



InSecTT Newsletter July 2023



Welcome!

This is the **July 2023 edition** of the InSecTT newsletter, highlighting news & achievements from InSecTT during Q2 2023.

Please distribute this newsletter to all interested parties in your organization. We appreciate your feedback, please send comments or requests to insectt@v2c2.at.

Enjoy the reading!

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New Podcast online: Hans-Peter Bernhard from SAL on future wireless systems

May 30, 2023

In this Podcast, Anamarija welcomes Hans-Peter Bernhard from Silicon Austria Labs (known as "SAL"). So ... what is SAL? Hans-Peter introduces this still young Austrian research institute, and talks about some of the top-notch research topics he and his team work on. Hans-Peters also shares his predictions for future wireless systems: what is still unsolved for IoT? What will be future communication technologies in 5 years? What will come in 10 years? And what research results can we expect from SAL when project InSecTT finalizes?



Benefits of passive QoS measurement in OT and IT networks

May 19, 2023

Network monitoring solutions typically base their analysis on active solutions, generating synthetic test traffic into networks. This burdens the operational networks with extra traffic while telling nothing about how the actual application traffic experiences the network condition reliably and accurately. Active tools are their best when verifying networks before bringing operative applications. Passive network measurement solutions are ideal for operational networks, not interfering with the operative use and seeing precisely the network quality for the real applications used over it. Kaitotek, a partner in the InSecTT project, is a pioneer in passive network monitoring. Their Qosium solution enables measuring the network quality without limitations on applications being measured and network technologies.



One-way QoS

May 19, 2023

Why is one-way QoS measurement essential? Most mission-critical traffic is one-way. Especially in wireless networks, the QoS between directions is asymmetric. Kaitotek, a partner in InSecTT, is a pioneer in passive network quality measurement and monitoring.



Situation awareness in private and OT networks

May 17, 2023

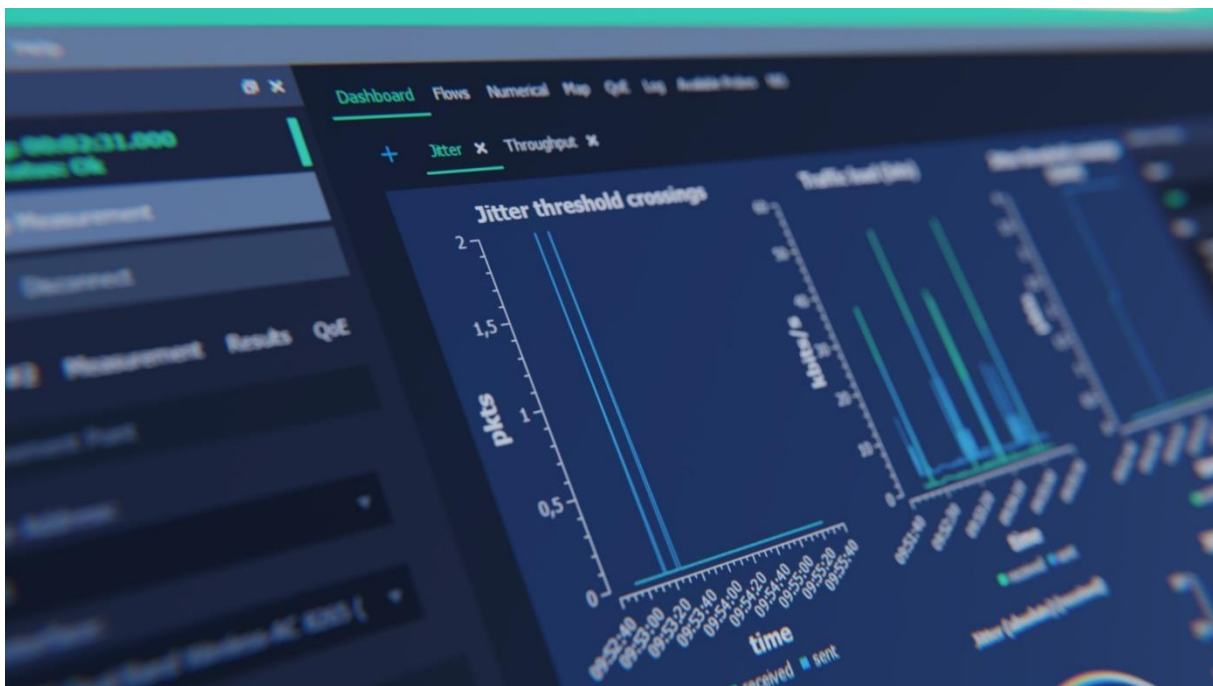
Private networks are proliferating. However, many network operators, not to mention the end-users, lack a way to really see how the network is working and what is the real-time quality of the applications used over it. In case of problems, how to know immediately and where precisely the problem is and what kind. Detecting, notifying, and providing detailed information about issues with no delay helps initiate focused recovery actions even before the problem escalates. Kaitotek's Qosium solution monitors the network quality in real-time. Passive measurement continuously tells how the actual application traffic is experiencing the network conditions without synthetic test traffic. By combining all the results, you have a real-time network-wide situational awareness of the quality of the communications.



