Digital Single Market

Projects story18 March 2014

Cutting out the noise

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Railways, aircraft and traffic are the main causes of urban environmental noise pollution. Studies reveal that of those exposed to such noise, approximately 30 % are troubled by aircraft, about 20 % by road traffic and about 10 % by trains. The noise is not only irritating – it results in decreased quality of life, health problems, mood changes and increased stress levels.

UPDATE 25/09/2014

New benchmarking tool for test-beds

Owners of application test-beds – or testing facilities – can now download a simple tool that tells them whether their facilities meet a basic standard for testing audio applications.

Developed by the EU's Ear-IT [1] acoustic surveillance project, it builds on the project's success in developing smart devices that make the most of cutting-edge sound-sensing technology in areas such as traffic monitoring, building security and energy efficiency.

The project discovered that audio surveillance devices can work in even low-speed wireless networks –as long as they have an advanced audio encoder/decoder – because these networks often have enough bandwidth for audio streaming devices.

The benchmarking tool helps developers find out whether their test-bed meets this minimum standard. Along with the test, Ear-IT can also supply an audio source and hardware to use the test, as well as support documentation.

You can find details of the procedure for the test here [2] and further explanation of how to use the benchmark tools here [3] – both from the Ear-IT website.

One of the latest successful applications of Ear-IT's technology is a new audio board [4] for small wireless listening devices. This board can stream audio, letting monitors know if someone carrying one of these devices is in distress – either at home or outdoors.

The project would like potential user's feedback on how they could use automated audio detection technology to develop further smart environments applications. If you have ideas on how the project can help you, please complete the project's survey here [5].

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EU Directive 2002/49/EC provides guidelines for the assessment and management of this noise pollution. A starting point is accurate monitoring tools. Using wireless sensor networks within smart cities opens up new opportunities to monitor traffic density and quantify noise levels. Some sensors are in place already, for example for measuring light, CO2 and humidity.

But the potential benefits of audio as a monitoring tool have been largely ignored, despite several clear advantages: audio sensors are cheap, energy-efficient and often easy to deploy, do not depend

on line-of-sight (NLOS), allow for omnidirectional sensing and are not affected by weather conditions or lighting.

The EAR-IT project is investigating how to incorporate acoustic modalities into traffic density monitoring applications. Technology would be used to classify noise type and acoustic events, and to quantify and assess noise on a subjective level. By incorporating this novel information into existing data management systems, more reliable noise maps – including their historical progression – could be developed. Parameters are derived to intelligently and adaptively steer traffic management systems, e.g. to actively reduce noise pollution in a certain area. Applications would therefore have high social, economic and ecological value.

Seeing the need for an intelligent sensor in line with the current definition of Internet of Things (IoT) devices (low-power, small, cheap, interconnected), the EAR-IT team developed an Acoustic Processing Unit (APU). In comparison with existing solutions, the APU has increased processing power thanks to an embedded processing platform able to process complex algorithms with high quality audio. It is equipped with a modular software framework for acoustic event detection. The APU is highly adaptable due to its modular structure, fully automated, respects privacy and is non-obtrusive.

Several APUs were deployed in the SmartSantander test bed in Spain (www.smartsantander.eu), complementing the existing sensor infrastructure, and allowing for experimentation. The EAR-IT team is currently investigating two different kinds of algorithm for traffic density monitoring: computationally low-cost deterministic approaches and more complex, machine-learning-based algorithms that would lead to a computationally scalable solution.

After further development, APUs will create a base technology that can easily be modified for applications beyond traffic density monitoring while remaining affordable, easy to produce and to deploy.

More info

www.ear-it.eu [6]

Download in PDF [7]

Links
[1] http://www.ear-it.eu/
[2] http://www.ear-it.eu/benchmark-procedure-0
[3] http://www.ear-it.eu/benchmark-tools
[4] http://www.ear-it.eu/article/iot-sensors-doing-streaming
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