

Design of a Microphone Array for Rollin' Justin

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Knowledge for Tomorrow



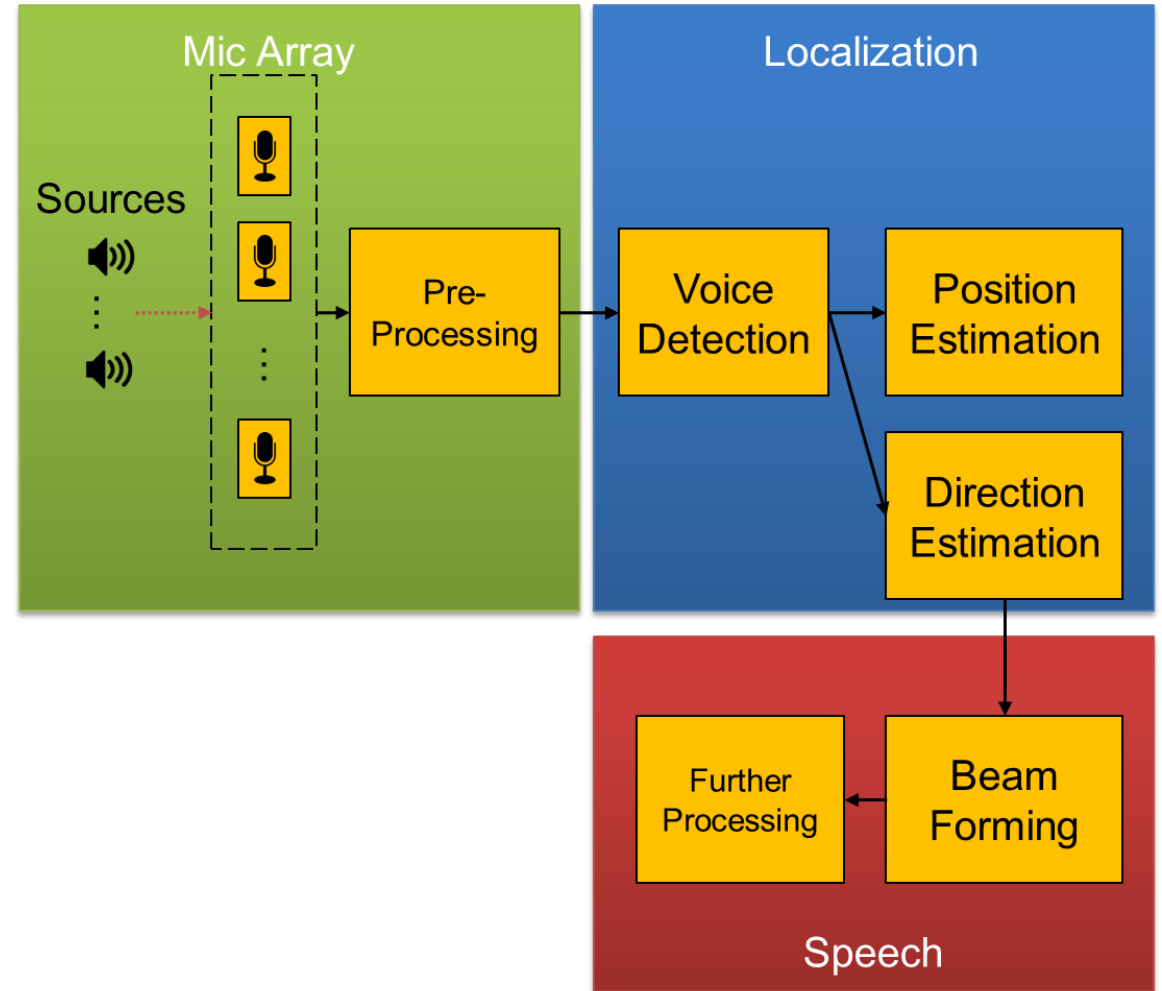
The Robotic Platform Rollin' Justin

- Humanoid
- 51 DoF
- Assistant Robotics for Astronauts & Service Robotics



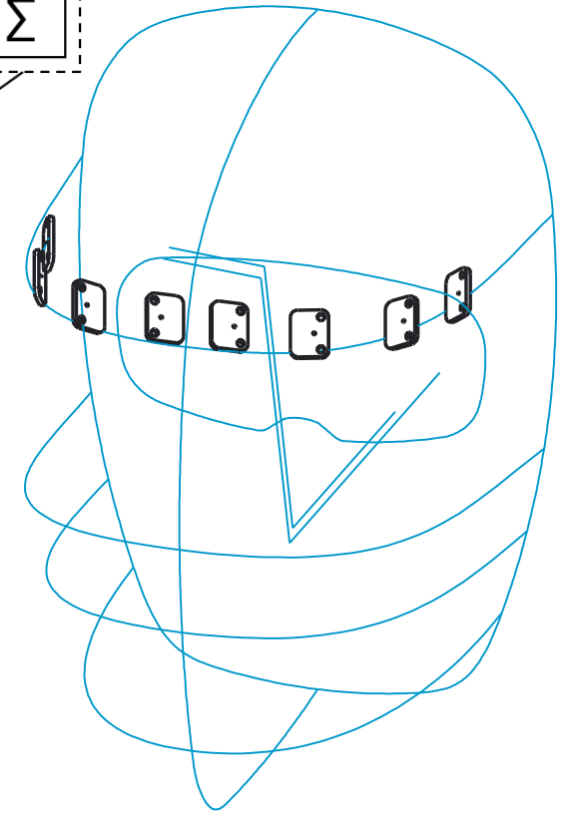
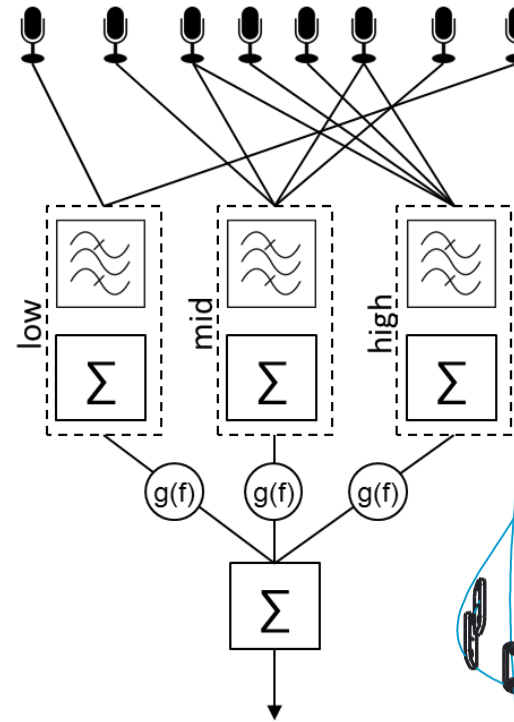
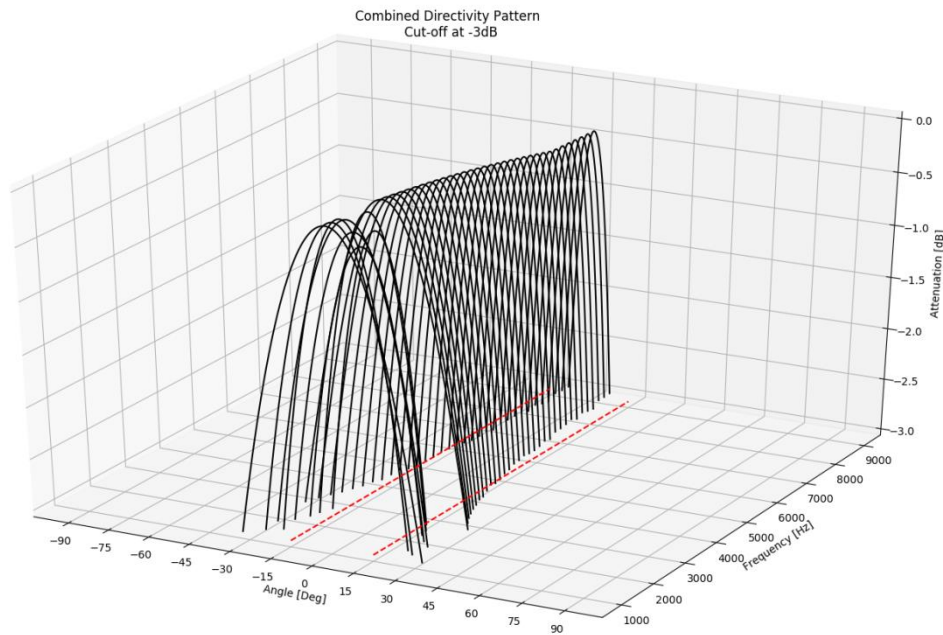
Audio Processing Pipeline

- microphone array audio input
- Passive detection of sources in 1D/2D
- Beam Forming for speech enhancement
- Speech commanding of robot



Microphone Array

- 8 channels
- Delay-and-Sum Subarray for Beam Forming



Direction of Arrival / Localization

- Delay between receiving signals

$$\Delta t_i = (\mathbf{p}_i^T \mathbf{e}_\theta) / c_0$$

- Estimation using MUSIC algorithm

- 2D localization of 2 microphone arrays