One-way delay measurement

May 16, 2023

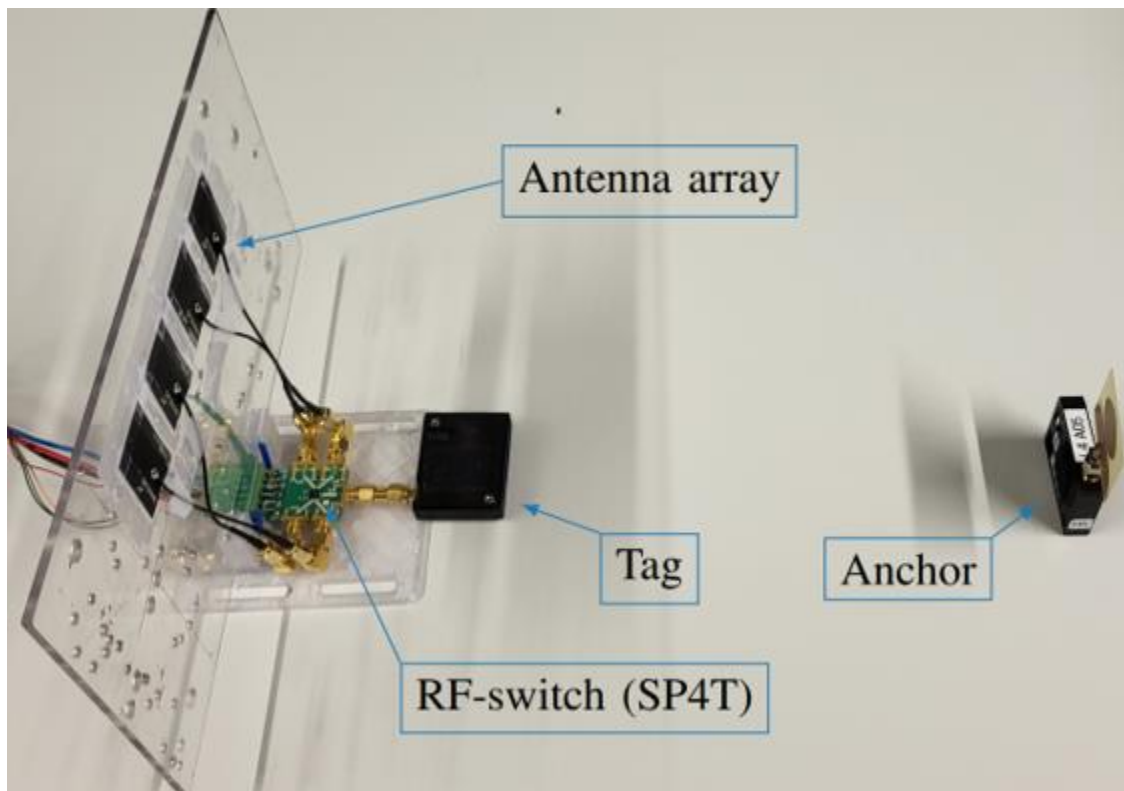
One-way delay tells you much more than typically measured round-trip time (RTT). Especially in wireless networks, the delay behavior between the traffic directions is rarely symmetric. Most delay-sensitive application traffic is also one-way in nature. In case of problems, RTT does not let you know which direction is causing the connectivity quality issue. The RTT solutions typically are active tools, which do not allow seeing the measurement results for the actual application traffic but only for the synthetically generated traffic. Moreover, as active solutions introduce extra load to networks, the continuous measurement is limited to simple ping-like methods. Kaitotek's Qosium measures QoS statistics always one-way and in real-time, also overcoming the issue of clock synchronisation between the measurement points for delay measurement.



