UNIVERSITÉ SORBONNE PARIS NORD

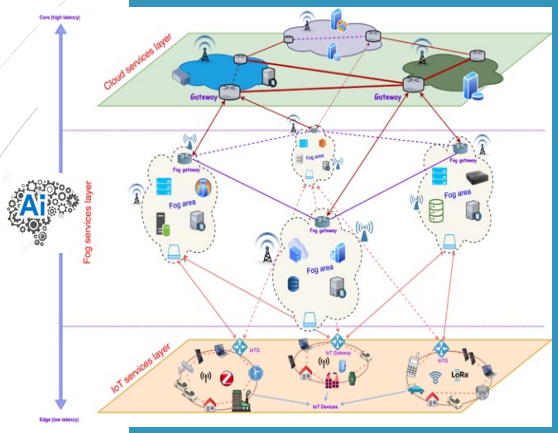
IPICYT
INSTITUTO POTOSINO DE INVESTIGACIÓN CIENTÍFICA Y TECNOLÓGICA, A.C.

Workshop IoT platforms for indoor air quality study

MUFRAMEX
MAISON UNIVERSITAIRE FRANCO MEXICAINE

EDUCACIÓN

MINISTÈRE DE L'ENSEIGNEMENT SUPÉRIEUR, DE LA RECHERCHE ET DE L'INNOVATION



USPN, Villetaneuse-France
22 & 23 May 2023

PROGRAM & ABSTRACTS

	Monday 22	EULER Amphi - Sessions
8:45	8:45 Registration & coffee 9:00 Opening	Welcome
9:20 11:00	Institutions presentation	IPICYT, UDG(CUCEI, CUCEA), UASLP, USPN (L2TI, LIPN), UGA, INRIA-Saclay, ESME, UDCLV, INSUBRIA, UMA (ERTIS, Victoria Network), KAUNAS, TAMK
11:00	Coffee break	Coffee break
11:20	MUFRAMEX & other funding opportunities	European or International Scientific Networking Program, ECOS Nord
12:15	Lunch break	Lunch break
14:00 15:30	Parterns experience sharing	Design and implementation of IoT Platforms IPICYT, L2TI (USPN)
15:30	Coffee break	Coffee break
16:00 18:30	IoT technology and applications	Scientific presentations: INSUBRIA, LIPN(USPN), Victoria Network (UMA), INRIA-Saclay

	Tuesday 23	EULER Amphi - Sessions
8:45	8:45 Registration & coffee 9:00 Opening	Welcome
9:00 10:30	Data Analysis tools	ERTIS(UMA), UDST/ESME-L2TI, L2TI(USPN), LIG(UGA)
10:30	Coffee break	Coffee break
11:00 12:30	Air Quality and Health Monitoring	Current projects IPICYT, LIG (UGA)
12:30	Lunch break	Lunch break
14:00 15:30	Air Quality Task Force Initiatives	Mexican experiences IPICYT, CUCEI, CUCEA
15:30	Coffee break	Coffee break
16:00 18:00	Working Session:	Developing a plan for joint collaboration

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Presentation

The **IoT platforms for indoor air quality study** workshop, was born out of a collaboration with Mr. Salvador Ruiz Correa of IPICYT in Mexico. It responds to an opportunity to collaborate with Mexican colleagues in the context of IoT, and in particular in the context of indoor air quality measurement and its implication in human health. This workshop responds to the first MUFRAMEX call for the organization of thematic workshops for the development of training or research international projects. This workshop is organized in their first edition at USPN, second edition will be at IPICYT.
This event aims to assemble a group of multidisciplinary and complementary researchers, which includes specialists in computer networks, IoT platforms, computer science, data processing, security and data analysis in relation to health and other champs of IoT applications. This workshop aims to reach at a diverse audience composed of teacher-researchers and PhD students from partner laboratories, specialized in the mentioned fields.

Workshop objectives:

1. On the one hand it will allow to structure the scientific and academic cooperation between our university (USPN) and Mexican partners from three Mexican institutions: The IPICyT, The University of San Luis Potosi and The University of Guadalajara
2. Secondly, the workshop will allow a meeting between researchers from various laboratories within the USPN (from the MathSTIC cluster, but also from the health cluster) to structure and coordinate their multidisciplinary research actions around IoT platforms and data analysis for health. The workshop will be open to our entire scientific community.
3. Finally, it is an opportunity for all participants (Europeans and Mexicans) to set up international collaboration projects, to develop the existing network of collaborations, both in the field of research and training.

The topic is part of the axes developed by the USPN university, through various research laboratories. In addition, this theme is part of the priority axes to be developed within the framework of the European alliance UNINOVIS DATA for LIFE, project that the USPN coordinates. Thus, this event is a positive step in the internationalization of our university and ours activities, allowing us to design future collaborations.

We would like to thank all our partners who, by their participation, make these two days rich in exchange and science. May this event be fruitful and a source of inspiration for new collaborations and multidisciplinary and applied projects.

Workshop sessions will be available here https://bluejeans.com/513148037.

We hope you enjoy the workshop.

