Institute launches ENABLE-6G project

More info

La red de comunicaciones cuánticas de Madrid: de la transferencia segura de datos a la creación de ecosistema

More info

telecompaper

Imdea launches MLEDGE cloud and federated learning project

More info

Home / IT / Imdea launches MLEDGE cloud and federated learning project

Imdea launches MLEDGE cloud and federated learning project

NEWS | BROADBAND | SPAIN | 20 JUN 2023 | BOOKMARK

Madrid-based Imdea Networks has announced the launch of a sustainable initiative for the development of efficient networks and related services in the cloud and federated learning space in Spain. The scheme, dubbed MLEDGE (Cloud and Edge Machine Learning), is designed to ensure data derived from Machine Learning (ML) algorithms is processed as close as possible to the end user while remaining private and confidential.

The MLEDGE led by principal investigator Dr. Nikolaos Laoutaris intends to implement Federated Learning (FL) as an independent but optimised cross-sector layer on top of the cloud edge, with real-world applications and data to demonstrate that the resulting synergy can yield great benefits for all.

COMPUTERWORLD

'Edge to cloud continuum': la arquitectura de cómputo y almacenamiento del mañana

More info

TENDENCIAS EMPRESAS TECNOLOGÍA ENTREVISTAS REPORTAJES ESPECIALES OPINIÓN EV

Partnerzones » Servicios que marcan la diferencia

Almacenamiento | Nube | Edge computing

'Edge to cloud continuum': la arquitectura de cómputo y almacenamiento del mañana

El proyecto EDGEDATA-CM, en el que participan investigadores de IMDEA Networks, integra la computación en la nube, el *edge computing* y el *fog computing* en aras de una gestión de datos consistente y confiable.

También te puede interesar:

- Las inversiones en 'edge computing' crecerán un 13,1% en 2023
- La computación en la nube impulsa una nueva 'gig economy' en la industria tecnológica
- ¿Qué es la computación de niebla o Fog Computing? Conectando la nube a las cosas

SER

El presente de los coches del futuro, en el IMDEA de Leganés

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Study reveals how you behave on the internet is influenced by your income level

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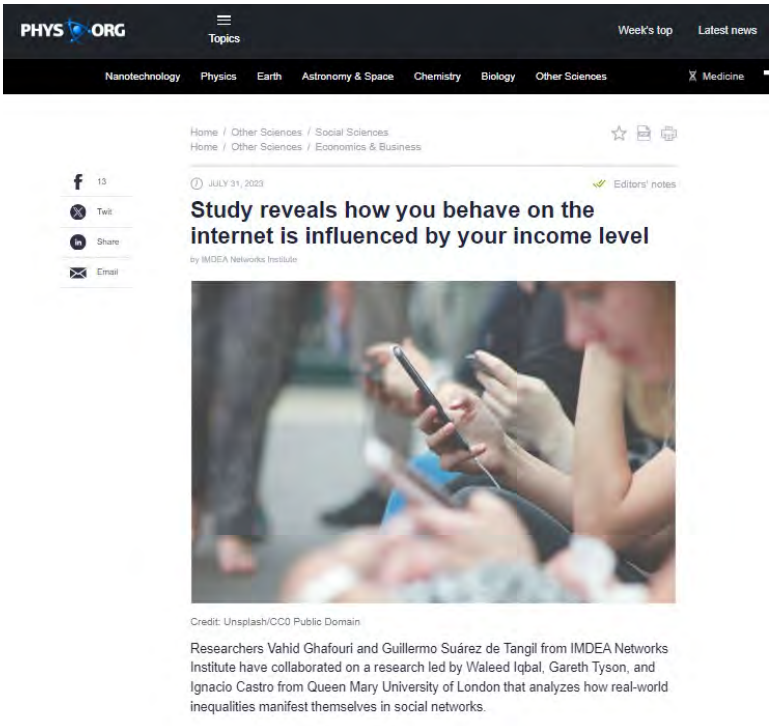

TeleMadrid

Madrid, líder en investigación

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ACTIVO LEGANÉS

El consejero de Ciencia es testigo en Leganés de los desarrollos del IMDEA

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ChatGPT tackles controversial issues better than before: From bias to moderation

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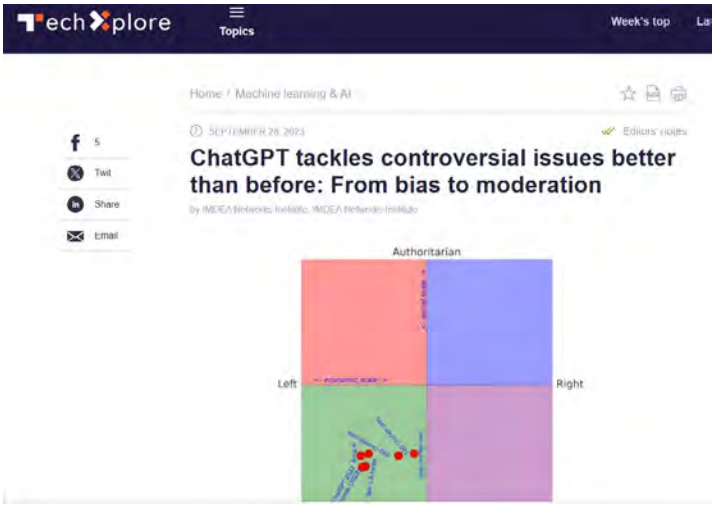


IMDEA Networks y la Carlos III presentan una infraestructura europea de investigación en el área de las TIC

More info

ABC

El gran laboratorio europeo de las telecomunicaciones del siglo XXI

More info

El gran laboratorio europeo de las telecomunicaciones del siglo XXI

El ambicioso proyecto Slices, que busca crear una infraestructura europea de investigación de vanguardia en esta actividad, tendrá un nodo en Madrid

Los satélites dan un impulso de altos vuelos a la conectividad de la España rural

SINC

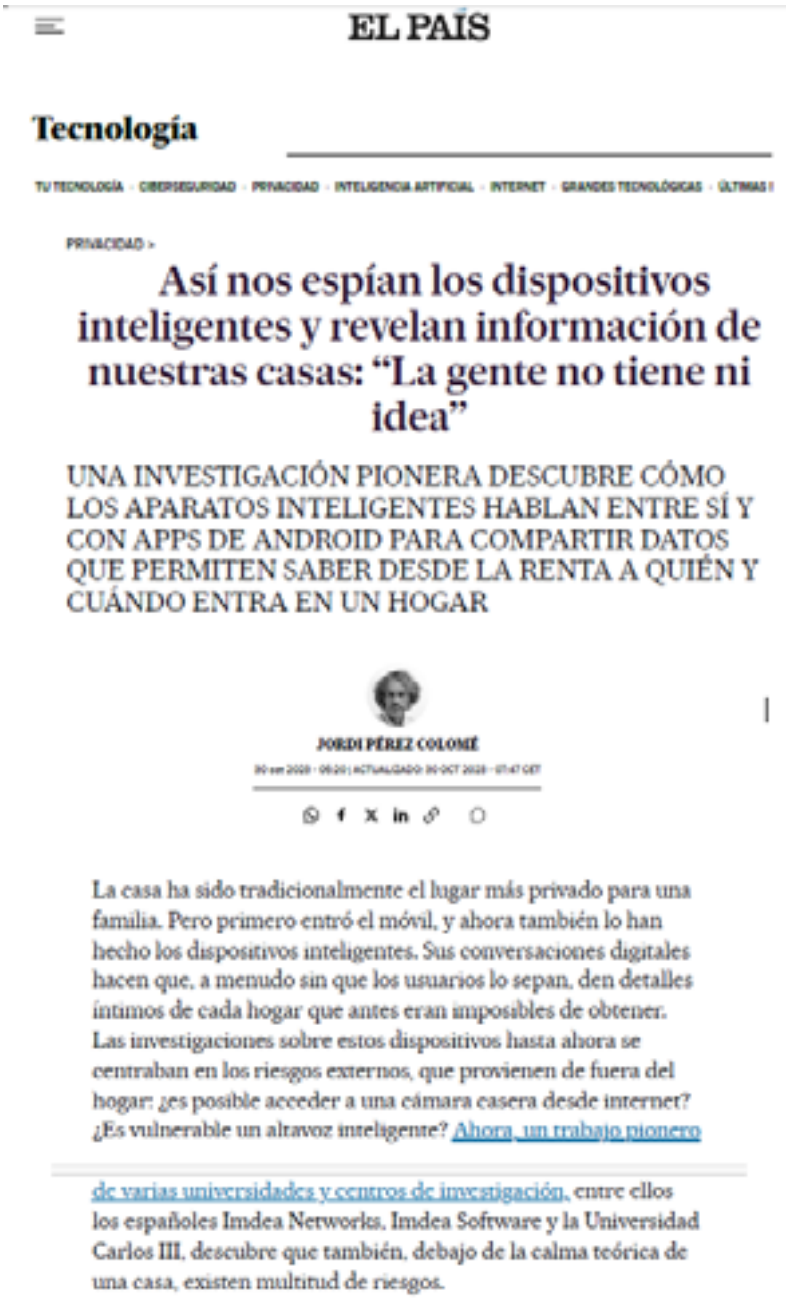
Un estudio revela amenazas para la privacidad y la seguridad en los hogares 'inteligentes'

More info

EL PAÍS

Así nos espían los dispositivos inteligentes y revelan información de nuestras casas: “La gente no tiene ni idea”

More info



EL PAÍS

Tecnología

TV TECNOLOGÍA · CIBERSEGURIDAD · PRIVACIDAD · INTELIGENCIA ARTIFICIAL · INTERNET · GRANDES TECNOLÓGICAS · ÚLTIMAS I

PRIVACIDAD >

Así nos espían los dispositivos inteligentes y revelan información de nuestras casas: “La gente no tiene ni idea”

UNA INVESTIGACIÓN PIONERA DESCUBRE CÓMO LOS APARATOS INTELIGENTES HABLAN ENTRE SÍ Y CON APPS DE ANDROID PARA COMPARTIR DATOS QUE PERMITEN SABER DESDE LA RENTA A QUIÉN Y CUÁNDO ENTRA EN UN HOGAR

JORDI PÉREZ COLOMÉ

La casa ha sido tradicionalmente el lugar más privado para una familia. Pero primero entró el móvil, y ahora también lo han hecho los dispositivos inteligentes. Sus conversaciones digitales hacen que, a menudo sin que los usuarios lo sepan, den detalles íntimos de cada hogar que antes eran imposibles de obtener. Las investigaciones sobre estos dispositivos hasta ahora se centraban en los riesgos externos, que provienen de fuera del hogar: ¿es posible acceder a una cámara casera desde internet? ¿Es vulnerable un altavoz inteligente? Ahora, un trabajo pionero de varias universidades y centros de investigación, entre ellos los españoles Imdea Networks, Imdea Software y la Universidad Carlos III, descubre que también, debajo de la calma teórica de una casa, existen multitud de riesgos.

5.5 Local Scientific Partnership

IMDEA Networks Institute has a strong scientific collaboration with a number of the local universities in the Madrid region. Among those, it is worth highlighting the partnerships with University Carlos III of Madrid (UC3M) and University of Alcalá (UAH) involving stable research collaboration in joint activities and projects. Furthermore, there is also an institutional collaboration in the form the participation of UC3M and UAH on the Institute's Board of Trustees.

Among other activities, the cooperation between IMDEA Networks and the local universities involve their joint participation in funded research projects. The regional project TAPIR-CM, which is currently ongoing, involves UC3M and UAH as participants under the coordination of IMDEA Networks. Furthermore, UC3M and IMDEA Networks jointly participate in several ongoing projects and they are both members of the 5TONIC laboratory.

With respect to teaching, IMDEA Networks is delivering, jointly with Ericsson and UC3M and with the participation of UAH, an M.Sc. degree on 5G, SDN and NFV. This Master is very successful and is strengthening the technological profile of the Madrid region.

Another important activity where IMDEA Networks is collaborating with the local universities is in the context of SCITEL, the Scientific Society of Telematic Engineering. IMDEA Networks, UC3M and UAH are very important members of this association, and are contributing to organize various activities in the framework of this association, such as the national conference on Telematics (JITEL).

Besides the above activities, IMDEA Networks, UC3M and UAH are also taking advantage of the physical proximity between the three institutions to share many of their daily activities, such as the scientific seminars organized by IMDEA Networks, which count with the participation of UC3M and UAH. Furthermore, it is also worth highlighting the personnel mobility between IMDEA Networks and University Carlos III and University of Alcalá. Recently a Professor from UAH has joined IMDEA as a visiting researcher.