Time-multiplexed angle-of-arrival (AoA) for UWB

May 12, 2023

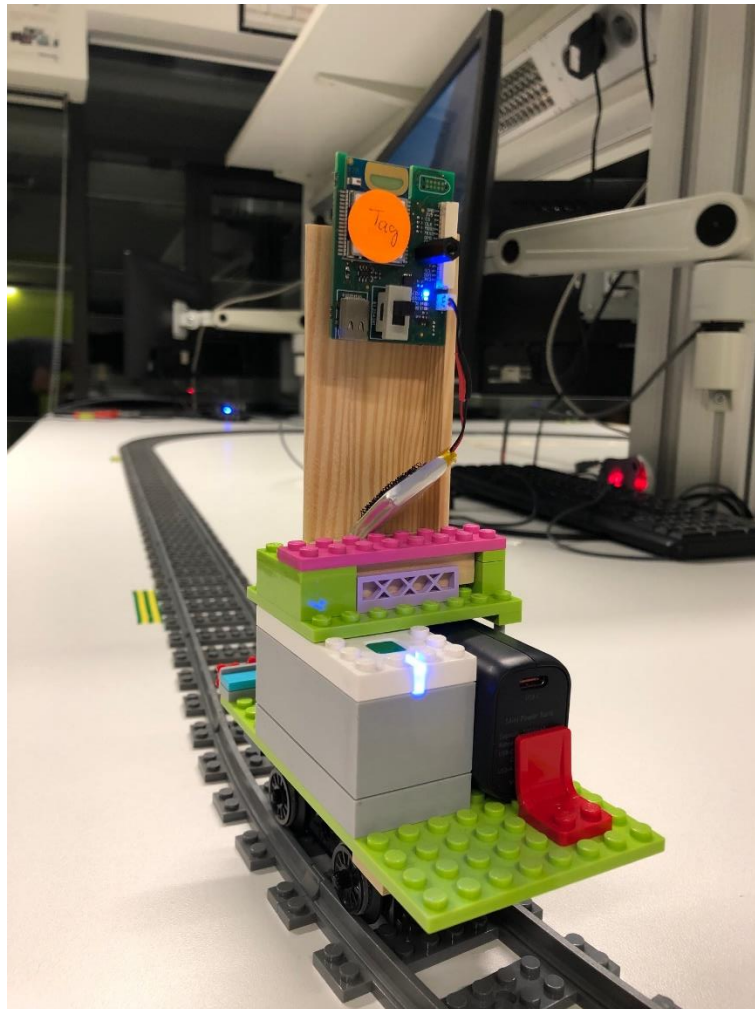
JKU recently came up with a time multiplexed angle-of-arrival approach for ultra-wideband systems. To evaluate our approach, we extended one of our Qorvo DW1000 based UWB-tags with an RF-switch allowing to select one out of four antennas. By subsequently receiving packets, one per antenna, and application of clock estimation we could estimate the direction of the transmitter with an accuracy of 5 degrees. We are proud, that our paper presenting this research was accepted at ICL-GNSS 2023!



Model train for acquisition of indoor localization measurements

May 10, 2023

JKU is working on a trustworthiness indicator for ultra-wideband indoor localization. To evaluate our algorithms, it was necessary to acquire some new measurements. To accomplish the task, we used a model train. Research can be fun!



Comparison of indoor localization systems

May 9, 2023

Recently Johannes Kepler University (JKU) and Linz Center of Mechatronics (LCM) met the team from Gdansk University of Technology (GUT) to carry out localization measurements together. The aim of the measurements was to compare different localization technologies (UWB/time-of-flight, UWB/time-difference-of-arrival, Bluetooth/angle-of-arrival with ESPAR antennas) by means of accuracy. To accomplish that task, we mounted our tags on a robot developed by GUT which automatically steered along a pre-defined trajectory based on GNSS-RTK. We're looking forward to getting interesting insights from the final results :-)



Econtalk: Being human in the age of AI

February 2023

Ian Leslie talks on the Econtalk podcast, hosted by Russ Roberts, about the launch of OpenAI's conversational chat last November. The journalist, surprised by the closeness of dialogue with the computer, discusses the importance of being able to differentiate ourselves from this technology.

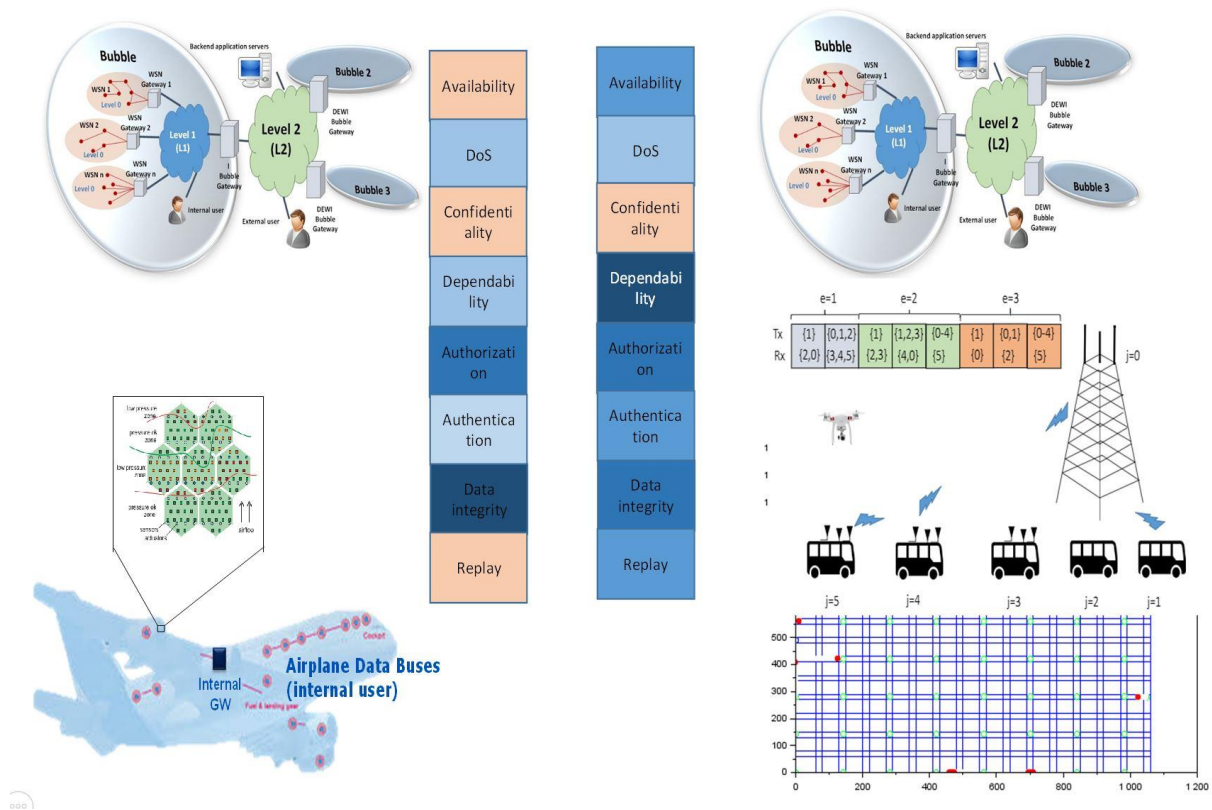
According to Leslie, the problem is not that robots have become more human, but that humans are becoming more predictable and generic. Education has a key role to play in this. We need to do away with predictable attitudes in order to confront our minds with the ambiguous and unexpected.