Gladys Diaz & **Salvador Ruiz Correa**

Organizing committee

Gladys Diaz
Université Sorbonne Paris Nord, France

Salvador Ruiz Correa
IPICyT, Instituto Potosino de Investigación Científica y Tecnológica, Mexico

Marco Aurelio Cárdenas Juárez
UASLP, Universidad Autonoma San Luis Potosi, Mexico

Ruben López-Revilla
DBM, División de Biología Molecular, IPICyT, Mexico

Marco Perez Cisneros
CUCEI, Centro Universitario de Ciencias Exactas e Ingenierías
Universidad de Guadalajara, Mexico

Institution Presentations

IPICyT, Mexico

Instituto Potosino de Investigación Científica y Tecnológica

El Youth Innovation Laboratory (You-i Lab)

Dr. Salvador Ruiz Correa, Professor, Director

The You-i lab is an action-research laboratory that focuses on developing technology for the social good. You-i Lab projects combine AI, machine learning, and ubiquitous computing tools to foster citizen-government synergies to address social problems in Mexico and other Latin American countries that matter most for people. The You-i Lab receives support from national and international organizations. You-i Lab researchers also participate in the Mobile Life Center, a research initiative focusing on developing public health issues in México, with an initial emphasis on San Luis Potosí state.
Web page: http://www.ipicyt.mx

División de Biología Molecular (DBM)

Dr. Ruben López-Revilla, Professor

Is one of the five academic divisions of the Instituto Potosino de Investigación Científica y Tecnológica (IPICYT), Centro Público de Investigación del Consejo Nacional de Ciencia y Tecnología located in the city of San Luis Potosí, México. The main lines of interest of the DBM are biomedicine, agrobiology and molecular biotechnology.

Web page: https://ipicyt.edu.mx/Biologia_Molecular/areas_biologia_molecular.php

Autonomous University of San Luis Potosi, Mexico

UASLP

The Autonomous University of San Luis Potosi (UASLP) is a higher education institution located in the Mexican state of San Luis Potosí, in the central-north part of Mexico, which offers a wide range of academic programs in areas such as exact sciences, engineering, medicine, social sciences, humanities, dentistry, agriculture, amongst others. The UASLP carry out scientific and technological research and counts with several research and technological innovation centers. The university has a modern and extensive infrastructure, with well-equipped and technologically advanced buildings. The Faculty of Sciences and the Coordination for the Application for Science and Technology (CIACYT) of the UASLP carry out research in wireless communications and applications of the radioelectric spectrum.

Web page: http://www.uaslp.mx

Laboratory for Applications of the Radioelectric Spectrum (LARS)

Dr. Marco Aurelio Cárdenas Juárez, professor

The objective of the LARS is to provide solutions to transversal problems of regional or national interest through the efficient use of the radio spectrum and associated devices, for which the following tasks are required: signal processing of radioelectric spectrum signals, design and characterization of antennas for communications applications in transversal environments, design of sensors and other radio frequency devices, radiofrequency measurements for industrial wireless applications, radioelectric spectrum measurements and development of novel spectrum sensing and sharing techniques for diverse environments (industrial, hospital, agricultural, etc.).

Web page: http://pie.fc.uaslp.mx

UdG, Universidad de Guadalajara, Mexico

CUCEI

Centro Universitario de Ciencias Exactas e Ingenierías

Dr. Marco Antonio Perez-Cisneros, SmIEEE. Rector

The University Center of Exact Sciences and Engineering (CUCEI) is the entity from the University of Guadalajara in Mexico which focuses in the fields of engineering, physical sciences, chemistry and mathematics. The CUCEI currently serves 18,300 students in 18 undergraduate and 25 postgraduate programs. It also has 332 researchers of the National System of Researchers (SNI) and 480 professors with recognition from the Mexican Teacher Professional Development Program (PRODEP).

One of the boldest research lines at CUCEI evolves around Intelligent Systems and their applications to several technologies, including the use of Metaheursitics Computation algorithms for applications in different fields such as image processing, operation research, electronics engineering, mechanical engineering, manufacturing design, power engineering, and many others. Metaheuristic algorithms are considered as generic optimization tools that can solve very complex problems characterized by having very large search spaces. Metaheuristic methods reduce the effective size of the search space through the use of effective search strategies. In particular, these algorithms can be used to solve many of the problems related to the monitoring of IoT devices for pollution or other smart cities devices.

Web page: http://www.cucei.udg.mx

CUCEA

Centro Universitario de Ciencias Económico Administrativas

Dr. Rocio Maciel Arellano, General Coordinator
Strategic Management of Information Technologies

CUCEA is a sustainable, inclusive and borderless Smart Campus, a national and international reference for its innovative and scientific educational offerings, based on a quality academic model that is multimodal, flexible, gender-sensitive, and emphasizes the importance of the formation of a global citizenship. The scientific and technological research it produces is of high impact and social commitment and responds to global challenges.
The Centro Universitario de Ciencias Económico Administrativas emerged in 1995 from the integration of four faculties: Accounting, Economics, Administration and Tourism; and four academic units dedicated to research: the Center for Research in Economic Theory, the Center for Social and Economic Research, the Center for Tourism Research and the Institute for Economic and Regional Studies.
New institutes and research centers have been created, such as the Institute for the Development of Innovation and Technology in Small and Medium Enterprises (IDITpyme), the Center for Quality and Innovation in Higher Education, the Institute for Public Policy Research and the Center for Innovation and Business Excellence.