Through these collaborations with local scientific partners, IMDEA Networks provides an important contribution to strengthening the scientific standing of the Madrid region in the area of Telematics.

impact and technology transfer

annual report

2023

www.networks.imdea.org

6.1. Patents

Patents are important steps in the process of **transferring technology to marketplace**. Patent creation has strong implications for the Institute: patents are incentives for their creators, as they imply recognition for their creativity and material reward when these inventions are marketable. These incentives encourage innovation, the guarantee to the continuous improvement in the quality of research and, ultimately, of human life. It is IMDEA Networks Institute's policy to share a very high percentage of financial proceeds with inventors (our researchers) as reward for their excellence and hard work.

EP Patent Application, Canadian and International (PCT) Patent Application published in April 2023, Singapore patent published in November 2023 and US patent published in March 2024

Title: RF backscatter system based on light fidelity
Inventors: Domenico GIUSTINIANO, Borja GENOVÉS GUZMÁN, Sarmad MIR
Rights: IMDEA Networks Institute
Overview: The present invention is related to a low-power backscatter system comprising a LiFi, "Light Fidelity", transmitter configured for generating and transmitting an optical signal comprising a sequence of a downlink data signal and a chirp signal and an IoT, "Internet of Things", tag.
Application number: EP4164143A1
Application number (International application No.): WO2023057618A1
Application number USA, Canada and Singapore: US20240080098A1 | CA3204806A1 | 11202306367X

6.2. Technology transfer

We direct our work towards strengthening collaboration ties with industry, particularly through joint participation in projects and technology transfer. We aim to develop technologies that have genuine socio-economic impact; that is to say, projects that deliver value and that can be transferred to industry and, ultimately, to society. In order to ensure that our focus remains on addressing real-world problems and that our development activities result in generating value, we continue to build on our strong links with the business community both in the Madrid region of Spain and in the rest of the World.

Our technology transfer strategy is aimed to ensure that the Institute's research activities remain relevant, that its innovations are diffused and their full value to society realized through various transfer processes such as licensing and the sale of patents, creation and support of spin-off companies in the region that seek to commercialize products exploiting

innovations developed within the Institute. We carry out several forms of collaboration, including direct contracts with industry, as well as participation in joint projects financed by public entities. Our projects include both types of partnerships with specific listings of those enterprises and organizations currently working with us.

Joint, funded research projects enable us to establish solid ties to business. We are engaged in various research projects with private sector collaborators:

6.2.1. Ongoing contracts

MIMORPH-5G

Funded by: Technische Universitat Darmstadt
Duration: October 2022 to December 2050

NR Computer Software Program Usage License Agreement

Contrato de servicios para el acceso a un laboratorio con infraestructura 5G y asistencia técnica para desarrollar prototipos que incorporen tecnología 5G, para su empleo en las Fuerzas Armadas

Funded by: Ministry of Defence
Duration: January 2024 to November 2025

TEST6G-3

Funded by: Technischen Universität Darmstadt
Duration: January 2023 to December 2023

TEST6G-2

Funded by: Technischen Universität Darmstadt
Duration: January 2023 to December 2023

ARMASUISSE-Aramis

Funded by: Armasuisse
Duration: January 2023 to December 2023

ARMASUISSE-AerialSensing

Funded by: Armasuisse
Duration: February 2023 to October 2023

AI-driven Activity Detection of Intruders from the Sky

OPENQKD

Funded by: Telefónica Investigación y Desarrollo, S.A.
Duration: July 2022 to March 2023

Open European Quantum Key Distribution Testbed

5G-CLARITY

Funded by: Telefónica Investigación y Desarrollo, S.A.
Duration: April 2022 to March 2023

Beyond 5g multitenant private networks integrating cellular, wifi, and lifi, powered by artificial intelligence and intent based policy

NetPredict5

Funded by: Telefónica Investigación y Desarrollo, S.A.
Duration: September 2022 to February 2023

Adaptative Anomaly Detection and Classification

6.2.2. Other forms of collaboration with the private sector

Telefónica - IMDEA Networks Joint Research Unit in 5G technologies

IMDEA Networks and Telefónica Research and Development continue collaborating on their Joint Research Unit (JRU), which was created in May 2014. The JRU is also known under the name «Telefónica - IMDEA Networks Joint Research Unit in 5G technologies». The development of 5G has already become a landmark in the global competition for technologi- cal leadership. Over a period of seven years up to 2020, this private-public alliance will share a wealth of know-how and in-house capabilities to tackle the challenge of creating a blueprint for the new technology and the standards that are to define future ICT networks.

Located at IMDEA Networks' headquarters in Madrid, the aim of the JRU Telefónica I+D - IMDEA Networks is to establish a strategic partnership that provides an operational framework for close interaction in a varied set of scientific activities. In particular, the JRU brings together a team comprising highly specialized multidisciplinary profiles ready to work collaboratively on externally funded R&D projects. One of the main areas in which this collaboration is reflected is the program «Advanced 5G Network Infrastructure for Future Internet PPP», sponsored by the EU Commission within the Horizon 2020 program.

The private-public alliance shares a wealth of know-how and in-house capabilities to tackle the challenge of creating a blueprint for the new technology and the standards that are to define future ICT networks. Work led by experienced researchers Diego R. López from Telefónica I+D and Arturo Azcorra, Joerg Widmer and Albert Banchs, from IMDEA Networks, focuses on key 5G enablers such as flexible functional split, joint handover optimization, 60GHz wireless networks, network function operating systems, secure virtual computing and green networking.

5TONIC - An Open Research and Innovation Laboratory focusing on 5G technologies

5TONIC is an open research and innovation laboratory focusing on 5G technologies that was founded by Telefonica and IMDEA Networks Institute in 2015. The first laboratory of 5G excellence in Spain also counts with Ericsson Spain, INTEL, Commscope, University Carlos III of Madrid, InterDigital and Capgemini Engineering amongst its members. During 2020, Juan Carlos García, Innovaton VP at Telefónica, became the new 5TONIC Chairman, and Carlos Bernados, professor at Universidad Carlos III Madrid, the 5TONIC Vice-chairman, substituting David del Val and Arturo Azcorra, respectively.

The objective of 5TONIC is to create a global open environment where members from industry and academia work together in specific research and innovation projects related to 5G technologies with a view to boost technology and business innovative ventures. The laboratory promotes joint project development and entrepreneurial ventures, discussion fora, events and conference sites, all in an international environment oriented to achieve the highest technological impact in the area of 5G.

5G networks are considered the gateway to the age of “intelligent everything” that awaits us. The development of 5G and its evolution towards 6G has thus become a landmark in the global competition for technological leadership.

5TONIC will serve to show the capabilities and interoperation of pre-commercial 5G equipment, services and applications by leading global companies in the 5G arena. Apart from

the initial members, 5TONIC welcomes new members to join and gain from the benefits of an advanced research and innovation laboratory, oriented to research, debate, field-testing and demonstration of all technologies and equipment to support 5G communications, services and applications.

The main 5TONIC Research & Innovation Laboratory site is located at IMDEA Networks. The Institute is one of the main leaders at European level in the field of 5G and 6G networks. Among 5G European research projects supported by the lab are the ongoing 5G Induce, AI@Edge, and Hexa-X.

5TONIC Members

Telefónica, institute IMDEA networks, ERICSSON, InterDigital, COMMSCOPE, uc3m, Capgemini engineering

5TONIC Collaborators

YBVR, ROHDE&SCHWARZ, celling 5G solutions, UTEK, NOKIA, Fivecomm, Telcaria, intel., ABB

New 5TONIC Collaborators

NEC, Open Nebula, AEROTOOLS, gmv INNOVATING SOLUTIONS, Atos

6.2.3 Industry partners

Our technology transfer activities have led to a significantly increased portfolio of companies we collaborate with. During 2023, they were the following:

ABI Lab: Ricerca e innovazione per il settore bancario

Amped Software

Associatia InfoCons (ICNS)

Battioli Paola Società Agricola S.S.

COSMOTE Kinites Tilepikoinonies

DigitalSign

F-Secure Oyj

Fondazione Mondo Digitale

Ford Otomotiv Sanayi Anonim Sirketi

Fundación Cibervoluntarios (CIB)

Interuniversity Microelectronics Centre (IMEC)

IoT Lab

Mycronic AB

NEC Europe Ltd.

NEC Laboratories Europe

Nokia Bell Labs Deutschland AG

Nokia Ireland Limited

Nokia Solutions and Networks Oy

Orange

pureLiFi Ltd.

Qascom

Ranplan Wireless Networks Design LTD.

Robert Bosch GMBH

Telecom Italia S.p.a.

Telefónica I+D

Televic Healthcare

Thales

The Circle Società Agricola a Responsabilità Limitata

Tree Technology S.A.

Trilateral Research Ltd (TRI)

Vithas Foundation

Warrant Hub

We continue to build firm relationships and sound collaborative arrangements with these companies and other key players in the field, including various regional, national and international bodies.

personnel

director

The Director is the CEO of the Institute. He is appointed by the Board of Trustees amongst scientists with a well-established international reputation in computer networking. The Director fosters and supervises the activities of IMDEA Networks Institute, and establishes the distribution and application of the available funds in accordance with the Institute's strategic goals and within the limits established by the Board of Trustees. The Director reports regularly to the Board. He is aided by the Scientific Council in determining the scientific research strategy and associated policies. The Deputy Director, the Research Director and the General Manager also assist the Director.

Dr. Arturo AZCORRA

Director

Research: 5G Networks and Services; Network Virtualization and Softwarization; Drone Communications; On-line Social Networks Data Analytics; Mammal Brain Cartography and Topology
Personal Site

Short Bio

Dr. Arturo Azcorra graduated in 1980 from Loy-Norrix High School, Michigan. He received his Telecommunication Engineering degree from Universidad Politécnica de Madrid in 1986, and the Doctor degree in 1989 from the same University. He currently is a full professor at Universidad Carlos III de Madrid, and he's also Director of the International Research Institute IMDEA Networks, a very relevant research institution in Europe. On the professional area, Arturo Azcorra is an IEEE Communications Society Senior Member, an Internet Society member, an ACM-SIGCOMM member, a founding member of the Association for Telematics, and also president of the said Association.

deputy director

The Deputy Director provides assistance to the Director in the fostering and supervision of the scientific activities of the Institute and of its administrative management.

Dr. Albert BANCHS

Deputy Director

Research: Beyond 5G; Mobile Networks; Network Algorithms and Protocols; Smart Networks; Computational-aware networking
Personal Site

Short Bio

Dr. Albert Banchs received his M.Sc. and Ph.D. degrees from the Polytechnic University of Catalonia (UPC-BarcelonaTech) in 1997 and 2002, respectively. He is currently a Full Professor with the University Carlos III of Madrid (UC3M), with double affiliation as Deputy Director of the IMDEA Networks institute. Before joining UC3M, he was at ICSI Berkeley in 1997, at Telefonica I+D in 1998, and at NEC Europe Ltd. from 1998 to 2003. He was an Academic Guest at ETHZ in 2012, a Visiting Professor at EPFL in 2015 and 2013 and a Fulbright scholar at University of Texas at Austin in 2019. Prof. Banchs authors over 150 publications in international conferences and journals, and is the co-inventor of several patents.

research professors

Research Professors are our most published and cited researchers. They are recognized and respected leaders in their field of research. They have already made a difference. Their expertise and research interests have a significant impact on the Institute's scientific output and on the careers of their charges.

Dr. Joerg WIDMER

Research Professor (tenured) & Research Director

Research: Wireless Networking; Millimeter-Wave Communication; Wireless Sensing and Localization; Mobile Network Architectures

Personal Site

Short Bio

Dr. Joerg Widmer is Research Professor and Research Director of IMDEA Networks in Madrid, Spain. Before, he held positions at DOCOMO Euro-Labs in Munich, Germany and EPFL, Switzerland. His research focuses on wireless networks, ranging from extremely high frequency millimeter-wave communication and MAC layer design to mobile network architectures. He authored more than 200 conference and journal papers, 3 IETF RFCs, and 13 patents. He received an ERC consolidator grant, the Friedrich Wilhelm Bessel Award of the Humboldt Foundation, a Ramon y Cajal grant, as well as nine best paper awards. He is Fellow of the IEEE and Distinguished Member of the ACM.