Trustworthiness by design

May 2nd, 2023

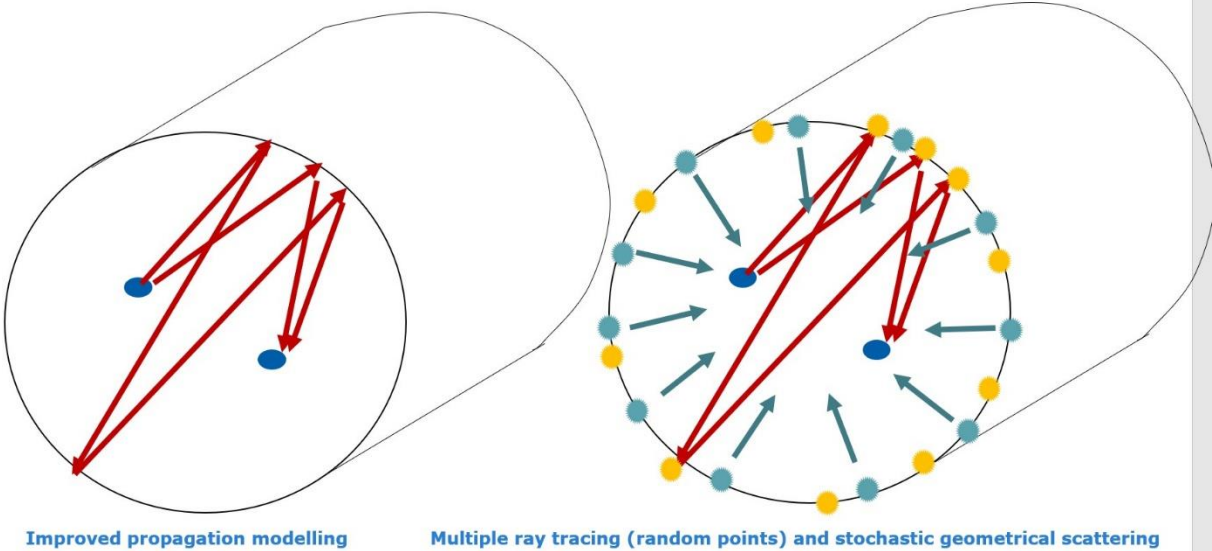
The InSecTT project investigates trustworthiness metrics for IoT analyzed and compared across different use cases. InSecTT introduces the concept of trust-by-design adopted through a reference architecture where different trustworthiness metrics can be enforced in different network layers and different entities. This can lead to a technology selection process based on a tradeoff between system complexity, trustworthiness, and other conflicting metrics. InSecTT also proposed a framework of online labelling based on trustworthiness metrics that would allow different Bubbles to adapt security mechanisms "on-the-fly" according to the trustworthiness indicators or metrics of the different networking entities.



Wireless Avionics Intra-communications

May 1st, 2023

The use of intelligent wireless services on board operational aircraft will bring major benefits for the aeronautical industry. The project InSecTT has shown that wireless networks assisted by AI and multiple antennas are capable to reach the standards of internal buses of commercial aircraft, and in some cases surpass the performance. This is mainly due to the spatial diversity properties of multiple antennas. With the results we can ensure that WAICs (wireless avionics intra-communications) can be potentially standardized and commercialized in the years to come.