Web page: http://www.cucea.udg.mx

UMA, Universidad de Malaga, Spain

ITIS Software and Victoria Network

Dr. Pedro Merino Gomez, professor and Director of Victoria Network.
Delia Rico, Francisco Luque Schempp, Phd students

The Institute of Software Technologies and Engineering (ITIS) is a centre dedicated to scientific and technical research. The main objective of ITIS is to contribute to the development and application of software technologies through research, innovation, training and technology transfer. ITIS offers several relevant research infrastructures for cybersecurity, data analytics, fog computing, mobile networks (5G, 6G) and AI.
The mobile networks infrastructure for research in 5G/6G combines commercial carrier grade and open-source network components. The indoor setup is based on a Keysight UXM emulators for 4G and 5G plus anechoic chambers, commercial user devices and advanced monitoring equipment (energy, spectrum, etc.). The outdoor deployment is based on a collaboration with Telefonica, uses NOKIA cells and provides coverage in the University of Málaga, Málaga Tech Park, the research farm "la Mayora", Torremolinos and Málaga city centre and harbour.

Web page: https://morse.uma.es

ITIS Software and ERTIS Group

Embedded Real Time Integration and Software

Dr. Manuel Diaz, professor and Director of ERTIS.
Dr. Cristian Matin, Associate Professor

ERTIS group comprises a team of professors and researchers at the Department of Programming Languages and Computer Science at the University of Malaga, Spain. Its headquarters are at the Technical High School on Computer Science and the Andalusian Institute for Technology and Software Engineering (ITIS). The group's activities are geared towards both basic and applied research, along with significant dedication to technological transference.

The group focuses its research activity on improving the management, accessibility and integration of embedded devices in the context of the Internet of Things (IoT). ERTIS also investigates the integration of Edge, Fog and Cloud paradigms to optimise response times and fault tolerance, and the implementation of deep and distributed machine learning techniques to analize IoT data. The fruit of his research has been successfully applied in the monitoring of critical infrastructures and smart grids.

Web page: http://ertis.uma.es

INSUBRIA, Italia

Università degli studi dell'Insubria

Research group in Software Engineering

Dr. Alessandra Rizzardi, Associate Professor

The research group in Software Engineering at the University of Insubria is composed of Prof. Alberto Coen Porisini, Prof. Sabrina Sicari (IEEE Senior Member), and Dr. Alessandra Rizzardi (IEEE member). The main research interests are focused on two principal topics. The first one is related to Wireless Sensor Networks (WSN), in particular on the definition of solutions able to guarantee security and privacy with limited power consumption, avoiding network congestion states and loss of information. The second one is related to security and privacy issues, access control, and policy enforcement, in the Internet of Things (IoT) and fog computing context.

The research is oriented toward the definition of distributed and scalable architectures, models, and mechanisms to guarantee adequate levels of robustness. The group collaborates with Politecnico of Milan, Politecnico of Bari, Università degli Studi di Napoli Federico II, Politecnico of Torino, University of Pisa, University College of London, University of Trento, Università Statale of Milan, research center Create-Net of Trento, U-Hopper of Trento, CNR-LAAS of Tolosa (France). The group has won several awards, including the "Computer Networks Timeless Impact Paper Award" from Computer Networks journal. Sabrina Sicari is a member of the editorial board of Computer Networks (Elsevier), IEEE Internet of Things, Transactions on Emerging Telecommunications Technologies (Wiley), and Internet Technology Letters (Wiley). Alessandra Rizzardi is a member of the editorial board of Transactions on Emerging Telecommunications Technologies (Wiley), Internet Technology Letters (Wiley), and Sensors (MDPI).

Web page: https://www.uninsubria.eu

Research group in Data management and Data analysis

Dr. Alberto Trombetta, Professor

The research group of Dr. Trombetta works on different topics regarding data management and data analysis at large.

In particular, it focus is about:

(i) the study and development of parallel/distributed/cloud-based architectures for efficiently computing data reduction and analysis techniques (like Monte Carlo Markov chains. In collaboration with National Astrophysics Institute (INAF) and National Research Council (CNR));

(ii) the study and development of techniques for efficiently and securely verifying the outcomes of outsourced computations over large datasets, with applications to architectures that improve the throughput of current blockchains (in collaboration with IBM Research Europe and RunTimeMachines AG, a small Swiss startup).

Web page: https://www.uninsubria.eu

UDCLV, Italia

Università degli studi della Campania Luigi Vanvitelli

Department of Mathematics and Physics

Dr. Rosanna Verde, Professor

The Department of Mathematics and Physics of the University of Campania Luigi Vanvitelli promotes and supports basic and applied research activities in the fields of Mathematics, Physics, Statistics, Informatics, Data Science, Geophysics and Chemistry, collaborating with other universities and national and foreign research centres. The diverse skills of the Department's teaching and research staff guarantee strongly interdisciplinary research, innovation, and experimental development activities. Research as a strategic activity and its results in the various fields of interest have both national and international recognition.

The following Research Groups are part of the department: Numerical Methods and Applications Team¸Statistics, Data and Computer Science; Atoms, Molecules and Precision measurements – AMP Group; Theoretical Nuclear Physics; Galois Geometries and Their Applications; Mathematical Models and PDEs in Mathematical Physics; Research group in Mathematics Education; Physics of Complex Systems. The Department hosts a PhD in Mathematics, Physics and Applications to Engineering.

Web page: https://www.unicampania.it

Université Sorbonne Paris Nord, France

USPN

Sorbonne Paris Nord University (USPN) is a major teaching and research center located in the north of Paris. Established in a dynamic area that will host one of the world's greatest events in 2024, the Olympic Games, it has five campuses in the two departments of Seine-Saint-Denis and Val d'Oise: Villetaneuse, Bobigny, Saint-Denis, la Plaine Saint-Denis and Argenteuil.