Dr. Marco AJMONE MARSAN

Research Professor

Research: Networks and applications; Performance evaluation

Personal Site

Short Bio

Marco Ajmone Marsan is a part-time research professor at the IMDEA Networks Institute in Spain and an Emeritus Professor of Politecnico di Torino. From 1974 to 2021 he was at the Politecnico di Torino, in the different roles of an academic career, with an interruption from 1987 to 1990, when he was a full professor at the Computer Science Department of the University of Milan. He obtained degrees in EE from the Politecnico di Torino and the University of California, Los Angeles (UCLA). He served in the editorial board of several international journals, and chaired the steering committee of the ACM/IEEE Transactions on Networking. He was the General Co-chair of Infocom 2013, and of ICC 2023. He is a Fellow of the IEEE, and a member of the Academia Europaea and of the Academy of Sciences of Torino. He is qualified as "ISI Highly Cited researcher" in computer science. He received a honorary degree in Telecommunication Networks from the Budapest University of Technology and Economics. He was named Commander of the Order of Merit of the Republic of Italy. He was the Vice-Rector for Research, Innovation and Technology Transfer at the Politecnico di Torino, and the Director of IEIIT-CNR. He was the Italian delegate in the ICT and IDEAS Committees of FP7.

Dr. Antonio FERNÁNDEZ ANTA

Research Professor

Research: Distributed Computing; Networks; Algorithms; Distributed Logs; Data Analysis; Crowdsourcing

Personal Site

Short Bio

Dr. Antonio Fernández Anta is a Research Professor at the IMDEA Networks Institute. Previously, he was a professor at the Universidad Rey Juan Carlos (URJC), and at the Universidad Politécnica de Madrid (UPM), where he received an award for his research productivity. He completed a postdoctoral stay at MIT from 1995 to 1997, and sabbaticals at Bell Labs in Murray Hill in 2008-2009 and at the MIT Media Lab in 2016-2017. He has over 30 years of research experience and more than 200 scientific publications. He received the "Aritmel" National Computer Science Award in 2019 and has been a Mercator Fellow at SFB MAKI in Germany from 2018 to 2024. Recently, his scientific work has won awards such as the Honorary Mention (2nd Best Paper) Award at the Social Impact Track of AAAI 2024, the Mario Gerla Best Paper Award at MedComNet 2022, and the Best Teaser Award at WoWMoM 2021. He has been Chair of the Steering Committee of DISC, and has chaired and served on the Scientific Committee of numerous conferences. He is Deputy Editor of The Computer Journal, Oxford Journals. Antonio Fernández Anta received his M.Sc. and Ph.D. in Computer Science from the University of Louisiana in 1992 and 1994, respectively. Previously, he completed his undergraduate and graduate studies in Computer Science at the UPM, in 1988 and 1991, having received national and university awards for his academic performance. He has been a senior member of IEEE since 2002 and of the ACM since 2007.

Dr. Marco FIORE

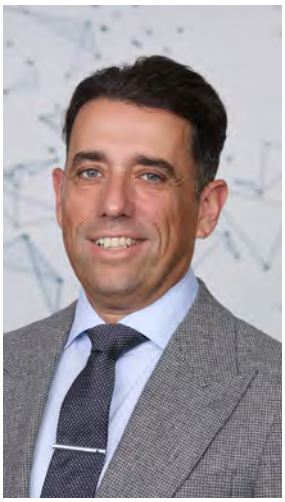
Research Associate

Research: Mobile Networks, Data Science, Network Intelligence, Computational social science

Personal Site

Short Bio

Marco Fiore is a Research Professor at IMDEA Networks Institute, Spain, and a co-founder and CTO at Net AI, a UK-based network intelligence company. He received MSc degrees from University of Illinois at Chicago, USA, and Politecnico of Torino, Italy, a PhD degree from Politecnico di Torino, Italy, and a Habilitation à Diriger des Recherches (HDR) from Université de Lyon, France. Marco has been a Maître de Conférences (Associate Professor) at Institut National des Sciences Appliquées (INSA) de Lyon, France, Associate Researcher at Inria, France, Researcher at Consiglio Nazionale delle Ricerche, Italy, and visiting researcher at Rice University, USA, Universitat Politècnica de Catalunya, Spain, and University College London, UK. He is a former Marie Curie fellow and Royal Society visiting research fellow, and he is a Senior Member of IEEE, and a Member of ACM. Marco's research interests are at the interface of mobile networks and data science.



Dr. Nikolaos LAOUTARIS

Research Professor

Research: Privacy; Transparency/ Data Protection; Economics of Networks and Information; Intelligent Transportation; Distributed Systems; Protocols; Network Measurements

Personal Site

Short Bio

Dr. Nikolaos Laoutaris is a research professor at IMDEA Networks Institute in Madrid. Prior to that, he was director of data science at Eurecat and chief scientist of the Data Transparency Lab, which he co-founded in 2014 during his 10-year tenure as a researcher and senior researcher of Telefonica Research in Barcelona. Before Telefonica, he was a postdoc fellow at Harvard University and Marie Curie postdoc fellow at Boston University. He got his PhD in computer science from the University of Athens in 2004.

research associate professors

Research Associate Professors are typically researchers with several years' experience who assume a position of responsibility in leading the day-to-day activities of our research teams.

Dr. Domenico GIUSTINIANO

Research Associate Professor

Research: Battery-free IoT Networks; Large-scale Spectrum Analytics; 5G and Beyond Localization Systems

Personal Site

Short Bio

Dr. Domenico Giustiniano is Research Associate Professor (tenured) at IMDEA Networks Institute and leader of the Pervasive Wireless System Group. Before joining IMDEA, he was a Senior Researcher and Lecturer at ETH Zurich. He also worked for a total of four years as Post-Doctoral Researcher in industrial research labs (Disney Research Zurich and Telefonica Research Barcelona). He holds a PhD in Telecommunication Engineering from the University of Rome Tor Vergata (2008). Domenico Giustiniano holds an Executive Education from IE Business School on Management Fundamentals and Skills for Scientists and Researchers (2021) and is co-founder and board member of Sensory-Fi Ltd (LiFi4Food product), a startup providing IoT solutions for precision agriculture; co-founder and leader of the OpenVLC project, an open-source platform for research in visible light communication networks; and co-founder and board member of the non-profit Electrosense association, a crowdsourcing initiative for spectrum data analytics.

Dr. Sergey GORINSKY

Research Associate Professor

Research: Computer Networks; Distributed Systems; Network Economics

Personal Site

Short Bio

Dr. Sergey Gorinsky is with IMDEA Networks Institute since 2009 and leads the NetEcon (Network Economics) research group. Between 2010 and 2014, he was a Ramón y Cajal Fellow funded by the Government of Spain. From 2003 to 2009, Dr. Gorinsky served on the tenure-track faculty at Washington University in St. Louis, USA. He received his Ph.D. and M.S. degrees from the University of Texas at Austin, USA in 2003 and 1999 respectively and Engineer degree from MIET (Moscow Institute of Electronic Technology), Zelenograd, Russia in 1994. Dr. Gorinsky distinguished himself through extensive service to the profession, such as TPC chairing of ICNP 2017, general chairing of SIGCOMM 2018 and ICNP 2020, and membership in the TPCs of SIGCOMM 2012, 2016, 2022, NSDI 2024, and other major conferences. He won the Distinguished TPC Member Award of the INFOCOM conference for the record 7 times. Dr. Gorinsky also evaluated research proposals for the European Research Council, European Commission, COST Association, Swiss National Science Foundation, Israel Science Foundation, and other funding agencies.

Dr. Vincenzo MANCUSO

Research Associate Professor

Research: Performance Evaluation; Efficient and sustainable wireless access and edge networks; Network-embedded machine learning; Edge-assisted autonomous driving; Design of opportunistic and sliced mobile networks; Measurements and assessment of mobile networks

Personal Site

Short Bio

Dr. Vincenzo Mancuso is tenured Research Associate Professor at IMDEA Networks Institute, Madrid, Spain. Previously, he was with INRIA (Sophia Antipolis, France), Rice University (Houston, TX, USA) and University of Palermo (Italy), from where he obtained his MSc and PhD. He authored more than 160 peer-reviewed publications focusing on the analysis, design, and experimental evaluation of opportunistic and adaptive protocols and architectures for wireless and edge networks. He is currently focusing on performance evaluation and optimization of connect-compute architectures for wireless access/edge networks, which includes measurements and assessment of mobile networks and services, and on the use of machine learning techniques for the identification of the causes of network performance problems of networked cyber-physical systems.

Dr. Narseo VALLINA-RODRÍGUEZ

Research Associate Professor

Research: Cybersecurity, Network Measurements, Privacy

Personal Site

Short Bio

Narseo Vallina (Ph.D. at Cambridge University) is an Associate Research Professor at IMDEA Networks where he leads the Internet Analytics Group (IAG). He is also one of AppCensus' co-founders. Narseo's research interests fall in the areas of network measurements, cybersecurity, online privacy, and digital rights. Before joining IMDEA, he was a research scientist at ICSI at Berkeley (USA). Narseo's research efforts received best paper awards at prestigious conferences such as IEEE Symposium on S&P, USENIX Security, and ACM IMC, amongst others. For his contributions, he has been selected as ACM Senior Member and a Ramon y Cajal Fellow in 2021 and recceived the Medal "Jóvenes Investigadores" awarded by the Royal Academy of Engineering in Spain. Data Protection Agencies and key industry players have recognized the societal, regulatory and technical value of his work through distinctions such as a Google Faculty Fellowship, the AEPD Emilio Aced Award, the CNIL-INRIA Privacy Protection Award, or the Caspar Bowden PETS Award.

research assistant professors

Research Assistant Professors at IMDEA Networks Institute are bright researchers at the beginning of their research career, who want to establish a strong research group based on their research vision. They lead their own team of PhD Students and post-doctoral researchers. Research Assistant Professors are not required to teach, so they can focus full-time on research if they so wish.

Dr. Jaya Prakash Varma CHAMPATI

Research Assistant Professor

Research: Edge Intelligence, Quantum Networking
Personal Site

Short Bio

Jaya Prakash Champati is an Assistant Professor at IMDEA Networks Institute, where he leads the Edge Networks group. His current research focus is on efficient inference in Edge AI systems. Before joining IMDEA, he was a post-doctoral researcher at EECS, KTH Royal Institute of Technology, Sweden, where he significantly contributed to the Age of Information Analysis and Optimization. He obtained his PhD in Electrical and Computer Engineering from the University of Toronto, Canada in 2017. His PhD work on generalizations for scheduling on parallel processors was recognized through the Doctoral Completion Award and the Paul Biringer Scholarship, both awarded by the Department of Electrical and Computer Engineering, University of Toronto. He obtained his master of technology degree from the Indian Institute of Technology (IIT) Bombay, India in 2010, and worked at Broadcom Communications for two years, where he contributed to the 4G LTE MAC layer development. He was a Marie Skłodowska-Curie Actions (MSCA) postdoctoral fellow and recipient of the best paper award at the IEEE National Conference on Communications, India, 2011.

Dr. Guillermo SUÁREZ-TANGIL

Research Assistant Professor

Research: Cibersecurity and Cibercrime; Malware Analysis; Mass marking fraud; security and privacy in the social web
Personal Site

Short Bio

Guillermo Suarez-Tangil is Assistant Professor IMDEA Networks and a Ramon y Cajal Fellow. His research focuses on modeling emerging threats in online communities and ing effective mitigation strategies. His background is on systems security and malware analysis and detection. In particular, in the study of smart malware, ranging from the detection of advanced obfuscated malware to automated analysis of targeted malware. Guillermo has been Assistant Professor at King's College London (KCL). Before joining KCL, he has been senior research associate at University College London (UCL) where he has explored the use of program analysis to study malware. He has also been actively involved in other research directions aiming at detecting and preventing of Mass-Marketing Fraud (MMF) and security and privacy in the social web. Prior to that, he held a post-doctoral position at Royal Holloway, University of London (RHUL) where he was part of the development team of CopperDroid, a tool to dynamically test malware that uses machine learning to model malicious behaviors. He also holds a solid expertise on building novel data learning algorithms for malware analysis. He obtained his PhD on smart malware analysis in Carlos III University of Madrid with distinction and received the Best National Student Academic Award, a competitive award given to the best Thesis in the field of Engineering between 2014-2015 with about 1% acceptance rate (about 100 Cum Laude Thesis were invited to compete for the only award).

IMDEA Networks Faculty researchers

senior researchers

Senior Researchers at IMDEA Networks Institute are experienced post-doctorate researchers who are starting to establish their own research area and building their own team of pre-doctorate researchers (PhD students).