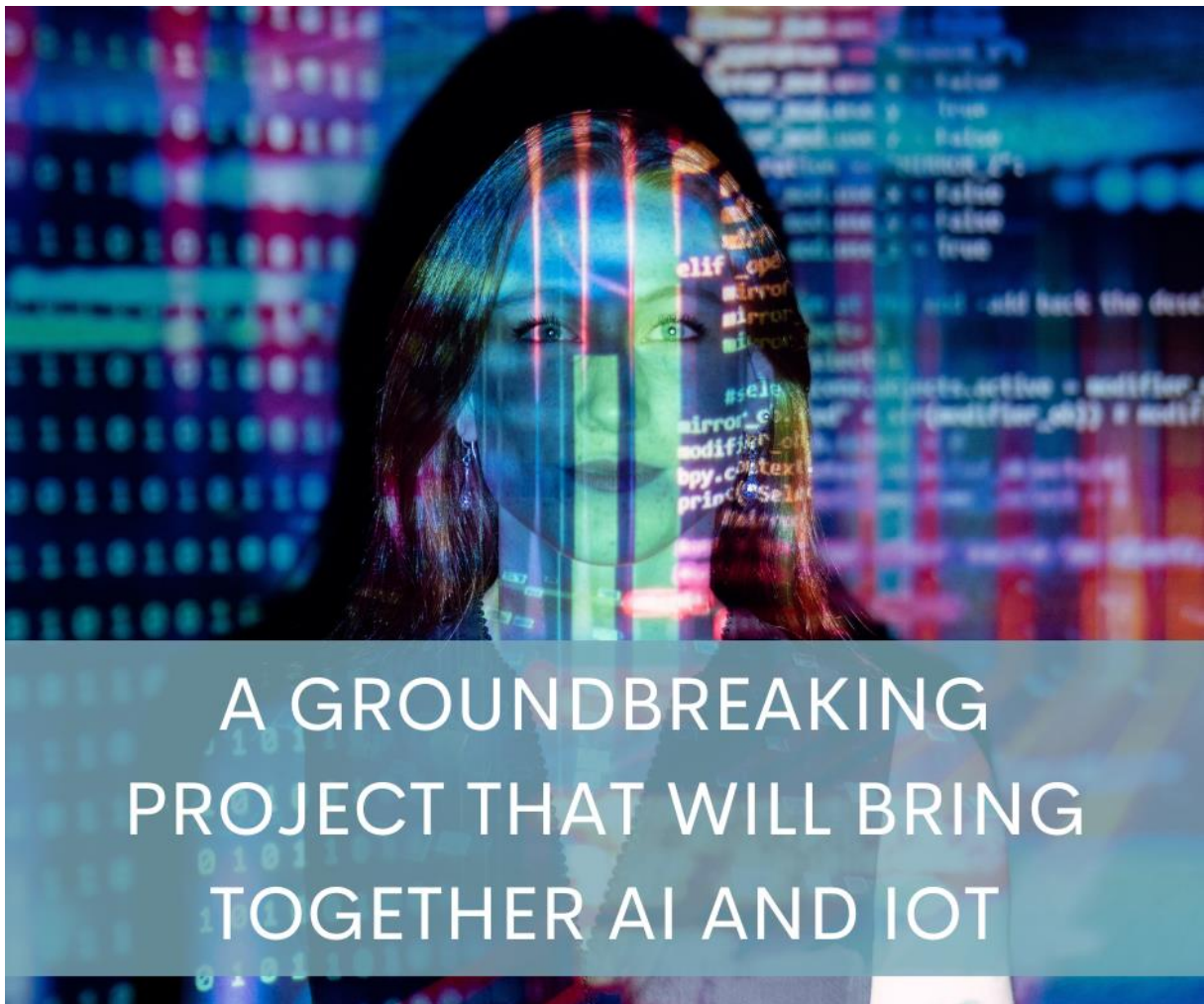


A groundbreaking project that will bring together AI and IoT

May 1st, 2023

In recent years, we have witnessed a massive avalanche of data, which has enabled the evolution of modern society and technology. InSecTT is the largest European project working to take the marriage of artificial intelligence and the internet of things to the next level.

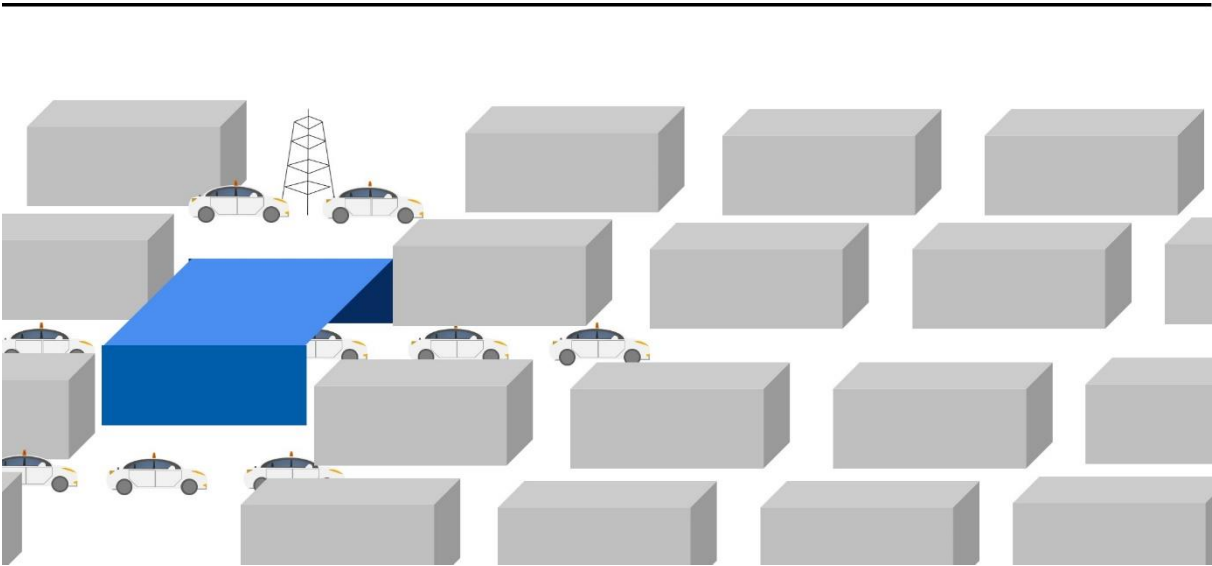
Our project will collaborate with different industries, research organisations and universities to realise integrated use cases in different domains where Europe has a leading position. InSecTT will conduct demonstrations in real-world environments, through which it can introduce smart solutions to industry in Europe