USPN welcomes more than 25,000 students in initial or continuing education, in all fields: Health, Medicine and Human Biology - Humanities, Languages, Social Sciences and Humanities - Law, Political and Social Sciences - Communication Sciences - Economics and Management - Mathematics and Computer Sciences, Physics and Chemistry, Networks and Telecommunications, Energy, Nanotechnologies, Biomaterials and Process Engineering. It thus offers its 25,000 students a multidisciplinary training program, resolutely oriented towards the professional world. USPN includes 5 Faculties, 1 Institute of Sciences and Engineering (Galileo Institute), 3 University Institutes of Technology, a Department of Physical and Sports Activities, a University Department of General Medicine and no less than 28 laboratories in 2 doctoral schools. The university's workforce is 1248 teachers and researchers, 1735 teacher assistants and 774 administrative staff. USPN has a House of Digital Sciences (LaMSN), which is a place for ideation, innovation and cross-fertilization between students, researchers and companies. It is an ecosystem conducive to exchange between the academic and socio-economic worlds with a regional, national and international strategy.

Indeed, University Sorbonne Paris Nord has recognized the digital as a cross-cutting theme that concerns all its activities and has included it in its strategic plan. It intends to profile itself as a "major player in the digital transition" on its territory. It is developing a structuring and inclusive vision of digital technology for all its campuses. This orientation has been concretized by the creation of the first Digital Science Center (LaMSN) in the higher education, research and innovation landscape. In addition to the Sorbonne Paris Nord University, this approach also aims to provide the Seine-Saint-Denis region with a center of excellence combining research, training and innovation in the digital field. USPN is a founding member of the Campus Condorcet, one of the world's leading research centers in humanities and social sciences, as well as Sorbonne Paris Cité Association of universities and institutions. Sorbonne Paris Nord University is also responsible of UNIF (Université numérique Île-de-France / Île-de-France Digital University), an inter- university service that brings together 18 regional partner institutions. USPN is the coordinator of UNINOVIS DATA for LIFE European Alliance project.

Web page: https://www.univ-spn.fr

Laboratoire de Traitement et Transport de l'Information

L2TI (USPN)

Networking Team

Dr. Gladys Diaz, HDR, Associate Professor.
Dr. Khaled Boussetta, Professor
Janeth Aguila, PhD student

The L2TI is a research unit created by the University of Paris 13 in 1998. The thematic positioning of the L2TI is in the field of STIC (Sciences and Technologies of Information and Communication). More specifically, we conduct our research in two thematic areas: "visual information analysis and processing" and "computer networks". The L2TI is structured in two teams covering respectively each of these two fields: (multimedia, networks).

The L2TI is a member of the MathSTIC research federation (FR3734), a research center in the fields of mathematics and information and communication sciences and technologies.

Networking team is organized around the following 3 research axes:

1. Dimensioning, deployment: subjects such as QoS management or resource allocation will find their place here. These problems exist everywhere in networks: resource allocation, for example, is found in access networks (especially 5G wireless networks) as well as in support networks (especially through virtualization). The methodologies to address them are often the same.

2. Collection, dissemination: Data has become more and more central. Their collection and/or dissemination are also central: these problems appear, for example, in sensor networks and, more generally, in the IoT (Internet of Things).

3. Architectures, services: virtualization is a means of organization and adaptation. SDN/NFV is a completely new perspective. New paradigms and services are to be identified and/or applied to new application contexts (eHealth, smart city, vehicular networks), etc.

Web page: https://www-l2ti.univ-paris13.fr

Laboratoire d'Informatique de Paris Nord

LIPN (USPN)
Dr. Christophe Cérin, Professor

LOvE Team (Logic and Verification)

Dr. Kais Klai, HDR, Associate Professor.
Dr. Jaime Arias, CNRS research engineer

The Laboratoire d'Informatique de Paris-Nord (LIPN) is a joint research unit (UMR 7030) between the CNRS and the University of Paris XIII, called Université Sorbonne Paris Nord (USPN).

The ambition of the LIPN is to attack the major challenges spanning from fundamental research to the valorization of the obtained results and to develop its research activities by promoting scientific collaborations and interdisciplinarity with the surrounding environment.

The main themes of the unit, organized around five research teams with 150 members, are machine learning, combinatorial optimization and high performance computing, design and analysis of combinatorial models at the interface of physics, geometry and algorithmics, foundations of computation and formal verification, automatic natural language processing and knowledge representation.

LoVE : Logique et Vérification
LoVE team is structured in two research axes, conducting their activities in an autonomous way:

- Types, models and programming theory.
- Modular and distributed specification and verification.

Web page: https://lipn.univ-paris13.fr

UGA, France

Université Grenoble Alpes

Laboratoire d'Informatique de Grenoble (LIG)

Dr. Didier Donsez, Professor
Louis Closson, Marie-Laure Aix PhD Students

The LIG aims to be a laboratory focused on the foundations and development of computer sciences, while ensuring an ambitious opening to society in order to meet the new challenges. Research at the LIG is structured in 5 research areas: Software and Information Systems Engineering, Formal Methods, Models and Languages, Intelligent Systems for Data, Knowledge and Humans, Interactive and Cognitive Systems, Distributed Systems, Parallel Computing and Networks. The LIG brings together nearly 22 research teams, 450 researchers, teacher-researchers, PhD students and research support staff.

Web page: https://www.liglab.fr

Université Grenoble Alpes

ERODS - LIG - UGA
Efficient and RObust Distributed Systems

The ERODS team studies the construction and the management of cloud infrastructures from the perspective of self-management, distributed execution support and virtual machine.

