HRTF

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HRTF (Head Related Transfer Function)

A tool which measures the impulse response using Maximum Length Sequence (MLS) acoustic stimuli. Data is stored as time domain impulse responses, and are typically measured for a number of transducers (microphones at the same time), and for many positions around the head. The tools are used to capture, plot and analyse the microphone responses, and can be used to generate input signals for modeling.

Releases

Project Name	Project Owner	Status Description
HRTF ver 1.00	[~Adam Hersbach]	

Overview

Maximum Length Sequence (MLS) acoustic stimulus is used to measure the system impulse response

Instructions

Help files contain valuable information, check them out.

Capture a new HRTF

To capture a new set of impulse responses using a sound card and store the results in a HRTF structure:

```
help HRTF_Capture
HRTF = HRTF_Capture;
HRTF_PlotAll(HRTF);
```

Pre-recorded HRTF data for Freedom and SP15 shells

HRTF's have been recorded for the following BTE shells which are used in Melbourne

Device Serial Number	Shell	Mic configuration	Conditions	File
xPC02	Freedom	dir-omni	Free Field, KEMAR's left ear, KEMAR's right ear, all with new gortex cover	xPC02 Free Field xPC02 Left KEMAR xPC02 Right KEMAR
xPC04	Freedom	omni-omni	Free Field, KEMAR's left ear, KEMAR's right ear, all with new gortex cover	xPC04 Free Field xPC04 Left KEMAR

				xPC04 Right KEMAR
xPC1501	SP15	omni-omni	KEMAR's right ear, porex plug removed	xPC1501 Right KEMAR
xPC1502	SP15	omni-omni	KEMAR's right ear, porex plug removed	xPC1502 Right KEMAR

The HRTF's are recorded at 5 degree resolution with Fs=48kHz, measured in the Babel sound treated room in Melbourne. The room has some reverberation.

Each file contains a HRTF structure, and the impulse response data is stored in HRTF.ir, measured using Maximum Length Sequence (MLS)
For each measurement, impulse response data is collected from 3 sensors, the Reference mic (which hangs above KEMAR's head), and the front and back mics of the BTE. The impulse responses of all three mics are collected for each angle, so HRTF.ir is a 3-D matrix, dim 1 is the impulse response samples, dim 2 is the sensor, dim 3 is the angle.

Manipulating the HRTF structure

There is a set of tools used for viewing and manipulating the HRTF structures. They are in perforce at: \\MelbourneProjects\ResearchTools\Analysis\HRTF\Releases\1.00\

For example, you can get the anechoic response by using the internal window (which I have set up so after windowing the reflections are removed)

```
HRTF_anechoic = HRTF_Window(HRTF, 'internal');
```

You can extract just the BTE microphones;

```
HRTF_frontbackmics = HRTF_Subset(HRTF, 'Sensors', [2,3]);
```

You can extract a certain angle (or group of angles)

```
HRTF_30degreesOnly = HRTF_Subset(HRTF, 'Angles', 30);
HRTF_45degreesResolution = HRTF_Subset(HRTF, 'Angles', [0:45:360]);
```

You can plot the data

```
HRTF_PlotAll(HRTF, 'Sensors', 1:3, 'Angles', 0, 'Reference', 1);
HRTF_PlotCardioid(HRTF, 'Sensors', 1:3, 'Reference', 1);
```

Labels

analysis

Children (2)

HRTF ver 1.00
Maximum Length Sequence (MLS)

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