Dr. Jose AGUILAR

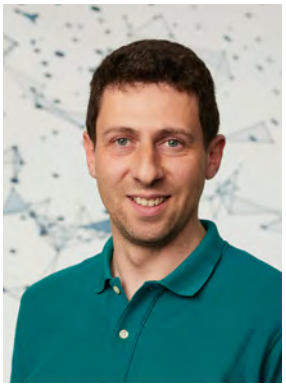
Senior Researcher

Research: Artificial intelligence; parallel and distributed systems; control systems; combinatorial optimization

Personal Site

Short Bio

Jose Aguilar received the B. S. degree in 1987 (Universidad de Los Andes-Venezuela), the M. Sc. degree in 1991 (Universite Paul Sabatier-France), and the Ph.D degree in 1995 (Universite Rene Descartes-France). He was a Postdoctoral Research Fellow in the Department of Computer Sciences at the University of Houston (1999-2000), and of the H2020-MSCA-COFUND-EU programme in the Department of Automática at the Universidad de Alcala (2020-2022). He has been full Professor at the Universidad de Los Andes, Venezuela, and EAFIT University, Medellín, Colombia. He is a Senior Researcher at IMDEA (Madrid Institute for Advanced Studies), in Madrid, Spain. He is member of the Mérida Science Academy and President of CLEI (Centro Latinoamericano de Estudios en Informática). He has published more than 650 papers and 10 books in journals, books and proceedings of international conferences. Dr. Aguilar has been a visiting research/professor in different universities/laboratories, coordinator or inviting research in more than 20 research/industrial projects, and supervised more than 20 Doctoral Thesis.



Dr. Claudio FIANDRINO

Senior Researcher

Research: Explainable and Robust AI; 5G network measurements

Personal Site

Short Bio

Claudio is a Ramón y Cajal Fellow and a Senior Researcher at IMDEA Networks Institute. He currently leads the Resilient AI Networking sub-group within the Wireless Networking Group (WNG). He obtained his Ph.D. degree at the University of Luxembourg in 2016. Claudio was a Visiting Ph.D. Student at Clarkson University, Potsdam, NY, US in 2016 and a José Castillejo/Fulbright visiting researcher at Northeastern University, Boston, MA, US in 2022. For his research, Claudio received several funding awards (Ramón y Cajal and Juan de la Cierva fellowships) and 6 Best Paper Awards (including the IEEE INFOCOM 2024). Claudio is member of the Editorial Board team of IEEE Networking Letters, for IEEE ComSoc EMEA is Voting Member during 2024-2025 and was Chair of the Awards Committee for 2022-2023.

Dr. Marius PARASCHIV

Senior Researcher

Research: Quantum Information; Quantum Communications; Quantum Machine Learning

Personal Site

Short Bio

Joined the Human Centric Data Economy group of Prof. Nikolaos Laoutaris in April 2019. His primary research interests are in geometric deep learning (application of machine learning algorithms to graph data). Prior to this, he has worked on a series of projects and collaborations with other IMDEA faculty members, including a comprehensive study of domain classification services and their relative inconsistencies as well as producing a computer vision model. A second research interest is related to the notions of “data value” and the value of individual data providers to a particular service, from an economic but also an information-theoretic perspective.

post-doc researchers

Post-doctoral Researchers at IMDEA Networks Institute are early-stage, post-doctorate researchers who are looking to establish their research career, working with top research professors and a team of young, pre-doctorate researchers (PhD students).

Dr. Santiago ANDRÉS

Post-Doc Researcher

Research: Data Economics; Artificial Intelligence; Machine Learning; Federated Learning; Data Marketplaces; Business Models; Regulation; Networking; Network Economics and Techno-economic analysis

Personal Site

Short Bio

Santiago works as a post-doctoral researcher in the field of data economics at IMDEA Networks Institute in Madrid. He has wide experience in ICT consulting with relevant projects relating to regulation, public policy, strategy, and operations, working for telcos, regulatory authorities, and governments in more than 25 countries in America and EMEA. He received a PhD in Telematics Engineering from UC3M, a Master of Arts in Economics from UNED, and an MSc in Telecom Engineering from UPM. He has published relevant papers related to the value of data in top computer science conferences and journals like IEEE ICDE, ACM Sigmod Record, and ACM SIGSPATIAL.

Dr. Constantine AYIMBA

Post-Doc Researcher

Research: Machine Learning; Cloud/Edge Computing; Explainable Artificial Intelligence; Connected vehicles

Personal Site

Short Bio

Constantine is a Post-Doc Researcher at IMDEA Networks Institute. He received his PhD. in Telematics Engineering in 2022 from University Carlos III in Madrid and an MSc. in Wireless Communication from Lund University in 2015. His research interests are at the intersection of network services and machine learning. He has several years professional experience working in the telecommunication industry in Sub Saharan Africa.

Dr. Antonio BAZCO-NOGUERAS

Post-Doc Researcher

Research: Edge Computing; Machine Learning; Wireless Networking; Information theory

Personal Site

Short Bio

Dr. Antonio Bazco-Nogueras is a postdoctoral researcher at IMDEA Networks Institute and recipient of the "Atracción de Talento" grant. He joined both the Network Data Science group and the Opportunistic Architectures Lab in 2021. His research is currently focused on embedding intelligence in the network and studying explainable and energy-efficient ML/AI solutions tailored for communications, and his research interests include distributed systems, information theory, Artificial Intelligence, and probability theory. He obtained a Ph.D. degree in Telecommunications from Sorbonne Université in 2019. Before joining IMDEA, he was a post-doctoral researcher at EURECOM (France) from 2020, and previously he was a predoctoral researcher at Mitsubishi Electric R&D Centre Europe (France) from 2016 to 2019. He was also a Visiting Scholar with the Center for Pervasive Communications and Computing (CPCC) at University of California–Irvine.

Dr. Adarsh Prasad BEHERA

Post-Doc Researcher

Research: Machine Learning, Edge Intelligence, Computer Vision, Wireless Communication, and IoT

Personal Site

Short Bio

Adarsh is currently working as a Postdoc researcher at IMDEA Networks Institute, Spain, in the Edge Networks lab. He received his Master's degree in Wireless Communication Engineering and PhD degree in Machine Learning from the Indian Institute of Information Technology (IIIT) Allahabad, India, in 2022. Prior to joining IMDEA, he worked as a Decision Scientist in FIGHTRIGHT Technologies Private Limited, India for 9 months (March-December 2022). He also worked as a Teaching and Research Assistant (TRA) in IIIT Allahabad, India, in 2021-2022.

Dr. Elisa CABANA

Post-Doc Researcher

Research: Machine Learning; Statistics; Robust data analysis; Outlier detection; Mobile network data; Watermarking; Data economics

Personal Site

Short Bio

Elisa holds a PhD in Mathematical Engineering by the University Carlos III of Madrid (UC3M). Before that she finished her Lic. degree in Mathematics and the master program at UC3M. She also worked as an Assistant Professor in the Statistics lecture in UC3M during the PhD. Elisa's research gives rise to a new methodology for outlier detection, robust regression, robust classification and quality control, with advantageous performance in case of high dimensional data and high levels of contamination, with application in neuroscience, environmental studies, health and other fields. Her work resulted in several presentations at both national and international congresses and research papers published in Scientific Journals of high quality. Now she is a post-doctoral researcher at the IMDEA Networks Institute in Madrid, in the Data Transparency Lab.

Dr. Javad DOGANI

Post-Doc Researcher

Research: Distributed Systems, Cloud/Edge/Fog Computing, Federated Deep Learning, Parallel Computing, and Big-Data Processing

Personal Site

Short Bio

Javad Dogani is a postdoctoral researcher at IMDEA Networks Institute, Madrid, Spain, where he joined the Data Transparency research group in October 2023. His ongoing research pursuits include the development of federated learning models customized to the specific requirements of distributed platforms, such as those employed in edge and fog computing. Javad received his M.Sc. degree in software engineering from Shiraz University in 2012 and completed his Ph.D. in software engineering from the same university in 2023. Before joining IMDEA, he served as a Teaching and Research Assistant at Shiraz University in Iran for nine months, from January to September 2023. Over the last eight years, he has amassed substantial teaching experience, instructing various computer science courses. He also held the Teaching and Research Assistant position at University of Hormozgan in Bandar-abbas, Iran, from 2014 to 2018.

Dr. Livia Elena CHATZIELEFTHERIOU

Post-Doc Researcher

Research: Online Learning; Optimization; Explainable AI

Personal Site

Short Bio

Livia Elena Chatzieleftheriou is a Juan de la Cierva awardee and postdoctoral researcher with the IMDEA Networks Institute, and a part-time Lecturer with the University Carlos III of Madrid (UC3M). She holds an M.Sc. in applied mathematics and a Ph.D. in Computer science. Her current research interests include online learning, optimization, and explainable AI for next-generation mobile networks.

Dr. Augusto GARCÍA

Post-Doc Researcher

Research: Artificial Intelligence in Medicine
Personal Site

Short Bio

Augusto Garcia-Agúndez studied Industrial Engineering at Universidad Politecnica de Madrid and completed his PhD in electronic engineering at TU Darmstadt. Currently, he is a postdoctoral researcher in Antonio Fernandez Anta's Global Computing group residing at Brown University as part of a Marie Skłodowska-Curie Global Fellowship Action.

Dr. Michele GUCCIARDO

Post-Doc Researcher

Research: Network Programmability, Network Intelligence, Beyond 5G
Personal Site

Short Bio

Michele Gucciardo is a postdoctoral researcher at IMDEA Network Institute, Spain. He received his B.Sc. and M.Sc. degrees in Telecommunications engineering respectively from Politecnico di Milano, Italy, and from the University of Palermo, Italy. He received a Ph.D. in ICT from the University of Palermo, Italy. His research activity has focused on wireless networks, with an interest on IoT access networks. More recently, he has focused on ML in programmable data planes for beyond 5G systems.

Dr. Blas KOLIC

Post-Doc Researcher

Research: Mathematical Modeling; Opinion Dynamics; Network Science; Agent-based Modeling; and Complex and Dynamic Systems.
Personal Site

Short Bio

Blas is a postdoctoral fellow at IMDEA Networks and IBiDat Institute at Universidad Carlos III de Madrid. His research draws from dynamical systems, complex systems, and network science. It focuses, on the one hand, on studying the behavior and evolution of norms and opinions in social networks, and, on the other hand, on estimating the latent states of statistical and agent-based models based on aggregate observations. Lately, he has drawn interest in the interpretability and fairness of machine learning models. Blas has a PhD in Mathematics from the University of Oxford under the supervision of Prof. Doyne Farmer, where he formed part of the Complexity Economics group of the Institute for New Economic Thinking at the Oxford Martin School. He has also worked with the World Bank Group as a data analyst and participated in numerous conferences, seminars, and competitions. Blas did his undergraduate studies in Physics at the Universidad Nacional Autónoma de México, Mexico. Besides his academic career, he is passionate about music.

Dr. Diego MADARIAGA

Post-Doc Researcher

Research: Machine Learning for Networking; Data Science; Network Measurements
Personal Site

Short Bio

Diego Madariaga is a postdoctoral researcher at IMDEA Networks Institute, in the Network Data Science (NDS) group. He received his PhD in Computer Science from the University of Chile in 2023. During his PhD, he carried out substantial research grounded on traffic measurements and the realization of experimental platforms for anticipatory networking, mainly focusing on topics related to network protocols and network monitoring. Currently, his research focuses on the analysis, characterization, and modeling of mobile network traffic.

Dr. Timothy OTIM

Post-Doc Researcher

Research: Positioning and navigation systems; mobile communications; channel modelling; transportation research; statistical modelling

Personal Site

Short Bio

In 2021, Timothy Otim worked as a Post-Doc Researcher at the German Aerospace Centre (DLR) in Wessling, Germany. Currently, he is working as a Post-Doc Researcher on 5G positioning at IMDEA Networks Institute in Madrid, Spain.

Dr. Juan Marcos RAMIREZ

Post-Doc Researcher

Research: Interpretable Models; Machine Learning; Mobile Networks

Personal Site

Short Bio

Juan Marcos Ramírez Rondón received the B.S. diploma in electrical engineering, the Master's degree in biomedical engineering, and the Doctor's degree in applied sciences at the Universidad de Los Andes (ULA), Mérida, Venezuela, in 2002, 2007, and 2017, respectively. In 2004, he joined as a teaching and research staff of the Electrical Engineering Department at ULA, Venezuela. He worked as a postdoctoral intern at the High Dimensional Signal Processing (HDSP) Group, Universidad Industrial de Santander, Colombia (2017-2019). He also worked as Marie Curie Postoctoral fellow at the Universidad Rey Juan Carlos (2017-2019). Currently, he is working as a Postdoctoral Researcher at IMDEA Networks Institute.