Web page: Web page : https://www.liglab.fr/fr/recherche/equipes-recherche/erods

INRIA Saclay, France

TriBE Team

inTeRnet BEyond the usual

Dr. Nadjib Achir, researcher at INRIA
& Associate Professor at USPN

TRiBE stands for "Internet Beyond the Usual," is a research team from INRIA Saclay - Ile de France, located in the Alain Turing building on the Campus of the École Polytechnique de Palaiseau.

The TRiBE team is part of the "Networks and telecommunications" theme of the "Networks, systems and services, distributed computing" research area. The research axes of the team fall within the context of the significant evolutions that the Internet has undergone in recent decades, moving from a "small" network, relatively homogeneous, to a "large" network with strong heterogeneity and use of equipment as the Internet of Things (IoT). The Internet of Things' specificities and emerging requirements (heterogeneity, densification, user mobility and preferences, traffic growth, the ubiquitous cyber-physical context, etc.) lead to new requirements and new scientific and technologies at the ends of the Internet. Our conviction is that the success of the IoT is anchored: in the network design choices involving the equipment, in the intelligence of the protocols and associated services as well as in the ability to react and adapt to the communication loop network edge-core.

Web page: https://www.inria.fr/fr/tribe

ESME Sudria, France

ESME Research Lab

Dr. Abdulhalim Dansdoush, Associate Professor

Founded in 1905, ESME is a five-year engineering school that trains multidisciplinary engineers ready to take on the technological challenges of the 21st century: the energy transition, autonomous vehicles, robotics, smart grids, connected cities, cyber security, and biotechnologies. ESME has developed an adaptable, open and efficient teaching method that is perfectly suited to the expectations of industry and the technological and ecological challenges of tomorrow.

The school has a research team, the ESME Research Lab. Due to the multidisciplinary dimension of the school, this team is made up of teacher-researchers working in various fields, ranging from fundamental research in mathematics to applied research in energy, electronics or information technology. The activities of the ESME Research Lab team have been structured around 3 major themes:

- TEI: Eco-Intelligent Transport
- MMA: Mathematical Modeling and Applications
- SAA: Health and Autonomy Assistance

Web page: https://www.esme.fr

Tampere University of Applied Sciences, TAMK

TAMK research team for Indoor climate

Kari Naakka (M.Sc.), Antti Mäkinen (M.Sc) and Sakari Uusitalo (M.Sc.)

Team consists of researchers and lecturers who specialize in indoor environment measurement and monitoring (e.g. particulate matter, VOCs, CO2, T, RH, pressure, surface hygiene and lighting conditions), health effects of indoor pollutants and ambient conditions, ventilation and filtration optimization and energy efficiency, risk analysis, management and reduction of airborne infection risks. Team is developing indoor air quality IoT system and analyzing methods. Teams expertise covers b2e areas in air quality IoT. Area covers deep knowledge of air quality theory and theory implementation to practice. Knowledge of analyzing data and how to design and build air quality IoT reference system that students are capable to design/build/verify from sensor to UI. All expertise areas are also integrated to TAMK teaching course activities.

Web page: https://www.tuni.fi/en

Abstracts of Projects

SenSky Project

Salvador Ruiz Correa
IPICYT - Mexico

SenSky aims to develop mobile crowdsensing/ crowdsourcing tools to measure ground-level air pollution in Mexican cities with the aid of people. The project received funding from the Consejo Nacional de Ciencia y Tecnología (CONACYT) and the Instituto Nacional de Geografía, Estadística e Informática (INEGI) to run a pilot study in three cities located in central México. The project developed a crowdsourcing technology implementing state-of-the-art data collection protocols developed by INEGI and air pollution monitors that enable citizens to measure pollution levels affecting their neighborhoods. The You-i Lab scientist developed the project.

CO2 Project

Ruben Lopez Revilla, División de Biología Molecular
IPICYT - Mexico

When we breathe, cough or sneeze, we exhale carbon dioxide (CO2) and emit saliva droplets and aerosols that can carry viruses and bacteria capable of causing disease. In poorly ventilated indoor spaces, the CO2 concentration is proportional to the concentration of respiratory aerosols exhaled by the occupants. Measuring the concentration of CO2 with low-cost sensors makes it possible to estimate whether enough outdoor air enters a room to exchange indoor air and dilute CO2 and infectious aerosols to minimize the risk of contagion by SARS-CoV-2 and other transmitted pathogens. aerial. This project —financed by the Potosino Science and Technology Council— included the design, construction, validation, and installation of CO2 monitors and a real-time digital monitoring platform that extracts spatiotemporal information from the remote sensor network and integrates it into a geographic information system with scientific visualization of the data and the distilled information that allows to verify in real time if the interior spaces are sufficiently ventilated and to take the pertinent measures to reduce the risk of airborne infections.

BQR-LoRa @ UP13 Project

Khaled Boussetta, Gladys Diaz
L2TI-USPN, France

The objective of this project is to set up a platform for experimenting with the LoRaWAN (Long Range Wide-Area Network) data collection technology, aiming to collect data from various objects (sensors or Internet of Things devices). A typical LoRaWAN infrastructure is composed by gateways that provide the link between the application server and the connected objects. Specifically, each gateway is an access point (as with Wifi) that collects data from end devices (e.g., sensors) deployed over a radius of several hundred meters (see kilometers) using LoRa wireless communication technology. The latter offers low data rate radio connectivity allowing to reduce the energy consumption.
We have started the deployment of an LoRaWAN experimental platform on the campuses of the Sorbonne Paris Nord University, over the Villetaneuse campus. At the infrastructure level, we begin to deploy four gateways (Access Point), an application server and a set of LoRa objects. A software layer will be developed and installed to administer this infrastructure, manage the experiments, process and store the collected data.