Wireless Platooning

April 28, 2023

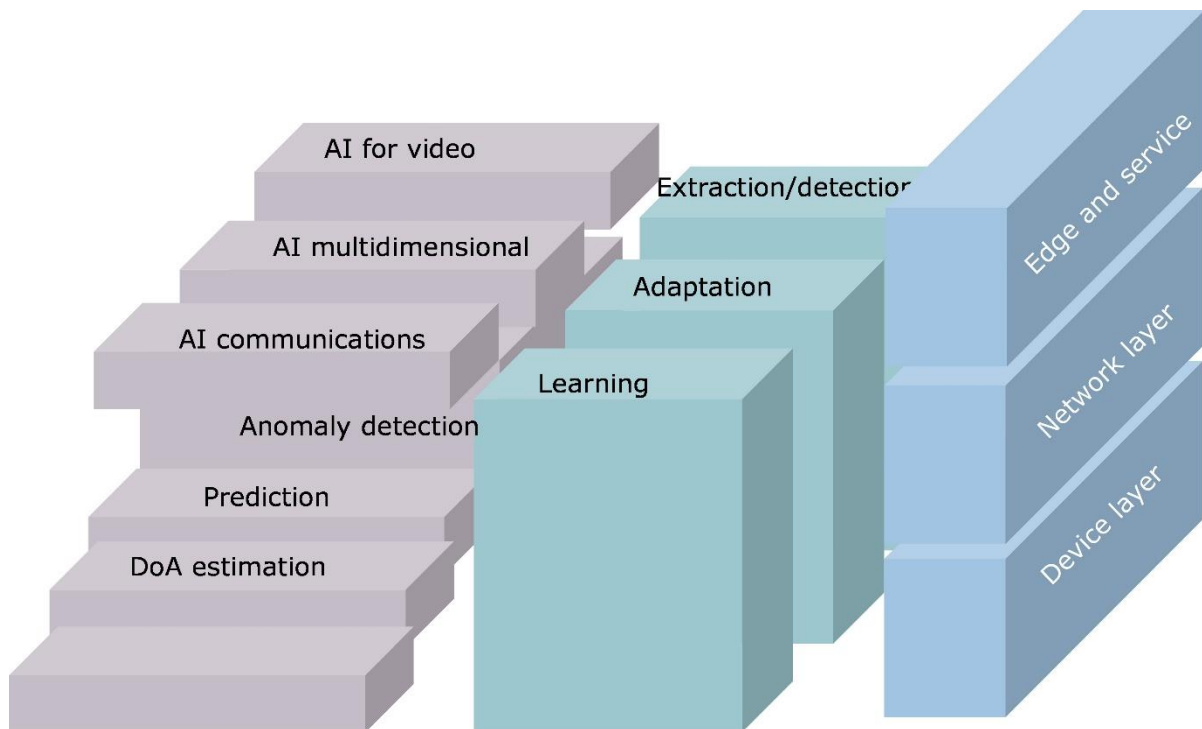
Vehicle platooning is an important topic in the future of autonomous or semi-autonomous vehicle and transportation systems. The benefits of the new smart vehicular infrastructure are significant: reduced emissions, improved transportation and commuting times, end-user satisfaction, reduced road incidents, etc. Our use case has explored methods to improve communications between all the elements of a platoon system to enable real-time information control and operation in dense urban scenarios or scenarios with difficult conditions such as tunnels. Our work has shown that AI plays a major role in the realization of systems that can ensure the minimum of conflicts or delays in communication that in turn minimize risks of accidents or collisions in future autonomous vehicular networks



Reference architecture

April 28, 2023

CISTER/ISEP leads the reference architecture and alignment activities of the project InSecTT. The InSecTT Reference architecture provides a standardized and a common framework to investigate the interfaces, entities, protocols, and devices used across different use cases and industrial domains. The reference architecture provides a high-level perspective of how the new AI dimension affects or impacts IoT systems across different perspectives, layers, or views of modern IoT architectures. It also highlights issues in current systems or interfaces and usually provides an overview of vulnerabilities or weaknesses that will have to be addressed by next generation systems.