Dr. Giuseppe SANTAROMITA

Post-Doc Researcher

Research: Wireless Networks; 5G; Localization

Personal Site

Short Bio

Dr. Giuseppe Santaromita joined the Pervasive Wireless Systems Group led by Dr. Domenico Giustiniano at IMDEA Networks in May 2020. He received his Ph.D. in Information and Communication Technologies at the University of Palermo (Italy), with a focus on physical layer flexibility to improve the performance of high-capacity and ultra-dense wireless networks. He is a member of IEEE and ACM. His main research interest at IMDEA involves low latency-high accuracy localization methods for wireless networks, and the implementation of an experimental 5G New Radio framework based on the popular opensource software OpenAirInterface and able to collect useful measurements for positioning.

Dr. Syed WAQAS HAIDER SHAH

Post-Doc Researcher

Research: 5G and beyond cellular networks; device-to-device communication; reconfigurable intelligent surfaces; analytical analysis of mobile networks; quality-of-service provisioning

Personal Site

Short Bio

Syed is a Marie Skłodowska-Curie Actions postdoctoral fellow at IMDEA Networks, Madrid, Spain. He joined the Wireless Networking Group in September 2022. He received a master's degree in electrical engineering from the National University of Science and Technology, Islamabad, Pakistan in 2016, and a Ph.D. degree in electrical engineering from Information Technology University, Lahore, Pakistan in 2021. From 2019 to 2021, he was a split-site Ph.D. Scholar with the Computer Laboratory, Department of Computer Science and Technology, University of Cambridge, UK, where he worked under the supervision of Prof. Jon Crowcroft. He has published in highly reputed venues, such as IEEE *INFOCOM*, *IEEE ICC*, *IEEE Wireless Communication Letters*, *IEEE Transactions on Vehicular Technology*, *IEEE Transactions on Green Communication and Networking*, *Elsevier Computer Networks*, and *Transactions on Emerging Telecommunication Technologies*. He is also a reviewer of many international journals and conferences.

visiting professors/researchers

Visiting Professors share our research interests and spend their sabbatical with us for either one or two terms. They usually have several years' post-doctoral research experience and are interested in extending their horizons with a temporary assignment in a new environment.

Dr. Joaquín ÁLVAREZ

University of origin: Universidad de Alcalá, Madrid, Spain

Short Bio

Joaquín Álvarez-Horcajo (PhD'20) obtained his PhD in Information and Communication Technologies engineering from the University of Alcala in 2020. After having worked at Telefonica as a test engineer for COFRE and RIMA networks, he was awarded a grant for university professor training (FPU) at the University of Alcala. At present, he currently works as an Assistant Professor in the University of Alcala where his current research interests encompass Software Defined Networks (SDN), Internet protocols, new generation protocols and data center networks. He has participated in various competitive projects funded through the Community of Madrid plan, such as TIGRE5-CM and TAPIR-CM.

Dr. Markus FIDLER

University of origin: Leibniz University Hannover, Germany

Short Bio

Markus Fidler is a professor for communications networks and the director of the Institute of Communications Technology at Leibniz University Hannover, Germany. After graduating in electrical engineering in 1997 from RWTH Aachen University, he was a systems engineer in mobile communications at Hagenuk Telecom and at Alcatel SEL. In 2004 he received his doctoral degree in computer engineering from RWTH Aachen University. As a postdoctoral researcher, he worked at the Institute Mittag-Leffler at KTH Stockholm, at NTNU Trondheim, the University of Toronto, and TU Darmstadt, where he received his habilitation degree in communications networks end of 2008. He was admitted to the Emmy Noether programme of the German Research Foundation in 2005 and he was awarded a Starting Grant of the European Research Council in 2012.

Dr. Matthias HOLLICK

University of origin: Technical University of Darmstadt, Germany

Short Bio

Matthias Hollick is a Full Professor of Computer Science at the Technical University of Darmstadt where he is heading the Secure Mobile Networking Lab (SEEMOO) since 2009. He is co-affiliated with the Department of Electrical Engineering and Information Technology Department. His research has been published at top venues such as ACM CoNEXT, ACM IMWUT, ACM MobiCom, AMC MobiSys, ACM Sigmetrics, ACM WiSec, EWSN, IEEE ComST, IEEE JSAC, IEEE Infocom, IEEE JioT, IEEE S&P, IEEE TMC, IEEE/ACM ToN, NDSS, PETS, USENIX Security, and other renowned venues in the topic area of mobile and wireless systems as well as cybersecurity and privacy.
The research of Prof. Hollick's team has been awarded with more than 15 best paper and demo awards including at ACM CHI, ACM MobiCom, ACM IMWUT, EWSN, ACM WiSec, and IEEE DOCSS in recent years. The results of his research found their way into numerous highly visible open source software projects.

Dr. Ivan RAPAPORT

University of origin: University of Chile

Short Bio

Ivan Rapaport is a Full Professor of the Department of Mathematical Engineering of the University of Chile. He obtained a PhD in Computer Science at the École Nórmale Supérior de Lyon in 1999. He has worked in many different issues related to networks: from cellular automata to genetic networks. His main interest, now, lies in distributed computing. In particular, in the problem of checking whether a given network has particular structural properties (such as being planar, k-colorable, etc).

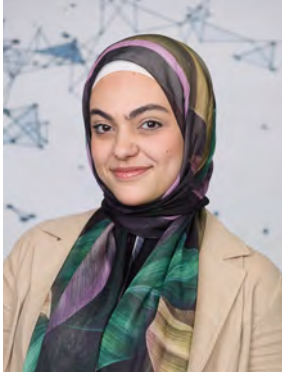
pre-doc researchers

Our PhD Students are young, aspiring researchers who occupy a salaried position in our research team whilst undertaking their Ph.D. at a leading Madrid University for up to five years. Most of these pre-doc researchers enter the Ph.D. program at University Carlos III of Madrid (UC3M). IMDEA Networks Institute has a far-reaching collaboration agreement with UC3M, which includes the provision of a Postgraduate program for our early-stage researchers. In the future, we may have similar arrangements with other Madrid Universities.

IMDEA Networks research team of postdocs, pre-doctoral researchers, engineers and internship students

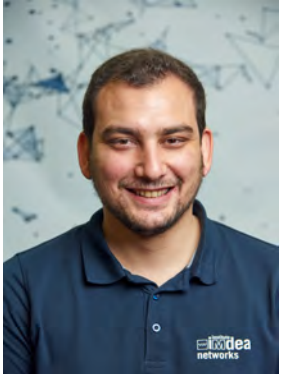
Aristide Tanyi Jong AKEM
Pre-Doc Researcher

BSc: Telecommunications Engineering - University of Yaounde I. Yaounde, Cameroon
MSc: Electrical and Computer Engineering - Carnegie Mellon University Africa. Kigali, Rwanda
Previous Position: Graduate Teaching Assistant, Carnegie Mellon University Africa, Kigali, Rwanda
Research: Machine Learning; Programmable Networks; Network Intelligence



Ghina AL ATAT
Pre-Doc Researcher

BSc: Physics with minors in Mathematics, Computer Science, and Computational Science - American University of Beirut (AUB). Beirut, Lebanon.
MSc: Computational Science – AUB. Beirut, Lebanon.
Previous Position: Research Assistant at Suliman S. Olayan School of Business, AUB, Beirut, Lebanon. Teaching Assistant at Physics Department, AUB, Beirut, Lebanon.
Research: Learning at the Edge; Edge Computing; Edge Intelligence; Design of Algorithms; Decision Making



Sergi ALCALÁ-MARÍN
Pre-Doc Researcher

BSc: Telecommunications Engineering - Universitat Politècnica de Catalunya. Spain
MSc: Advanced Telecommunication Technologies - Universitat Politècnica de Catalunya. Spain
Previous Position: Manager. Universitat de Barcelona. Spain
Research: Beyond 5g, Deep Learning, Wireless communications, Network performance analysis, Network performance measurement; Mobile networks

Nikolaos APOSTOLAKIS
Pre-Doc Researcher

Integrated Master (BSc + MSc): Eletrical and Computer Engineering - National Technical University of Athens. Athens, Greece
Previous position: Network Software Engineer - Intracom Telecom. Paiania, Greece
Research: Network automation; Cloud orchestration; Deep Reinforcement Learning

Vinuri BANDARA
Pre-Doc Researcher

BSc: Information Systems - University of Colombo. Sri Lanka
MSc: Sofware and Systems - Universidad Politécnica de Madrid (UPM). Madrid, Spain
Previous Position: Research Engineer, Score Lab, Sri Lanka
Research: Android Privacy and Security; Network security

Beyza BÜTÜN
Pre-Doc Researcher

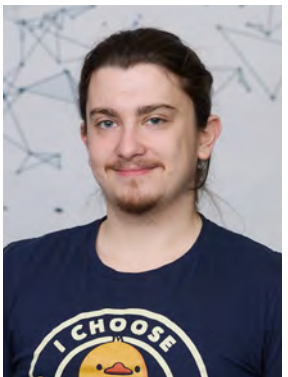
BSc: Computer Engineering - Middle East Technical University. Ankara, Turkey
MSc: Computer Engineering - Middle East Technical University. Ankara, Turkey
Research: Machine Learning, Programmable Networks, Sustainable Network Intelligence, Energy Consumption Measurements and Optimization

Tianyue CHU
Pre-Doc Researcher

BSc: Double Bachelor's Degree. Mathematics and Applied Mathematics & Finance - Shenzhen University. Shenzhen, China
MSc: Statistics - Shenzhen University. Shenzhen, China
Previous position: Research Assistant. Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences. Shenzhen. China
Research: Machine learning; Statistics

Alan COLLET
Pre-Doc Researcher

BSc: Engineering Sciences - Polytechnic Institute of Bordeaux. Bordeaux, France
MSc: Telecommunication Engineering - ENSEIRB-MATMECA. Bordeaux, France
MSc: Computer Sciences - Illinois Institute of Technology. Chicago, United States
Research: Apply AI to networks; network intelligence; intent-based networking



Alejandro Tjaarda DE COCK
Pre-Doc Researcher

BSc: Telecommunications, specialization in Sound and Image – University Carlos III of Madrid. Madrid, Spain
MSc: Internet of Things – University Carlos III of Madrid. Madrid, Spain
Research: Quantum communications networks and network virtualization

Sai Pavan DERAM
Pre-Doc Researcher

BSc: Electronics and communications engineering - SASTRA University. India
MSc: Communication and signal processing - TU Ilmenau, Germany
Previous position: Research Assistant. Communications Reseach Laboratory, TU Ilmenau, Germany
Research: mmWave communications, Physical layer signal processing, parameter estimation techniques

Sergio DÍAZ ARANDA
Pre-Doc Researcher

BSc: Mathematics – Complutense University. Madrid, Spain
MSc: Mathematics – Complutense University. Madrid, Spain
MSc: Statistical-Computational Treatment of Information – Complutense University. Madrid, Spain
Previous position: Research Assistant at the UC3M-Santander Big Data Institute, Madrid, Spain
Research: social networks; statistics; data science; discrete mathematics

Stavros ELEFTHERAKIS
Pre-Doc Researcher

BSc: Mathematics - University of Crete. Heraklion, Greece
MSc: Applied and Computational Mathematics - University of Crete. Heraklion, Greece
MSc: Telecommunications Engineering – University Carlos III of Madrid. Madrid, Spain
Previous position: Teaching Assistant. Department of Mathematics and Applied Mathematics. University of Crete
Research: 5G Localization, Wireless Sensing, Artificial Intelligence, Network Privacy, Applied Mathematics

Andrea FRESA
Pre-Doc Researcher

BSc: Computer Engineering - University Federico II. Naples, Italy
MSc: Computer Engineering - University Federico II. Naples, Italy
Previous Position: Master Thesis Worker. Ericsson Research. Jorvas, Finland
Research: Edge Computing; Edge Intelligence; Design of Algorithms; IoT

Dayrene FRÓMETA
Pre-Doc Researcher

BSc: Electronics and Telecommunication Engineering - Technological University of Havana José Antonio Echeverría (CUJAE). Havana, Cuba
MSc: Communication Systems - Pontifical Catholic University of Rio de Janeiro (PUC-Rio). Rio de Janeiro, Brazil
Previous Position: Lecturer. Department of Telematics, Technological University of Havana José Antonio Echeverría (CUJAE). Havana. Cuba
Research: Next Generation Wireless Networks; Visible Light Communication (VLC); LiFi systems; Millimeter-wave (mm-wave) systems

