

Dr. Yiu Ka-fai, Cedric

Current research activities include:

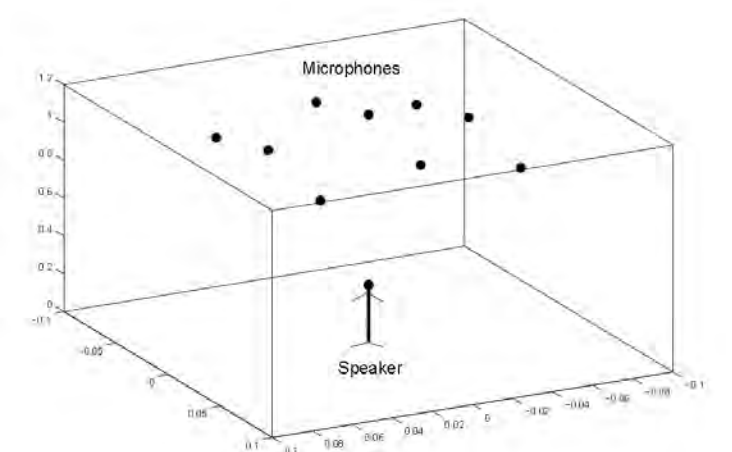
- Financial Risk Management
- Signal Processing
- Optimization and Optimal Control
- High Performance Computing
- Scientific Computing

On-going GRF project

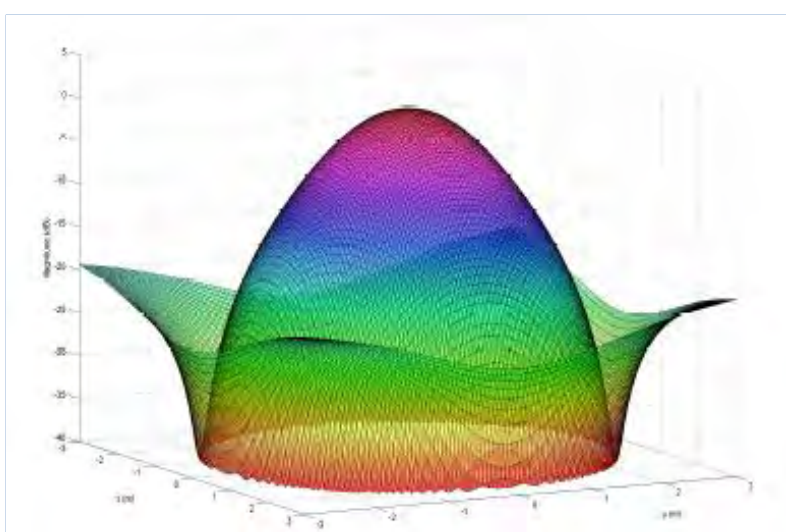
Optimal design of distributed acoustic beamforming system

Abstract

In this project, we consider the design of acoustic noise reduction Systems based on distributed microphone arrays transmitted over a wireless sensor network. This noise reduced acoustic interface has many applications. Apart from playing an important role in voice communications, it has a lot of potential as a natural control of electrical and electronic appliances for intelligent home or factory automation.



A typical 3D design of beamformer



Broadband beamformers have been studied extensively due to their wide applications in many areas such as radar, sonar, wireless communications, biomedicine, speech and acoustics. For speech pick-up, microphone arrays are commonly deployed to reduce the level of localized and ambient noise signals from a desired direction via spatial filtering. However, multi-dimensional beamformer design is very difficult because of the large-scale nature of the problem.

It is getting more prominent to include beamforming as an important component in voice control devices since the performance of the speech recognition engine diminishes rapidly when there is a mismatch between the training and testing conditions, and especially so with the unavoidable signal degradation.

Another important aspect is the array configuration. For most existing design methods, the configuration is fixed and the only design variable is the filter coefficients. However, when the microphone positions are changed, the performance of the Design could improve significantly, showing that the positions of the microphone elements play an important role in the design process and should not be neglected.

Design with optimized microphone positions