Health Sentinel-Centinela de la Salud

Salvador Ruiz Correa, You-i Lab
IPICYT - Mexico

The Health Sentinel is a mobile crowdsensing platform developed by a scientist from IPICYT´s Mobile Health Center, the Universidad Autónoma de San Luis Potosí and the Servicios de Salud del Estado de San Luis Potosí to conduct epidemiological surveillance of the COVID-19 pandemic in San Luis Potsí Metropolitan Area. The platform uses a mobile app to estimate the COVID-19 risk from individual geolocated auto-reports of signs, symptoms, and co-morbidities. The digital platform was able to predict infection hot spots during the third phase of the pandemic using data from phases one and two. Data collected with the platform informed public health officials about the state of the pandemic to support decision-making.

Centinela del Aire

Ruben Lopez Revilla, División de Biología Molecular
Salvador Ruiz Correa, You-i Lab
IPICYT - Mexico

The city of San Luis Potosí is the capital of the Mexican state of San Luis Potosí. It has a population of 825,000 in the city proper and around 1.2 million in its metropolitan area (AMSLP), making it the eleventh largest Mexican metropolis. A recent study identified pollutants in the air, particularly in the northern part of the city. On the other hand, the interior public spaces of the AMSLP have not been characterized and regulations are lacking to monitor and improve indoor air quality (IAQ) in buildings. The objective of this project –funded by the Balvi Clean Air Initiative– is to develop a framework to monitor, document, characterize and improve the CAI in public spaces of the AMSLP. The initial goal for proof of concept of the framework is the characterization and intervention of IAC in a stratified statistical sample of AMSLP public school indoor spaces to reduce the spread of COVID-19 and other airborne infections.

The Air Quality Station Project

Didier Donsez
UGA - LIG, France

The Air Quality Station project aims to develop low-cost and repairable air quality measurement stations using off-the-shelves components and sensors and to connect them via the LoRaWAN community network The Things Network. It is the subject of engineering student projects every year. Citizens and non-profit organizations can reuse and improve the various versions of the stations.

Web page: https://airqualitystation.github.io/

Abstracts of Air Quality Task Force Initiatives

Mobile Health and Life Initiative Center

Salvador Ruiz Correa, You-i Lab
IPICYT - Mexico

Smart Cities Innovation Center

Dr Víctor Manuel Larios Rosillo
CUCEA - UdG - Mexico

Based in a young and enthusiast team of researchers committed to develop and innovate into the the Guadalajara Smart City in the Metropolitan Area. This innovation Center was born from previous industry collaboration projects as well as the local ambitious government projects requiring technological and social innovation as main axes. Also, this center is supported by the PhD in Information Technologies at UDG, one of the biggest platform of our research talent development in Mexico and aims to converge projects into the GDL Smart City Pilot acknowledged internationally by IEEE. Since Smart Cities requieres an holistic view, we use the Information Technologies as a vehicle to address solutions connecting with trans-diciplinar local, national e international research networks.

Web page: http://cici.cucea.udg.mx/en

Monitoring air pollution (CO) through IoT and nanomaterials

Antonio Casillas Zamora, CUCEI - UdG - Mexico

The trend of technology has been miniaturization and connection. On this, we cannot deny the urge for such merge. Materials with particle sizes below 100 nm for their potential technological applications including IoT are needed. The development of sensors for monitoring carbon monoxide (CO) and gaseous hydrocarbons requires special attention due to their security risks. Carbon monoxide is an odorless and colorless toxic gas. Prolonged exposure to this gas can cause severe damage to human health and even death. It is toral to deal with. It is important to design and produce a prototype that would detect carbon monoxide, and provide proper solutions. These solutions can emerge from IoT connection.

Abstracts of technical presentations

Internet of Things: current and future security and privacy challenges.

Alessandra Rizzardi, INSUBRIA

The talk focuses on the security challenges and associated risks arising due to the increasing diffusion of IoT-enabled services, where the concept of interconnected smart objects has a primary role. The emerging issues include data confidentiality and authentication, access control, trust, and policy enforcement. Traditional security countermeasures cannot be directly applied to IoT technologies due to the different standards and communication stacks involved. Hence, a flexible and cross-domain middleware platform must be set up with the final goal of managing the huge amount of heterogeneous IoT data and promptly dealing with security threats. The talk discusses more broadly how security solutions can contribute to the design and develop robust IoT networks, and suggests exciting open areas for future research directions.

A scalable and secure architecture for blockchain-based micro-payments.

Alberto Trombetta, INSUBRIA

A verified ledger db-based architecture for the efficient management of blockchain-based micro-payments is presented. The architecture is part of a system that allows for the efficient management and rapid prototyping of decentralised apps that access as-a-service different consensus protocols, as provided by public, external distributed ledgers.

Towards Formal Verification of Business Processes in the Blockchain.