Vahid GHAFOURI
Pre-Doc Researcher

BSc: Industrial Engineering - Sharif University. Tehran, Iran
MSc: Business Analytics - Sabanci University. Istanbul, Turkey
Research: Polarization and Radicalization on Social Media

Khasa GILLANI
Pre-Doc Researcher

BSc: Information Technology - PMAS Arid Agriculture University Rawalpindi. Rawalpindi, Pakistan
MSc: Software Engineering - Sangmyung University. Seoul, South Korea
Previous position: Research Assistant - Sangmyung University. Seoul, South Korea
Research: 5Growth; Mobile Edge Computing (MEC)

Aniketh GIRISH
Pre-Doc Researcher

BSc: Computer Science - Amrita Vishwa Vidyapeetham. Kerala, India
MSc: Cybersecurity - University Carlos III de Madrid. Madrid, Spain
Previous position: Research Associate - IIJ Innovation Institute, Tokyo, Japan
Research: Privacy and Security; Regulatory Compliance; IoT

Alexandr GOULTIAEV TOLSTOKOROV
Pre-Doc Researcher

BSc: Electronic Engineering - Trinity College Dublin. Dublin, Ireland
MSc: Electronic Engineering - Trinity College Dublin. Dublin, Ireland
Research: Distributed Machine Learning; Data Economy; Data Valuation; and Federated Learning

Nina GROSHEVA
Pre-Doc Researcher

BSc: Telecommunication and Information Engineering. Ss. Cyril and Methodius University. Skopje. North Macedonia
MSc: Communications Engineering - RWTH Aachen University. Aachen, Germany
Previous Position: Intern. German Aerospace Center. Oberpfaffenhofen, Germany
Research: Millimeter-Wave Networking, Joint Communication and Sensing, Network Simulation (ns-3)

Behafarid HEMMATPOUR
Pre-Doc Researcher

BSc: Physics - Ferdowsi University of Mashhad. Mashhad, Iran
MSc: Statistical Physics and Complex Systems - Shiraz University. Shiraz, Iran
Research: Machine Learning; Intelligent Transportation; Spatiotemporal Data; Smart Cities; Computational Epidemiology

Rita INGABIRE
Pre-Doc Researcher

BSc: Electrical Engineering - Makerere University. Kampala, Uganda
MSc: Information Systems - Makerere University. Kampala, Uganda
Previous Position: Senior Engineer. MTN Uganda
Research: Interpretable machine learning; Edge/Cloud design; Intelligent Network design

Devriş IŞLER
Pre-Doc Researcher

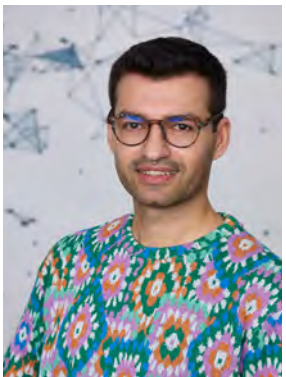
BSc: Computer Science and Engineering - Gaziantep Zirve University. Gaziantep, Turkey
MSc: Computer Science and Engineering - Koç University. İstanbul, Turkey
Previous position: Research Assistant. KU Leuven. Leuven, Belgium
Research: Applied cryptography privacy; usable security; data transparency and protection

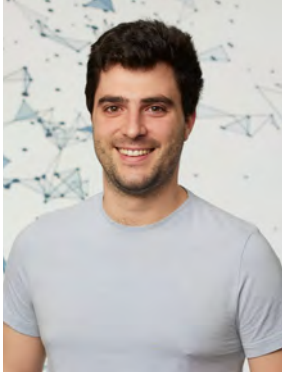
Arivarasan KARMEGAM
Pre-Doc Researcher

BSc: Computer Science and Engineering - Ramco Institute of Technology. Rajapalayam, India
MSc: Computer Science and Engineering - Indian Institute of Technology (Indian School of Mines). Dhanbad, India
Research: Blockchain and Distributed Ledger Technology

Naicheng LI
Pre-Doc Researcher

BSc: Optoelectronic Information Science and Technology - Nanjing University of Science and Technology. China
MSc: Computer Systems and Networks - Chalmers University of Technology. Sweden
Research: Federal Learning; Privacy Preserving





Yago LIZARRIBAR
Pre-Doc Researcher

BSc: Industrial Technologies Engineering - University of Navarra. San Sebastián, Spain
MSc: Mechanical Engineering - University of Navarra. San Sebastián, Spain
Previous Position: Research Assistant. Massachusetts Institute of Technology. Cambridge. MA. USA
Research: Collaborative Spectrum Sensing; Distributed Systems; Machine Learning

Leonardo LO SCHIAVO
Pre-Doc Researcher

BSc: Computer Science Engineering - Università degli Studi di Catania. Catania, Italy
MSc: Communications and Computer Networks Engineering - Politecnico di Torino. Turin, Italy
Previous position: Project Implementation Engineer at Amadeus IT Group. Nice. France
Research: Software-defined Networking; 5G cellular networks; O-RAN; Machine Learning

Blanca LÓPEZ
Pre-Doc Researcher

BSc: Physics - University of Seville. Seville, Spain
MSc: Physics and Mathematics – University of Granada. Granada, Spain
Research: Quantum communications

José Pedro MARTÍN YUBERO
Pre-Doc Researcher

BSc: Telecommunications Engineering – University Carlos III of Madrid. Madrid, Spain
MSc: Quantum technologies and engineering – University Carlos III of Madrid. Madrid, Spain
Research: Quantum Internet

Orlando E. MARTÍNEZ-DURIVE
Pre-Doc Researcher

BSc: Computer Science - University of Havana. Havana, Cuba
MSc: Computer Science - University of Havana. Havana, Cuba
Previous position: Researcher at the Faculty of Physics, University of Havana, Cuba
Research: Remote sensing; population estimation; land usage detection; mobile networks metadata

Amir MEHRJOO
Pre-Doc Researcher

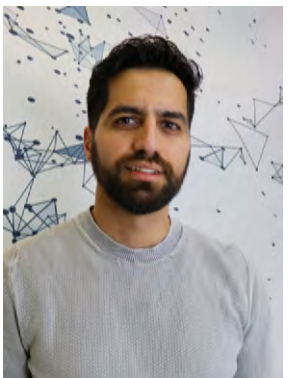
BSc: Mechanical Engineering - Shiraz University. Shiraz, Iran
MSc: Business and Finance (Marketing Specialization) - University Carlos III of Madrid. Madrid, Spain
Previous position: Teaching Assistant. University Carlos III of Madrid. Spain
Research: Algorithmic Bias, Social conflict, Fraud detection

Louis MIERMONT
Pre-Doc Researcher

MSc: ESIEA - Graduate School of Engineering, France
Research: Cybersecurity, Machine Learning, AI

Mariella MISCHINGER
Pre-Doc Researcher

BSc: Computer Science - Technical University of Munich. Munich, Germany
MSc: Computer Science - Technical University of Munich. Munich, Germany
Previous position: IT Product Owner / Project Manager at Unternehmer-TUM GmbH, Munich, Germany
Research: Cybersecurity; Malware; Crime; Fraud



Sachit MISHRA
Pre-Doc Researcher

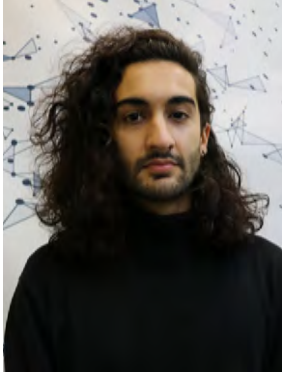
BSc: Electronics and Communication Engineering - Jaypee University of Engineering and Technology. Guna, India
MSc: Computer Engineering - Politecnico di Torino. Turin, Italy
Previous position: Software Developer. Accenture Private Ltd.
Research: Mobile traffic analysis and modeling

Serly MOGHADAS GOLIAN
Pre-Doc Researcher

BSc: Electrical and Electronics Engineering – Urmia University of Technology (Urmia, Iran)
MSc: Communications Systems Engineering – Urmia University (Urmia, Iran)
Research: Explainable AI, Machine Learning, Mobile Networks

Bei OUYANG
Pre-Doc Researcher

BSc: Electrical and Information Engineering - Beijing Institute of Technology. Beijing, China
MSc: Electrical and Computer Engineering - Rice University. Houston, United States
Previous Position: Research Intern, Microsoft Research Asia, Shanghai, China
Research: Integrated Sensing and Communication; mmwave; wireless systems



Jesús PÉREZ-VALERO
Pre-Doc Researcher

BSc: Telematics Engineering - Technical University of Cartagena. Cartagena, Spain
MSc: Telecommunications Engineering - Technical University of Cartagena. Cartagena, Spain
Research: Mathematical Optimization; Statistical Modeling; Performance Analysis and Ultra-Reliable B5G Networks

Leonardo PERONI
Pre-Doc Researcher

BSc: Informatic and automatic engineering - Università “La Sapienza” di Roma. Rome, Italy
MSc: Mechatronic Engineering - Politecnico di Torino. Turin, Italy
Previous position: Technology Consultant. Hesplora. Florence. Italy.
Research: Machine learning; Computer Networks; Control theory

Alfonso RODRÍGUEZ
Pre-Doc Researcher

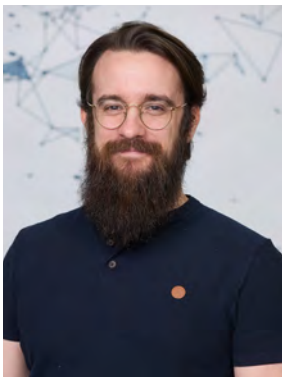
BSc: Computer Science and Engineering - Carlos III University. Madrid, Spain
MSc: Informatics Engineering - Carlos III University. Madrid, Spain
MSc: Cybersecurity - Carlos III University. Madrid, Spain
Research: Metaverse, Security & Privacy, Reversing XR/VR Applications

Pablo SAUCEDO DE MIGUEL
Pre-Doc Researcher

BSc: Computer Engineering - Autonomous University. Madrid, Spain
MSc: Internet of Things - Politechnic University. Madrid, Spain
Research: TinyML, Distributed Computing, Integrated Sensing and Communications, mmWave

Alessio SCALINGI
Pre-Doc Researcher

BSc: Computer Engineering - University of Naples Federico II. Naples, Italy
MSc: Computer Engineering - University of Naples Federico II. Naples, Italy
Previous position: Data Engineer. Alliance Healthcare
Research: Pervasive Wireless Systems; Anomaly Detenction

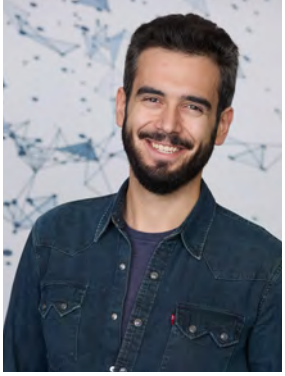


Salil SHARMA
Pre-Doc Researcher

BSc: Electronics & Communications Engineering - Rajasthan Technical University. Kota, India
MSc: Communication Systems Design - Indian Institute of Information Technology, Design & Manufacturing, Kancheepuram. Chennai, India
MSc: Mobile Computing Systems - Eurecom. Sophia Antipolis, France
Research: Integrated Sensing and Communication; Signal Processing Algorithms; mm-wave

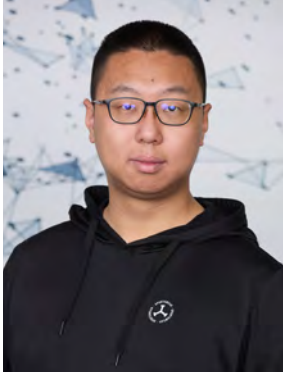
Francesco SPINELLI
Pre-Doc Researcher

BSc: Cinema and Media Engineering - Politecnico di Torino. Torino, Italy
MSc: Communications and Computer Network Engineering - Politecnico di Torino. Torino, Italy
Previous Position: R&D Engineer. Telecom ParisTech. Paris, France
Research: Multi-Access Edge Computing; AI; NFV



Javier TALAVANTE
Pre-Doc Researcher

BSc: Audiovisual Systems Engineering - University Carlos III of Madrid. Madrid, Spain
MSc: Telecommunication Engineering - University Carlos III of Madrid. Madrid, Spain
Previous Position: Research assistant. Infrared Lab UC3M. Madrid, Spain
Research: Visible Light Communication (VLC), LiFi systems, VLC backscatter, Battery-free IoT devices



Junlang WANG
Pre-Doc Researcher

BSc: Information Security - Xi'an University of Posts and Telecommunications, China
MSc: Computer Systems and Networks - Chalmers University of Technology, Sweden
Research: Distributed system

Nipuna WEERASEKARA
Pre-Doc Researcher

BSc: Information Systems (Honors) - University of Colombo. Colombo, Sri Lanka
MSc: Sofware and Systems - Universidad Politécnica de Madrid (UPM). Madrid, Spain
Research: Android Privacy and Security; Network security

André ZANELLA
Pre-Doc Researcher

BSc: Electrical Engineering - Universidade Federal do Paraná (UFPR). Curitiba, Brazil
MSc: Electrical Engineering - Universidade Federal do Paraná (UFPR). Curitiba, Brazil
Research: Remote Sensing; Mobile Network Metadata; Networks Data Science

external PhD students

Our External PhD Students are young, aspiring researchers who are supervised or co-supervised by a member of the IMDEA Networks' research team. Most of the External PhD Students to IMDEA Networks are undertaking the Ph.D. program at University Carlos III of Madrid (UC3M).

