University of Salford
A Greater Manchester University

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IMPRINTS

Acoustics Research Centre
University of Salford

Internet and mobile technologies for a public role in noise surveying

C Mydlarz, I Drumm & T J Cox

The traditional method of noise surveying is to use trained professionals to go to a specific site to measure and assess noise levels using dedicated and expensive equipment. With the implementation of mobile phone, PDA and PC applications, alongside web based collation techniques; we aim to empower the public in the gathering of context specific data on soundscapes.

The combined use of these technologies will contribute to the project in two respects:

1) It enables environmental noise data from a large participant base to be automatically collated and analysed.

2) It enables participants to include subjective responses to the soundscapes they inhabit, providing a more nuanced understanding of the context and reasons for human responses to environmental sounds.

Stage One - Data Acquisition

The project participant downloads a small application for use on their mobile device. The Java mobile software exploits the audio capture functionality of the mobile phones through the Java Mobile Edition JSR135 (Multi Media API). As well as the capturing of audio, it allows for the logging of subjective response data from the participant. The software will prompt the user to enter short worded responses, select from multiple choice options & select values from differential scales.

The data gathered from the participant while immersed in the soundscape will provide a more accurate impression of the impact of the individual's soundscape as they are responding in-situ and not relying on memories of a sound space which may be inaccurately recalled.

v1.0 Version 1.0 caters for the lower end of mobile phones that have the capability of capturing the compressed AMR-WB (Adaptive Multi-Rate - Wideband compression) format of audio only. This records using a maximum bitrate of around 16 Kbit's at 13 bit. The resultant signal has a filtered range of 50 - 7000Hz due to its optimisation for speech encoding.

v2.0 Version 2.0 will be installed on higher end handsets that offer the capability of high bandwidth audio capture in the PCM wav format. This format allows the manipulation of the raw audio signal for graphical visualisation on the mobile device.

v3.0 The Windows Mobile software being developed in Microsoft C# for PDA's will provide further possibilities in terms of visualisation and feedback due to its increased processing power and memory capabilities, coupled with a larger screen and predominantly touch screen interface.

Stage Two - Collation, Acquisition & Preliminary Analysis

Once the participant has collected a number of soundscape recordings along with a collection of responses to each one they will be prompted to upload this data to their home computer. With the data successfully uploaded the IMPRINtS PC software will assess the type of audio data and convert from the AMR format to wav if necessary.

The increased processing power of the home PC will be utilised to provide more advanced methods of audio visualisation for the participant. The PC software will also prompt the participant to enter further reflective opinions on the soundscapes they have inhabited.

Another major role of this PC stage is the completion of further more advanced signal analysis on the audio data, as well as the collation and analysis of the subjective responses of the participant.

The data retrieved from this stage will therefore be pre-processed and 'packaged' in a format that requires little to no further acoustical analysis.

Stage Three - Primary Analysis

The final stage in the project sees the pre-processed 'packet' of data sent back to the project server via the IMPRINtS PC software. The server application can thus automatically collate, analyse and present data received from any of the enabled technologies (mobile, PC, PDA etc) providing visual feedback to the participants on their contribution to the project.

Quantitative data can be extracted from the subjective open responses of participants, alongside a process of qualitative analysis. This can then be used with the objective analysis data already obtained to make inferences on the effect and importance of the holistic and atomistic soundscape features in terms of their acoustic characteristics and their subjective influences.

Challenges

The major technological problem to overcome is the audio calibration of the mobile devices as well as the minimisation of user error and the actual recruitment of the projects participants.

The potential to gather vast amounts of data from a huge number of participants should provide new insights into how sounds vary spatially and peoples' relationships to their acoustic environments. The data gathered, combined with the inferences made, can be used to better inform strategies for environmental noise abatement and the enhancement of public spaces through increased soundscape consideration.

www.soundaroundyou.com c.mydlarz@salford.ac.uk