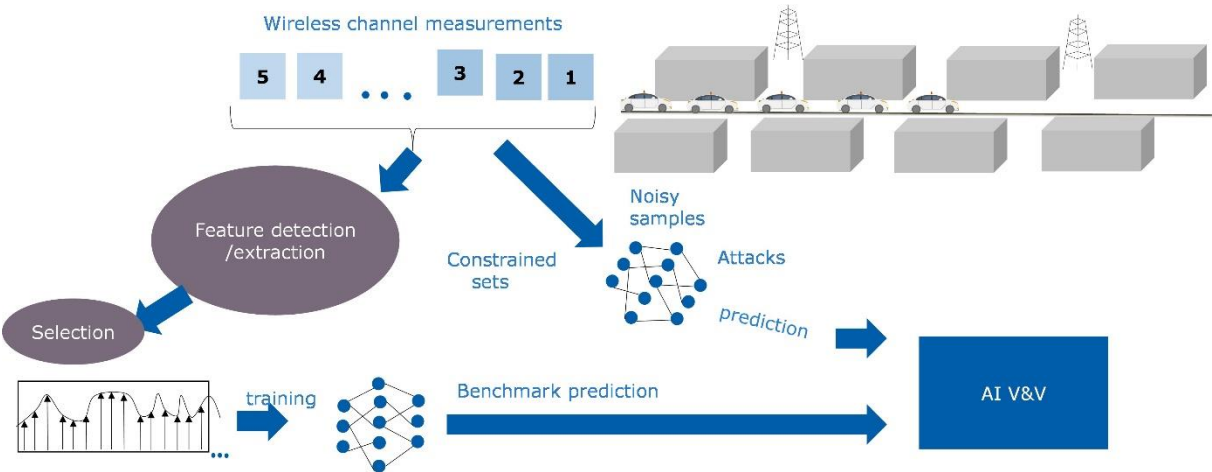
Channel prediction with imperfect data sets

April 28, 2023

CISTER is the Research unit on Real-time and Embedded Computing Systems of the engineering school of the Polytechnic of Porto in Portugal.

Our work has produced interesting bounds of learning algorithms in the presence of different impairments of the data sets or the learning networks.

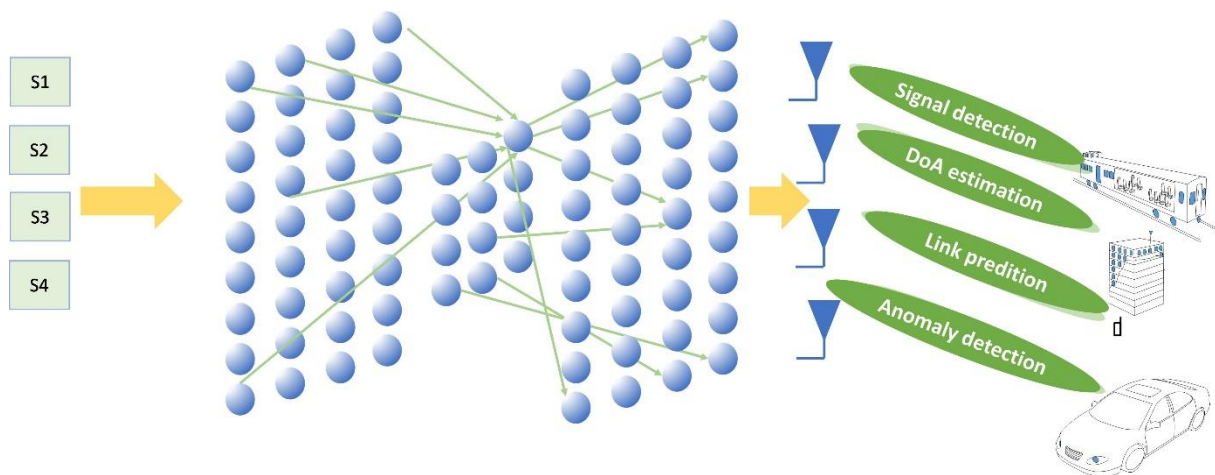
In the case of wireless channel prediction, the parameters of the neural networks were optimized according to the statistics of the channel and the sampling/noise parameters of the data set. Deep learning algorithms showed interesting results when the data sets were relatively more complete and particularly in the under-sampling regime, where channel information is less reliable.



Intelligent Wireless services

April 24, 2023

CISTER is the Research unit on Real-time and Embedded Computing Systems of the engineering school of the Polytechnic of Porto in Portugal. We collaborate in the InSecTT project as leaders of the task on the use of artificial intelligence for wireless communications. The task has produced a detailed analysis of different types of AI algorithms for different aspects of the communication process. The InSecTT project has tested and implemented a variety of algorithms focusing on aspects such as: improved signal reception in multiple antenna systems, interference rejection based on direction-of-arrival estimation, link and channel prediction for improved equalization, interface selection, real-time allocation and low latency, and finally anomaly detection in communication layers.



JSI

April 21, 2023

Jožef Stefan Institute (JSI) is the largest Slovenian public research institution, employing over a thousand specialists in natural sciences, life sciences, and engineering. As a research partner of the InSecTT project, we take pride in our active participation aimed at bringing together explainable Artificial Intelligence and the Internet of Things to create intelligent, secure, and trustworthy systems for a wide range of fields.

Our primary focus in the project was on developing smart and adaptive connected solutions across the health continuum. Leveraging our expertise in AI, machine learning, and image

processing, we aimed to contribute to the project's goal of delivering cutting-edge healthcare solutions. By working closely with our project partners, we ensured that our solutions would be instrumental in future healthcare applications.

To learn more about contributions to the health domain within the InSecTT project, please visit <https://www.insectt.eu/domains/health/>.



