Tutor project proposals for 2009 Summer School in Sound and Music Computing

"Hearing objects" with Dr. Jean-Julien Aucouturier

The goal of the project is to design and build (or at least prototype) intelligent everyday objects that have sound recognition capacities. For instance, in an audio smart home, the coffee machine may recognize the ringing of your alarm clock and start making coffee.

The participants will think out design solutions, record databases of sounds, evaluate the performance of state-of-art pattern recognition technologies, and engineer solutions to address potential problems.

This is both a research and a design project. It addresses one of the biggest current challenge faced by audio pattern recognition (how to learn and incorporate contextual information) in a fun and creative way. The main goal is to (learn to) think beyond typical applications.

___*In particular, in this project...:*

Students will have the opportunity to use Orelia's hardware and software solution for audio pattern recognition (Audiosense, http://www.orelia.fr/index_fichiers/Security_and_Surveillance.htm), and, time permitting, mechanical control using Lego Mindstorm NXT (participants having experience with Mindstorm/Urbi are especially welcome).

"UrbanSync: back in Porto" with Dr. Stephan Baumann and Rui Penha

2009: social networks have conquered the living rooms of adults and our children. The omnipresence of our most private data, which is broadcasted globally by all kinds of iPhones, Googlephones and Nokias has led to an inconsiderate, blatant form of self-promotion. "Me-streams" and "24/7-life-logging" are knocking at the doors of Facebook, Twitter, LinkedIn, etc. Microblogging will soon be very lame and BrightKite, the popular GPS-microblogging app, may be augmented by real urban sounds and personal emotions. But what will it mean to us, how will we feel in a world where our most private moments are exploited for perfect match-making, etc. ?

To find some first, vague answers to this question we collected real-life data in October 2008 in Porto ending up with 45GB of multimodal data: audio, GPS, biodata, GHz network traffic, etc. This data source is still waiting to be explored to its full extend by means of creating astonishing sound mashups, interactive sonic recalls, audible GoogleMaps, and just any kind of cross-media mashup the students are able to imagine.

Procedure: Art meets Science, Researchers meet Porto

(1) *"The beauty of Porto" / Content gathering:* The participants are asked for using either the data (Audio, GPS, accelerometers, ect.) as gathered during the original Porto sessions or to create their very own experiences first by using sensor setups. They have the freedom to use our approach and devices or think about "abusing" existing everyday devices (mobile phones, camcorders, classic text transcriptions, etc.)

(2) *"Hidden or personal treasures" / Content exploration*: The Urban Sync approach usually ends up with large-scale amount of data. If required some post-processing analysis

may be performed either for the audio or even crossmodal data. Depending on the preferences of the students preferred tools could be used at this point (e.g Marsyas, Audacity, jAudio, Rapidminer, Yale, Weka, etc.).

(3) *"Activate the Porto experience" / Sonification/Visualisation/Interaction:* The students will be asked to build sonifications or interactive installations on top of step (1) and (2). We will offer some ready-made building blocks along with original software to achieve a jump start for the participants. It is also possible to use Wii remote controllers as alternative/additional devices for interaction.

___*In particular, in this project...:*

Students will participate to the project UrbanSync (http://urbansync.wordpress.com) and will make experiments with diverse hardware and software tools (GHz scanner/sonifier, GPS data logger, Physiological data logger, Wii remote controller, etc.)

(1) "Porto sound shaker", (2) **"Porto Mobile Sound Wall"**, or (3) **"Porto fact-oid mutlimedia kiosk"**, with Dr. Eoin Brazil

(1) The idea is to take an ordinary kitchen/restaurant large suger/salt shaker and embed an accelerometer, speaker, and arduino. When the shaker is given a good shake, it'll play a random sound from the student that they've collected during the summer school. A more advanced idea of this could be to incorporate gestures.

(2) In a similar vein to the idea of the MobileArtBlog (www.mobileartblog.org), one of the display screens (with associated speakers) in the venue will be used to allow people with mobile phones to compose a soundscape using the collected field recordings. There could be vary levels of implementation difficult moving from single user to group use.

(3) Using a YBox2, an Arduino, and an Arduino Wave Shield with / without sensors a small pedestal unit connected to an old monitor / tv and speakers could present random facts about Porto while cycling through the field recordings. A more ambitious version of this project would involve buttons and a street plan of Porto where each area with collected recordings had an associated button. In this version, the button would be pressed triggering the display linked to the YBox2 to present some fact about the particular district while the sounds being played would be only the ones taken from that particular location.

___*In particular, in this project...:*

Students will experiment diverse hardware platforms: Arduino, programming on mobile phones, YBox2, etc.

"Automatic segmentation, classification and clustering of sounds of Porto for tangible interaction", with Dr. Luis Gustavo Martins

In this project, students will use machine learning algorithms (some of them already implemented and available for use) for the automatic segmentation, classification and clustering of collections of sounds from Porto (e.g. traffic noises, sea sounds, voices, music textures/backgrounds, etc.). The idea is then to develop and use tangible interfaces to interact with the audio content in innovative, creative and interesting ways.

___*In particular, in this project...:*

Students will learn about Music/Sound Information Retrieval and Processing with the software platforms Marsyas (http://marsyas.sf.net) and Processing (http://www.processing.org/).

"Interfaces and algorithms for a robotic Gamelan", with Rui Penha

During the first quarter of 2009, a team will build robotic mallets for Casa da Música's Gamelan. This robot will be controlled via Midi, so it can be used with a wide range of interfaces or be used with any algorithmic composition patch. The idea of this project will be to create algorithms and interfaces to interact with the robotic Gamelan. The sound recordings made by the students while wandering in Porto will be chopped up and analyzed in order to provide rhythmic and spectral motives to be used within an algorithmic composition patch for the robotic gamelan, to be built using Max/MSP. Some of the variables of this algorithm will be performed in realtime using some interactive interface, either pre-built, e.g. the Wiimote, or made specifically for this project, using the Arduino platform and some sensors.

___*In particular, in this project...:*

Students will work on Max/MSP patches to control a robotic Gamelan.

"Natural interactive walking in Porto", with Dr. Stefania Serafin and Dr. Federico Fontana

The goal of this project is to analyze and augment an interactive soundscape of Porto obtained by walking around a place in the city. Students will choose a specific location in Porto, and record the soundscape of such place both when standing in a specific location and when walking around it. Such sounds will be analyzed to understand how our perception of a space is affected when we are able to interact with the space itself. The interactive soundscape will be reproduced in the laboratory setting, by combining the recorded sounds with interactive footsteps obtained using shoes enhanced with different sensors and loudspeakers. The ultimate goal is the recreation of feeling of walking around the city recreated in a laboratory setting.

___*In particular, in this project...:*

More info can be found here: http://www.niwproject.eu/