Developing a HRTF Measurement Facility

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**Problem**

monaural sound → stereo Sound

Can we reproduce a monaural sound into a binaural sound over headphones which will sound as if it originated from a particular spatial location?

--- Beneficial

**Inspiration**

Auditory Localization

The differences between the sounds at the two ears provide the primary basis for human to locate the direction of a sound source.

--- Amazing

**Key Element**

Head-Related Transfer Function

The head related transfer function, HRTF, is a frequency response describing how a sound is filtered by the diffraction and reflection properties of the head, pinna, and torso.

--- Useful

**Method: HRTF Measurement on KEMAR Manikin**

- **University of Maryland**
  - Based on Reciprocity
  - Linear Sweep
  - 7 Subjects
  - 1132 Points
  - in 2003

- **Listen Project, Paris**
  - Logarithmic Sweep
  - 58 Human Subjects
  - 187 Points
  - in 2002

- **MIT Media Lab**
  - MLS
  - KEMAR Manikin
  - 710 Points
  - in 1994

- **U.C. Davis**
  - CIPI Laboratory
  - Golay-code Signals
  - KEMAR, 43 Human Subjects
  - 1250 Points
  - in 2001

**Results**

- **Frequency Domain Representation of HRTFs**
  - Left Ear (a) and Right Ear (b) Measured at the Direction of $\theta = 0$ and $\varphi = 0$.

We successfully set up a new HRTF database measured on the KEMAR manikin for the acoustic community.

--- Exciting

**Further Research**

- **Individual Differences**
  - Do further human trials to develop a theory that efficiently models the observed variation in a statistical model.

--- Interesting

**Beyond HRTF**

- **Signals in Astronomy**
  - Measuring and Modeling Complicated Functions of Azimuth and Elevation

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