Kais Klai, USPN - LIPN - LOvE Teams

Despite the benefits that the Blockchain technology brings to many application fields, its adoption does not come without challenges. Smart contracts, which are at the core of second generation blockchains, can often be riddled with vulnerabilities that can be exploited to attack the platform and threaten its security. It is therefore crucial for the protection of the designed systems to prove the correctness of the smart contracts to be deployed. Approaches have been proposed to detect generic vulnerabilities like reentrancy, but the results would often include false positives where the detected bug is either nonexistent or not exploitable. Besides, such approaches do not offer to check contract-specific properties.

In this talk we present a formal approach that we have proposed in an attempt to bridge this gap. In particular, we consider the adoption of the Blockchain technology for the Business Process Management (BPM) field. This previously outlined approach is based on the transformation of Solidity smart contracts into Coloured Petri nets, which provides the possibility to verify smart contracts with reference to properties expressed as Linear Temporal Logic (LTL) formulae. We will focus mainly on two points: (1) taking into account the concept of function calls in the transformation and (2) the LTL properties that can define the correctness of a smart contract. Such properties can be specific to the control- or data-flow of the contracts being checked. They can also be used to express vulnerabilities as we showcase by proposing LTL formalizations for six vulnerabilities from the literature. We then leverage the capability of the Helena model checker to detect these vulnerabilities while discerning their exploitability, as well as check temporal-based contract-specific properties.

Deterministic Communications over 5G - Validation with Victoria Network at UMA.

Delia Rico, Pedro Merino Gomez, Francisco Luque Schempp
UMA - Victoria Network teams

Deterministic communications require high levels of reliability combined with low levels of latency. Applications such as the Tactile Internet that include industrial automation or drone remote control need a network that can support their operation with stringent requirements. In this context we present two solutions.

First, a transport protocol that exploits multi-connectivity (MTIP) in an intelligent manner to add redundancy and enhance the communication. MTIP uses context-aware information such as application preferences and network measurements to perform this selection. Secondly, we combine TSN with 5G to provide deterministic connectivity in environments where requirements like mobility are required. New entities and challenges arise to attain this objective. For instance, the TSN translators development or the time synchronization between both domains.

Privacy-aware passive sniffing: from packet collection to bounded trajectories

Fernando Molano Ortiz, Nadjib Achir (USPN-INRIA), and Aline Carneiro Viana, Researchers at INRIA Saclay

In this presentation we focus on the research challenges of the ANR Mitik project. In this project, we propose a data collection relying on non-intrusive passive measurements to infer the mobility of nodes and their potential interactions while on the move. To this end, the proposed methodology is to deploy a number of "sniffers" which listen to the wireless activity in a given target zone. If properly deployed, different sniffers will feed the system with sufficient complementary information to capture the mobility of the nodes. But passive measurements do not come for free - as sniffers have a binary view of the nodes (either it captures a packet, or it does not), achieving precise mobility characterization is a difficult task. To cope with this specificity, Mitik adopts a multi-technique methodology involving: optimization techniques for an efficient placement of sniffers, advanced synchronization strategies for the merging of measurement data from multiple sniffers, techniques for trajectory reconstruction, contact inference from rough estimations of trajectories, and, at last but not least, protection of user privacy.

Machine Learning and Data streams with KAFKA-ML.

Cristian Martín, UMA - ERTIS group

Traditionally, most of the ML/AI frameworks, which are behind the design and development of ML/AI algorithms, have been designed to work not with data streams like those in real-time generated by the IoT, but with persistent datasets and static data. Even nowadays, popular Python frameworks such as PyTorch, Theano, and TensorFlow provide, at the most, only partial support for data stream systems like Apache Kafka, the most popular data stream system. This does not merely include training of ML models, but also the rest of the steps that may be part of an ML/AI pipeline, such as ML model comparison and inference for production environments. In this talk, we will describe Kakfa-ML, a novel and open-source framework that enables the management of ML/AI pipelines through data streams. Kafka-ML provides an accessible and user-friendly Web user interface where users can easily define ML models, to then train, evaluate, and deploy them for inferences.

Aether: open source 5G Connected Edge platform for enabling critical enterprise IoT application

Abdulhalim Dandoush, ESME Sudria, Researcher at UDST & L2TI

AETHER: Aether is a collaborative effort between major network and service providers technology companies, and academic institutions to develop and deploy 5G technology at tthe edge. Some of the key partners in the Aether ONF project include: AT&T, Intel, Deutsche Telekom, Google, Radisys and Stanford university. The goal of the project is to drive innovation and collaboration in the development of next-generation networking solutions. Aether is an open source 5G Connected Edge platform-as-a-Service with simultaneous support for wireless connectivity over licensed, unlicensed and lightly-licensed (CBRS) spectrum. It provides wireless connectivity for private enterprise network including optimized edge cloud services with multi-cloud deployment support. We will introduce in this presentation its deployment view and how it brings together private 5G cellular and edge cloud delivered as a cloud managed platform, supporting low latency mission critical edge applications and AI/ML driven IoT aplications.

Optimizing energy and communication resources for IoT: A case study at USPN

Khaled Boussetta, Janeth Aguilar and Gladys Diaz, USPN - L2TI

From sensors to time series forecasting: a whole prediction framework.

Louis Closson, PhD student at Adeunis, associated at UDG/LIG - ERODS and Datamove teams

The increasing monitoring of building data enables better analysis and predictions of smart building indoor environments. They will allow fine automatism and thus better comfort and less energy consumption.
AI has proven efficient to forecast time series, however it needs a good understanding of the learning and inference tasks to create adequate datasets. We will explain an AI architecture, the processing of data and the learning process leading to a reasonably fast and efficient forecasting framework. I will show example based on real data, from CO2 and temperature sensors, coming from Adeunis building and GreEn-Er building.

