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ICT

iFEST

A new generation of festival wristbands

If you visit a concert or festival, chances are that you will be wearing textile wristbands for access control and that you will be using paper tickets and cash money to buy drinks. In other words: although the artists are working with the latest high-tech equipment, concertgoers cannot yet enjoy the benefits of a high-tech festival experience for access control, social interaction and so on.

But change is on its way. During the 2014 edition of Tomorrowland – a pioneering event in terms of innovating the festival experience – "smart wristbands" were used to ensure smooth access control, enabled by combining short range RFID with long range wireless. In addition, the tracking and LED features enabled, at the same time, enhanced security and massive visitor engagement during an impressive light show. And much more is to come: by integrating wearables, wireless network technology, data analysis, mobile applications, sensors, etc. a real revolution for festivalgoers and organizers can be realized.

The iFEST consortium contributed to this revolution by developing a new generation of festival wristbands and combining these with built-in communication capabilities, sensors and a software platform for data analysis to ensure a richer festival experience

"A key challenge within the iFEST project was to transform the existing smart wristbands to a true Internet of Things network supporting more robust and reliable connectivity," explains iFEST project lead David De Wever (PlayPass). "And this was not an easy task: festival or concert locations are the most chaotic environments one can imagine in terms of setting up and maintaining wireless networks. In other words: supporting 10.000s of connected festival wristbands and providing visitors and organizers with a robust wireless connection was a big challenge. But cracking this nut would allow us to change the festival experience forever."

THE OUTCOMES

1. New protocol and wireless gateways for a robust wireless connectivity in high-density 'chaotic' environments

The basis for a new, digital festival experience is a robust wireless network. A stable network needs to be configured in a short amount of time (typical 12-24h prior to a concert), for a large amount of users, on a location with no or few network facilities (think of a tract of land as the festival's location). Also, once set up, a festival or concert is the worst thinkable scene in terms of keeping wireless networks up and running: there is constant interference by people using their smartphone, the metal structure of the stages and the use of non-traditional wireless devices to control of sound, fireworks, etc. In short, it's a wireless mess.

"We were surprised to see that the state of the art models for predicting the performance of WiFi in such an environment largely underestimated the situation," explains research lead Steven Latré (imec – UAntwerpen – IDLab). "Therefore, one of the major outcomes of the iFEST project is the realization of a new protocol to wirelessly connect thousands of people via their bracelets in such kind of 'chaotic' environment. We also developed wireless gateways (as opposed to the wired gateways that are used today) that are low power and specifically created for high-density environments. They allow for a faster set-up and configuration of festival networks. Finally, by using the signals that the wristbands send out as the basis, we developed more accurate and scalable localization algorithms, which allow pinpointing both a single user and a crowd."

2. A platform that gathers and interprets different types of realtime data

Another important result from the project is the platform that was set up to gather and combine all sorts of data – which can then be analyzed and used as input for different applications. The central data platform should be able to consume different types of data in real time and make the necessary real time interpretations.

David De Wever: "A festivalgoer has multiple identification methods: his ticket, social media accounts, etc. We developed a technique that combines all these IDs into one guest ID, which can be used at the festival. During the event the data from this ID can be enriched with other kinds of data (e.g. localization data), allowing us to learn about someone's favorite food, music, etc. The central platform that consumes all these different types of information allows the different stakeholders within iFEST to produce, consume and treat messages, with a specific focus on data retention, onsite-online replication taking privacy concerns into account."

Based on this unified ID, a profiling app was built that can profile individual users. If desired, information on the user can be gathered before and during the concert or festival. As such, users can receive vouchers or tips on restaurants nearby the concert location, traffic info and recommendations on the fastest route to the event, and directions on the event location itself to easily find one's seat number. More generally, it allows us to provide the user with real-time recommendations (at the right time and place) based on his own interactions at the festival and the context of that moment (e.g, concert that is playing, weather, time of day).

3. Unique and scalable localization techniques for a richer festival experience

Knowing where your audience is is not only relevant for a festival organizer. Accurate localization is one of the most important contextual parameters to trigger the above recommendations. Steven Latré: "For this kind of scenarios, we developed new localization techniques that make people trackable with meter accuracy in a rough environment, when wearing the festival wristband. We developed several localization techniques each differing in accuracy, scalability and required hardware at the user side. For example, a technique based on radio tomographic imaging, was developed when no wristbands are worn, and no cameras are used. Based on radiation and its reflection, it can estimate the crowd density in a certain area. This is important information for the organizer and security staff. It's the first time that such technology was developed for a high-density environment and on such large scale."

NEXT STEPS

Several parties involved in the iFEST project will use the knowledge and insights to enhance and innovate their products. For sure, the resulting technologies will not only be deployed in a festival setting but also for other kinds of events (e.g. congresses, in soccer stadia, attraction parks or holiday resorts) and for user-based profiling applications. Furthermore, at large public events, the technology could allow tracking of possible criminal or terrorist activities. The balance between safety and privacy remains a topic of further investigation. For the imec research groups, it was an eye-opener to see just how chaotic a festival/concert environment is. The need for high-density networks (so-called dense LANs) is high and therefore several PhD research projects on this topic were set up.

FACTS

NAME	iFEST
OBJECTIVE	Develop a new generation of festival wristbands based on built-in communication and sensor functions
TECHNOLOGIES USED	Wi-Fi, DASH7, Lambda architecture and Tengu platform for big data, Apache Cassandra, artificial intelligence, 6TISCH
TYPE	imec.icon project
DURATION	01/01/2015 - 31/12/2016
PROJECT LEAD	David De Wever, PlayPass
RESEARCH LEAD	Steven Latré, imec – IDLab
BUDGET	2.9M Euro
PROJECT PARTNERS	Telenet, PlayPass, Sendrato, ID&T, 3factr, Sentiance
IMEC RESEARCH GROUPS	Living Labs, UGent – MICT, IDLab

WHAT IS AN

IMEC.ICON PROJECT?

The imec.icon research program equals demand-driven, cooperative research. The driving force behind imec.icon projects are multidisciplinary teams of imec researchers, industry partners and / or social-profit organizations. Together, they lay the foundation of digital solutions which find their way into the product portfolios of the participating partners.

iFEST project partners:

3factr · ID&T · playpass · SENDRATO · sentiance

AGENTSCHAP INNOVEREN & ONDERNEMEN · Vlaanderen is ondernemen

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