Miguel Ángel BERMEJO

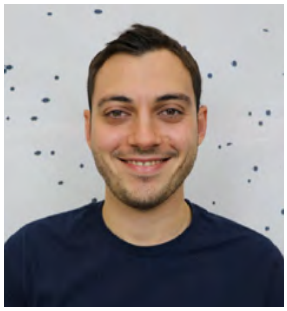
Pre-Doc Researcher

BSc: Telecommunications Engineering - Universidad Politécnica de Madrid (UPM). Madrid, Spain
MSc: Data Science - Universitat Oberta de Catalunya (UOC). Barcelona, Spain
Previous Position: Telecommunications Engineer. Lisbon, Portugal
Research: Online advertising; Internet measurements; Data Analytics; Machine Learning

Vittorio PRODOMO

External PhD Student

BSc: Computer Engineering - University of Naples Federico II. Naples, Italy
MSc: Computer Engineering - Networks and Internet - University of Naples Federico II. Naples, Italy
Research: Machine Learning for Mobile Networks



Antonio RUSSO

External PhD Student

BSc: Computer Science Engineering. Università degli Studi di Napoli Federico II. Naples. Italy
MSc: Computer Science Engineering. Università degli Studi di Napoli Federico II. Naples. Italy
Previous Position: Teaching Assistant. Cybersecurity Academy (Università di Napoli Federico II). Naples. Italy
Research: blockchain; applied cryptography; network security; distributed systems

Lucía UGUINA

External PhD Student

BSc: Telecommunication Technologies Engineering - University Carlos III of Madrid. Madrid, Spain
MSc: Computer Science and Mathematics - Universitat Rovira i Vigili / Universitat Oberta de Catalunya. Tarragona, Spain
Previous Position: Junior Assistant. Management Solutions. Madrid. Spain
Research: Learning Analytics; Data Mining; Real-Time Data

research engineering and support

The Research Engineering & Support unit at IMDEA Networks is dedicated to supporting the continued growth in our research capacity and maximizing the impact of our research output by providing specific technical and professional expertise and assistance to ongoing research endeavors in a variety of ways. Research Engineering & Support personnel work either at the level of the entire Institute, or closely with researchers and their groups. There are roles with an engineering background that take care of the design, installation and maintenance of the IT infrastructure. Other roles may, for instance, provide administrative or operational support to project or lab management.

Typical jobs include systems administration, research (software and/or hardware) engineering, project or research administrator and laboratory technician. These positions are similar to their industry equivalents. They enable our employees to work on cutting-edge research problems and technology in a stimulating and innovative environment.

Admin and research support team

administrative unit

Ramón GIRONA
General Manager

Qualifications: BSc: Computer Science. Universidad de las Palmas de Gran Canaria (ULPGC). Canary Islands. Spain; Industrial Engineering. Universidad Politécnica de Canarias (UPC). Canary Islands. Spain; MBA: Instituto Universitario de Empresa. Madrid. Spain

Marta DORADO
Operations & Communications Manager

Qualifications: BSc: Dual Bachelor's degree in Journalism and Audiovisual Communication - University Carlos III of Madrid (UC3M). Madrid, Spain. MSc: Journalism and Digital Communication ABC - Complutense University of Madrid (UCM). Madrid, Spain

Brian DUNNE
Senior Human Resources Manager

Qualifications: BBS in Business Studies and French - Trinity College Dublin. Ireland

Ana GONZÁLEZ
Senior Projects & Funding Manager

Qualifications: BA (Hons) "Modern European Studies". University of West London. UK; Postgraduate Diploma in "European Studies". University of West London. UK

Pilar SÁEZ
HR Administration Manager

Qualifications: Labour Relations. Complutense University of Madrid. Madrid. Spain; Postgraduate Diploma in "Executive Compensation and Benefits". Centro de Estudios Garrigues. Madrid. Spain

research engineering & support

Diego BENITO
Research Engineer

BSc: Computer Science – University of Alcalá de Henares. Madrid, Spain
MSc: Data Analysis and Big Data - University of Alcalá de Henares. Madrid, Spain
Research: Data Analysis; Explainability Analysis; Machine Learning

Ignacio BERBERANA
Senior Research Engineer

MSc: Mining Engineer. School of Mining Engineering - Polytechnic University of Madrid. Madrid, Spain
Research: 5G; Radio Communications; RAN Virtualization

Iñaki BRAVO
Research Engineer

BSc: Aerospace Engineering - Polytechnic University of Madrid. Madrid, Spain
MSc: Applied and Computational Mathematics – University Carlos III of Madrid. Madrid, Spain
Research: Edge intelligence; IoT; Machine Learning

Celia CABELLO
Research Engineer

BSc: Psychology - UNED
MSc: Advanced Studies in Brain and Behavior – University of Seville
Research: Biometric SDKs. Cybersecurity & Internet Analytics

Elvira CONTI
Project Manager

BSc: International Relationships - Rey Juan Carlos University. Madrid, Spain
MSc: Business Innovation and Project Management - Mondragon University. Basque country. Spain

Paula DE DIOS
Project Administrator

BSc: Journalism. Complutense University of Madrid (UCM). Madrid, Spain
MSc: European Political and Social Integration. Vrije Universiteit Brussel. Belgium
MSc: Feminism and Gender Complutense University of Madrid (UCM). Madrid, Spain

Pablo FERNÁNDEZ
Research Engineer

BSc: Mining Engineering - Polytechnic University of Madrid. Madrid, Spain
MSc: Mining Engineering - Polytechnic University of Madrid. Madrid, Spain
Research: AI, Machine Learning, Deep Learning, Explainable AI

José GALLEGO
Research Engineer

BSc: Physics - Universidad Complutense de Madrid. Madrid, Spain
MSc: Computational Engineering and Mathematics - Universitat Oberta de Catalunya & Universitat Rovira i Virgili. Online, Spain
Research: Edge intelligence; IoT; Machine Learning

Neftalí GONZÁLEZ
Systems Administrator

BSc: IT Systems Engineer. Universidad Rey Juan Carlos. Móstoles. Spain

Susana HERNÁNDEZ
Project Administrator

MSc: Biology (Specialization: Biotechnology) - EQF Level 7 Certificate (Master). Complutense University of Madrid. Madrid. Spain
MSc: Food Science and Technology - EQF Level 7 Certificate. Complutense University of Madrid. Madrid. Spain

Francisco Javier HERVÁS
Project Administrator

BSc: Business Administration - Universidad Autónoma de Madrid. Madrid, Spain
MSc: Management of Human Resources - Universidad Autónoma de Madrid. Madrid, Spain

MohammadErfan JABBARI
Research Engineer

BSc: Electrical Engineering (Telecom) - University of Tehran. Tehran, Iran

Dr. Jesús Omar LACRUZ
Research Engineer

BSc: Electrical Engineering - University of the Andes. Mérida, Venezuela
MSc: Electronic System Engineering - Polytechnic University of Valencia. Valencia, Spain
PhD: Electronic Engineering. Polytechnic University of Valencia. Valencia. Spain
Research: mm-Wave; FPGA design; Signal Processing; Digital Communications

Daniel LORENZO
Research Engineer

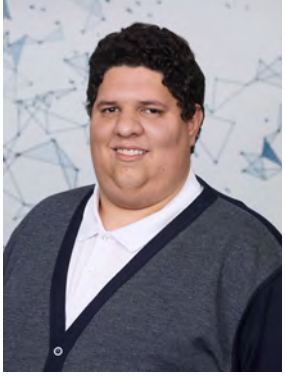
BSc: Telematics Engineering – University Carlos III of Madrid. Madrid, Spain

Beatriz MARTÍN
Project Administrator

BSc: Law – Rey Juan Carlos University. Madrid, Spain
MSc: Training of Secondary Education, High School, Vocational Training and Language Teachers – Rey Juan Carlos University. Madrid, Spain

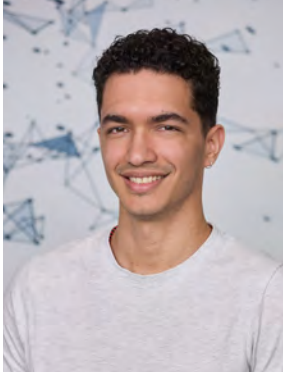
Óscar NIETO
Project Administrator

BSc: Environmental Science - Manchester Met. University. Manchester, UK
MSc: Renewable Energies, Fuel Cells and Hydrogen - Consejo Superior De Investigaciones Científicas. Madrid, Spain
PhD: Engineering - Institute of Risk and Uncertainty. Liverpool, UK



José Manuel PANDELO
Research Engineer

BSc: Law – Pontificia Universidad Católica Madre y Maestra – Dominican Republic
MSc: Digital Business – Spain Business School and UCAM Murcia



Steven Jesús PAZ
Research Engineer

BSc: Telecommunications and Electronic Engineering – Technological University of Havana. Cuba
MSc: Advanced Technologies and Communications – University Carlos III of Madrid. Madrid, Spain
Research: Visible Light Communication (VLC); LiFi systems; VLC backscatter; Embedded systems

Rafael RUIZ
Systems Administrator

BSc: Industrial Electronics and Automation Engineering - Universidad Politécnica de Cartagena. Murcia, Spain
MSc: Industrial Electronics - Universidad Politécnica de Madrid. Madrid, Spain

Rubén RUPÉREZ
Program Manager

BSc: Industrial Technology Engineering - University Carlos III of Madrid. Madrid, Spain
MSc: Industrial Engineering - University Carlos III of Madrid. Madrid, Spain

Guillermo SÁNCHEZ ILLÁN
Research Engineer

BSc: Telecommunications Engineering - University Carlos III of Madrid. Madrid, Spain
MSc: Telecommunications Engineering - University Carlos III of Madrid. Madrid, Spain

Michal TERESZKOWSKI-KAMINSKI
Research Engineer

MSc: Computer Science - King's College London. London, UK
Research: Malware; Underground Forums; Source Code Analysis; stylometry; Code Reuse

internship students

IMDEA Networks offers a Research Internship program. Eligible candidates are students who are currently undertaking a B.Sc., M.Sc. or equivalent in Computer Science, Electrical Engineering, Computer Engineering, Telecommunications, Telematics or a related field, and who wish to enhance their research potential developing the Science of Networks. Interns work closely with members of our research team, which allows them to acquire on-the-job training and gain valuable experience in computer networking science and technology.

The minimum expected internship duration is usually 3 months, but longer stays are accommodated depending on individual circumstances. Successful interns also receive a special consideration for future positions on our PhD Student team.

We also have a program in place for Visiting PhD Students from partner universities or research organizations to undertake an internship at IMDEA Networks under the direction of one of our faculty members. This program enables them to develop new skills and gain expertise in an enriching new environment.