See https://mhi-srv.g2elab.grenoble-inp.fr/django/API/

Participant list

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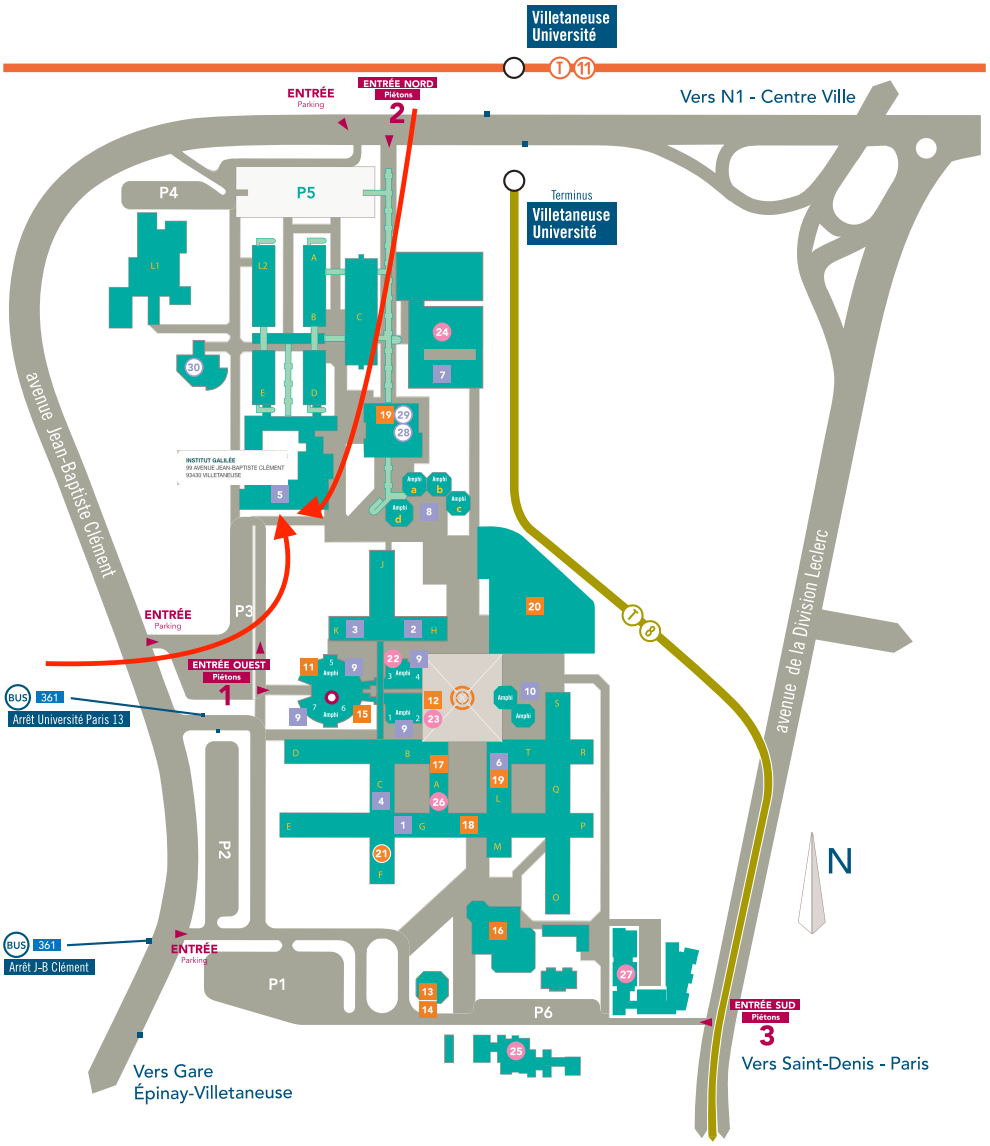
Registration: Amphi EULER, Institut Galilée, Campus of Villetaneuse (first floor, right wing)

Opening: Christophe Fouqueré (USPN President) Bruno Manil (Galileo Institut, Director)

Lectures: Amphi EULER (Institut Galilée)



Accueil / Boutique

COMPOSANTES - DÉPARTEMENTS

1. UFR Communication - *Sciences de la communication*
2. UFR DSPS - *Droit, sciences politiques et sociales*
3. UFR SEG - *Sciences économiques et de gestion*
4. UFR LLSHS - *Lettres, langues, sciences humaines et des sociétés*
5. Institut Galilée
6. IUT de Villetaneuse
7. DAPS - *Département des activités physiques et sportives*
8. Amphis a b c d
9. Amphis 1 2 3 4 5 6 7 (1er étage)
10. Amphis IUT

SERVICES COMMUNS

11. Service VOIE
12. Service culturel
13. Service social
14. Médecine préventive
15. Cellule Action sociale et handicap
16. Restaurant universitaire CROUS
17. Formation continue (rdc)
18. Service espace langues
19. Relations internationales
20. Bibliothèque universitaire
21. Scolarité centrale / inscriptions

VIE ÉTUDIANTE

22. Associations étudiantes
22. Bureau du vice-président étudiant
23. Cafétéria du CROUS

FORUM

24. Gymnase
25. La Chaufferie
26. Salle de réunion étudiants
27. Logements étudiants

ADMINISTRATION

28. Présidence / administration
29. BRED *Bureau de la Recherche et des Études Doctorales*
30. Restaurant administratif