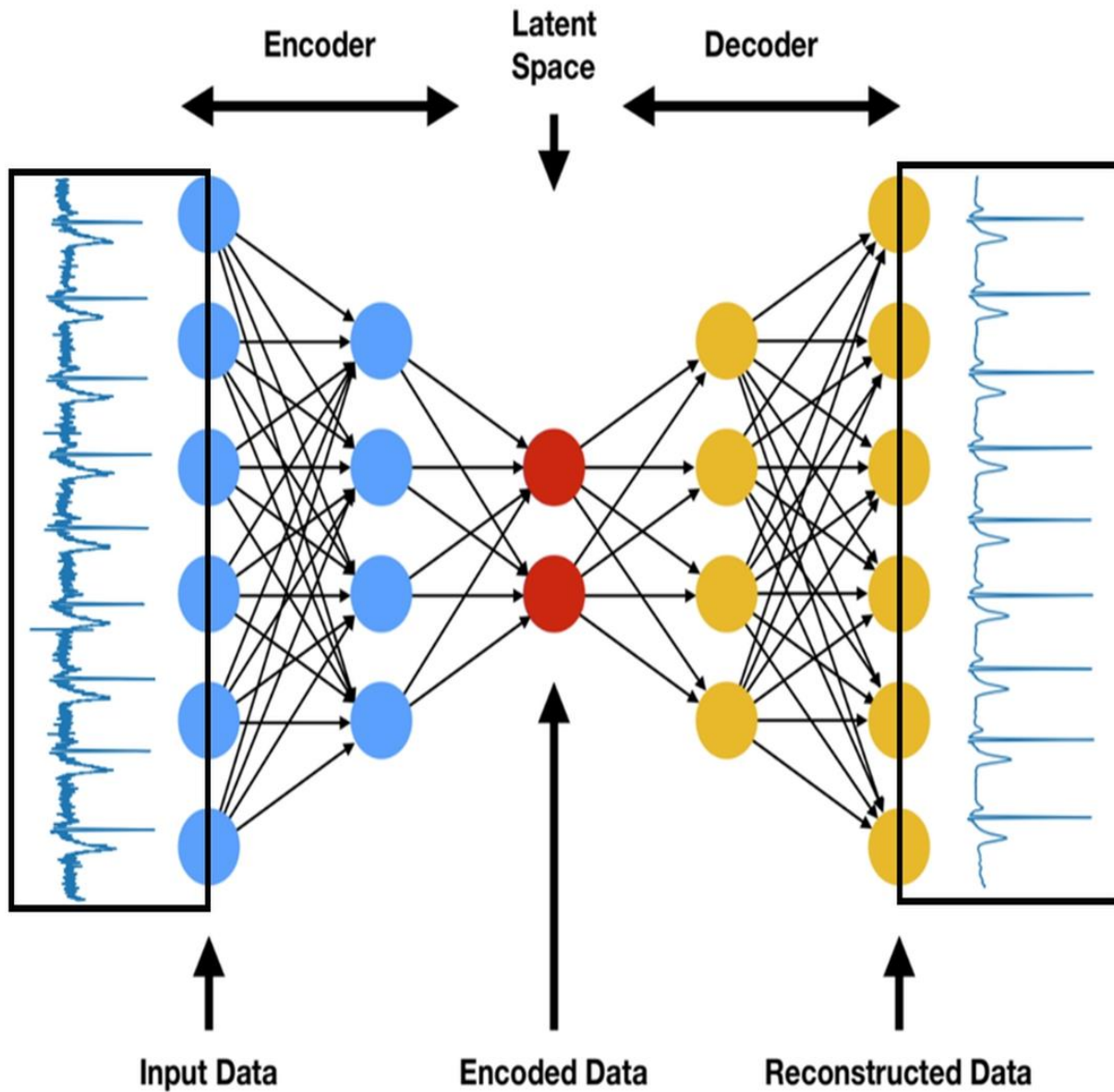
Localization Awareness

April 19, 2023

JSI is proud to participate in the InSecTT project, where we are leveraging our expertise in AI, machine learning, and image processing to achieve our shared goal of promoting cooperation among big industrial players from various domains, a diverse range of innovative SMEs located across Europe, as well as cutting-edge research organizations and universities. Our primary objective is to bring explainable AI and trustworthy Internet of Things together to develop intelligent, secure, and reliable systems.

We are contributing to the project in two significant ways. Firstly, we are working on localization awareness in Mass Casualty Incidents. Our advanced system reports the location and injury status of casualties to the server in real time, providing arriving rescue teams with critical information in advance. It also enables indoor navigation using only passive QR tags, without requiring any communication or satellite positioning systems.

Secondly, we have developed a smart hospital solution for anomaly detection in ECG signals, which contributes to patient risk assessment based on an autoencoder deep neural network. By leveraging the power of deep learning algorithms, we aim to provide accurate patient risk assessments, enabling medical professionals to make informed decisions and provide optimal care.



Security of AI Networks

April 15, 2023

IDEMIA is proud to see the successful completion of an important cross-discipline project 3 years in the making—EU Project InSecTT—which focuses on securing IoT by using reliable AI and machine learning.

Our team was tasked with enhancing the security of artificial neural networks from adversarial attacks, with particular attention given to safeguarding facial recognition algorithms.