Timothe ALBOUY
University of origin: Université de Rennes, a Public Scientific, Cultural and Professional University (EPCSCP)

Wajid ALI
University of origin: University of Liverpool (UK)

Daniel Alejandro AMARO
University of origin: Universidad de La Habana (Cuba)

Alejandro CALVILLO
University of origin: Universidad Carlos III de Madrid (Madrid, Spain)

Mohit DAGA
University of origin: KTH Royal Institute of Technology (Stockholm, Sweden)

Omar EL KENDI
University of origin: Universidad Carlos III de Madrid (Madrid, Spain)

Mohammed FAHIM RASHED
University of origin: Universidad Carlos III de Madrid (Madrid, Spain)

Malgorzata FIC
University of origin: Max Planck Institute for Evolutionary Biology (Plön, Germany)

Jairo Alberto FUENTES
University of origin: Universidad de EAFIT (Medellín, Colombia)

Carlota GALOCHA
University of origin: Universidad Carlos III de Madrid (Madrid, Spain)

Genoveva GARCÍA
University of origin: Universidad Carlos III de Madrid (Madrid, Spain)

Sergio IGLESIAS
University of origin: Universidad Politécnica de Madrid (Spain)

Javad MOHAMADICHAM-GAVI
University of origin: University of Warsaw (Poland)

Lucía MORENO
University of origin: Universidad Carlos III de Madrid (Madrid, Spain)

Federico MUNGARI
University of origin: Politecnico di Torino (Italy)

Diletta OLLIARO
University of origin: University of Venice Ca' Foscari (Venice, Italy)

Prashant Kumar RAY
University of origin: Politecnico di Torino (Italy)

David RICO
University of origin: Universidad Carlos III de Madrid (Madrid, Spain)

Gontzal SAGASTABEITIA
University of origin: Universidad del País Vasco (Spain)

Alessandro SANNA
University of origin: The University of Cagliari (Italy)

Domenico STOTECE
University of origin: University of Bologna (Italy)

Rui WANG
University of origin: TU Delft (Delft, Netherlands)

Adam ZAHIR RODRIGUEZ
University of origin: Universidad Carlos III de Madrid (Madrid, Spain)

alumni network

The Institute's Alumni Network is built upon graduate PhD Students who have obtained their Ph.D. and have left the team to further their research career in other organizations. Networking is about making contacts and building relationships. The alumni frame provides its members a supportive community of graduates who have shared experiences, values and goals that will last a lifetime. It also provides a venue through which former PhD Students can maintain a long-term collaborative relationship with the Institute. Alumni are IMDEA Networks Institute's ambassadors worldwide, creating awareness and opening up new communication channels with the global scientific community.

The members of the alumni network appear listed here following the most recent graduation date up to the end of 2023.

Dr. Santiago ANDRÉS
Current Position: Post-Doc Researcher. IMDEA Networks Institute. Madrid. Spain
Ph.D. Date: 10 May 2023

Dr. Pelayo VALLINA
Current Position: Data Privacy Specialist. MAPFRE. Madrid. Spain
Ph.D. Date: 17 January 2023

Dr. Oluwasegun OJO
Current Position: Post-Doc Researcher. Universidad Carlos III de Madrid. Madrid, Spain
Ph.D. Date: 30 November 2022

Dr. Álvaro FEAL
Current Position: Postdoctoral researcher. Northeastern University, Boston, MA, USA
Ph.D. Date: 29 November 2022

Dr. Dolores GARCIA MARTI
Current Position: Senior Fellow at CERN. Geneva, Switzerland
Ph.D. Date: 28 September 2022

Dr. Julien GAMBA
Current Position: Data scientist. Cisco Systems. Madrid, Spain
Ph.D. Date: 15 September 2022

Dr. Mohamed Lamine MOULAY
Current Position: Technical Product Owner. Signicat. Madrid, Spain
Ph.D. Date: 20 July 2022

Dr. Víctor SÁNCHEZ AGÜERO
Current Position: UAS Engineer at GMV. Madrid. Spain
Ph.D. Date: 5 July 2022

Dr. Alejandro BLANCO

Current Position: Post-Doc Researcher. University of Edinburgh. UK
Ph.D. Date: 19 May 2022

Dr. Constantine AYIMBA

Current Position: Post-Doc Researcher. IMDEA Networks Institute. Madrid, Spain
Ph.D. Date: 19 May 2022

Dr. Noelia PERÉZ PALMA

Current Position: Postdoctoral Research Assistant. Universidad de Murcia. Spain
Ph.D. Date: 3 February 2022

Dr. Pablo JIMÉNEZ MATEO

Current Position: DevOps Engineer. Exheus. Barcelona. Spain
Ph.D. Date: 17 December 2021

Dr. Luis F. CHIROQUE

Current Position: Data Scientist. TAPTAP Digital. Madrid, Spain
Ph.D. Date: 15 November 2021

Dr. Nuria MOLNER

Current Position: R&D engineer. iTEAM Research Institute of Universitat Politècnica de València. Valencia, Spain
Ph.D. Date: 30 September 2021

Dr. Elizaveta DUBROVINSKAYA

Current Position: Board Member. Teleone OÜ. Tallinn. Estonia.
Ph.D. Date: 9 June 2021

Dr. Vitalii DEMIANIUK

Current Position: Post-Doc Researcher. Ariel University. Israel
Ph.D. Date: 24 February 2021

Dr. Joan PALACIOS

Current Position: Antenna Research Engineer. Pivotal Commware. Kirkland, Washington, USA
Ph.D. Date: 23 October 2020

Dr. Patricia CALLEJO

Current Position: Visiting Professor. University Carlos III of Madrid. Madrid. Spain
Ph.D. Date: 8 September 2020

Dr. Edgar ARRIBAS

Current Position: Profesor Doctor. Department of Mathematics and Data Science - CEU San Pablo University. Madrid. Spain
Ph.D. Date: 29 July 2020

Dr. Maurizio REA

Current Position: Senior Researcher. i2CAT Foundation. Barcelona, Spain
Ph.D. Date: 12 June 2020

Dr. Ander GALISTEO

Current Position: Senior Firmware Engineer. Dojo Five: The Embedded Experts. St. Paul, Minnesota. USA
Ph.D. Date: 3 June 2020

Dr. Dario BEGA

Current Position: Network System Automation Researcher. Nokia Bell Labs Core Research. Munich. Germany
Ph.D. Date: 17 April 2020

Dr. Yonas Mitike KASSA

Current Position: Research Scientist. Eurecat. Spain
Ph.D. Date: 14 February 2020

Dr. Pavel CHUPRIKOV

Current Position: Post-Doc Researcher. Universita della Svizzera Italiana. Lugano. Switzerland
Ph.D. Date: 14 November 2019

Dr. Carlos DONATO

Current Position: Project Manager. Zhilabs. A Samsung Company. Madrid. Spain
Ph.D. Date: 7 November 2019

Dr. Guillermo BIELSA

Current Position: RAN Innovation Engineer: New Radio Solutions - Global CTIO. Telefonica. Madrid. Spain
Ph.D. Date: 26 July 2019

Dr. Hany ASSASA

Current Position: System Engineer. Pharrowtech. Leuven. Belgium
Ph.D. Date: 23 July 2019

Dr. Roberto CALVO-PALOMINO

Current Position: Associate Professor. Department of Signal Theory and Communications, Telematics and Computing. Universidad Rey Juan Carlos. Madrid. Spain
Ph.D. Date: 10 July 2019

Dr. Foivos MICHELINAKIS

Current Position: Research Scientist. Simula Metropolitan Center for Digital Engineering (SimulaMet). Oslo. Norway
Ph.D. Date: 19 September 2018

Dr. Aymen FAKHREDDINE

Current Position: Principal Investigator, University of Klagenfurt, Austria & Senior researcher, TII, UAE
Ph.D. Date: 14 June 2018

Dr. Roderick FANOU

Current Position: Systems Engineer. Cloudflare, Inc. Austin, Texas, USA
Ph.D. Date: 14 December 2017

Dr. Christian VITALE

Current Position: Research Associate. KIOS Research and Innovation Centre of Excellence (KIOS CoE). Nicosia. Cyprus
Ph.D. Date: 9 June 2017

Dr. José A. RUIPÉREZ-VALIENTE

Current Position: Associate Professor. Department of Information and Communications Engineering. Universidad de Murcia. Murcia. Spain
Ph.D. Date: 31 May 2017

Dr. Evgenia CHRISTOFOROU

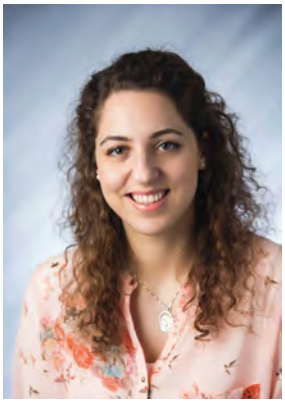
Current Position: Research Associate (Transparency in Algorithms Group) at the CYENS-Centre of Excellence, Nicosia, Cyprus
Ph.D. Date: 25 May 2017

Dr. Nicola BUI

Current Position: Senior Research Engineer. Bastille. Boston. Massachusetts. USA
Ph.D. Date: 12 May 2017

Dr. Angelos CHATZIPAPAS

Current Position: Engineering Lead. Lloyds Banking Group. London. United Kingdom
Ph.D. Date: 25 November 2016

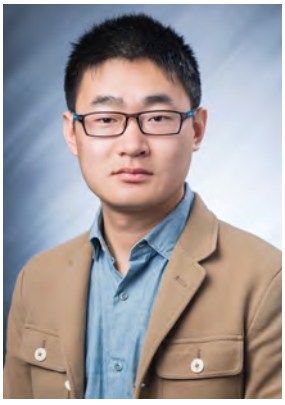


Dr. Elli ZAVOU

Current Position: Service Delivery Manager and Data Governance Expert. StratioBD. Madrid. Spain
Ph.D. Date: 30 September 2016

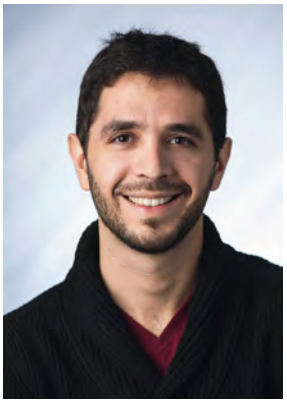
Dr. Syed Anwar UL HASAN

Current Position: Postdoctoral Researcher. ETH Zurich. Switzerland
Ph.D. Date: 20 June 2016



Dr. Qing WANG

Current Position: Assistant Professor. Delft University of Technology - TU Delft. Delft. The Netherlands
Ph.D. Date: 19 May 2016



Dr. Juan Camilo CARDONA

Current Position: Senior Software Engineer. NTT GIN
Ph.D. Date: 6 May 2016

Dr. Pablo SALVADOR

Current Position: Agile Delivery Leader. Paradigma Digital. Madrid. Spain
Ph.D. Date: 8 April 2016

Dr. Gek Hong SIM

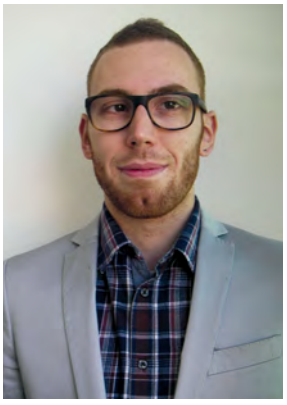
Current Position: Post-doc Researcher. TU Darmstadt. Germany
Ph.D. Date: 30 March 2016

Dr. M. Isabel SANCHEZ

Current Position: Postdoctoral Fellow. Simula Research Laboratory. Oslo. Norway
Ph.D. Date: 8 March 2016

Dr. Arash ASADI

Current Position: Research Group leader & Athene Young Investigator. Wireless Communication and Sensing Lab (WISE). Technische Universität Darmstadt. Germany
Ph.D. Date: 8 March 2016



Dr. Vincenzo SCIANCALEPORE

Current Position: Research Scientist. NEC Laboratories Europe. Heidelberg. Germany
Ph.D. Date: 27 November 2015

Dr. Thomas NITSCHE

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Current Position: Lecturer. Queen Mary University of London. UK
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research team structure

networked systems&algorithms

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- Dr. Sergey Gorinsky
- Dr. Jaya Prakash Varma Champati

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- Ghina Al Atat
- Andrea Fresa
- Khasa Gillani
- Amir Mehrjoo
- Leonardo Peroni
- Lucía Uguina

wireless networking

Research Professors
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- Dr. Marco Fiore
- Dr. Domenico Giustiniano
- Dr. Marco Ajmone-Marsan

Senior Researchers
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- Dr. Borja Genovés Guzmán
- Dr. Jesús Omar Lacruz
- Dr. Michele Gucciardo
- Dr. Diego Madariaga
- Dr. Timothy Otim
- Dr. Giuseppe Santaromita
- Dr. Syed Waqas Haider Shah
- Sergi Alcalá-Marín
- Aristide Tanyi Jong Akem
- Giulia Attanasio
- Beyza Bütün
- Alan Collet
- Sai Pavan Deram
- Stavros Eleftherakis
- Dayrene Frómeta
- Dolores García
- Nina Grosheva
- Yago Lizarribar
- Leonardo Lo Schiavo
- Orlando E. Martínez-Durive
- Muhammad Sarmad Shahab Mir
- Sachit Mishra
- Serly Moghadas Golian
- Bei Ouyang
- Pablo Saucedo
- Rafael Ruiz
- Alessio Scalingi
- Salil Sharma
- Javier Talavante
- André Zanella

network measurements&analytics

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