

A photograph of a modern university building at night, with its interior lights glowing and reflecting in a body of water in the foreground. The building has a mix of brick and glass facades. The sky is a deep purple.

MODEL-BASED SPARSE FEEDBACK CANCELLATION FOR LIVE MUSIC

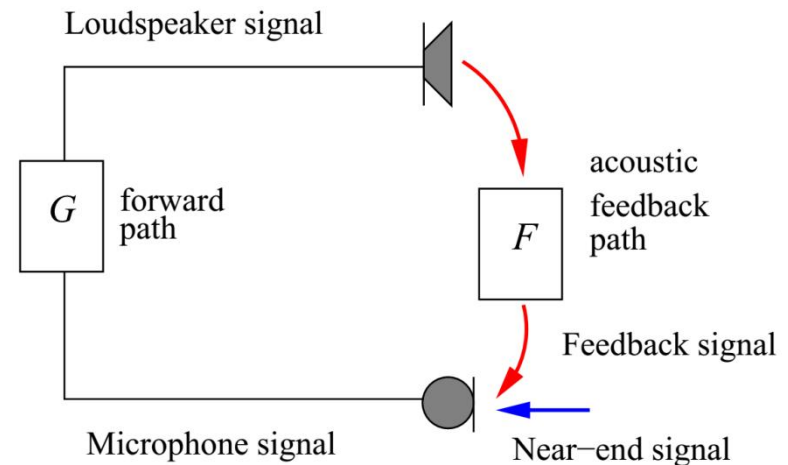
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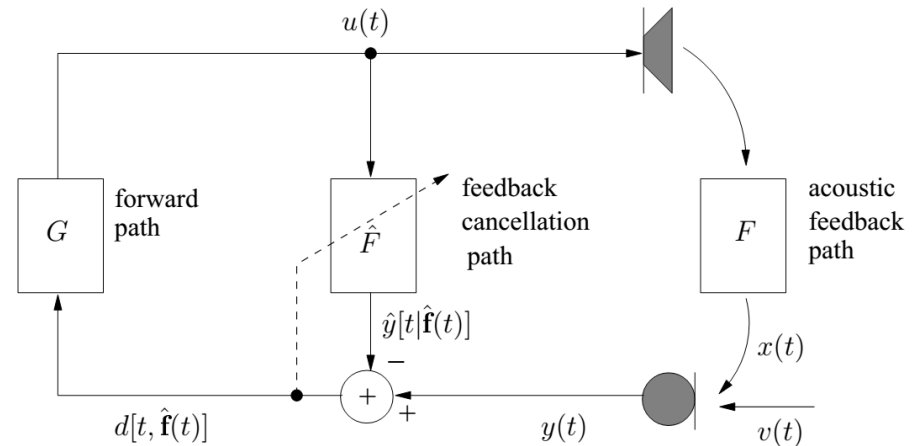
Introduction

- Feedback cancellation is concerned with solving the problem of feedback.
- The problem occurs when the output of a loudspeaker outputting the input from a microphone is fed back into the microphone.
- The system can become unstable and cause howling!
- It is a common problem for, e.g., singers and guitarists in live music (when using microphones and monitors/PA system).



The Idea

- Feedback cancellation is often solved using adaptive filters, like the LMS algorithm.
- Recently, it was shown that performance can be improved by using a model of the near-end signal.
- In this project, we will explore this further and also take into account that the acoustic feedback path is likely to be sparse.



The Project

- First, a near-end signal will be chosen (singing voice, guitar, etc.) and a model for that will be found.
- An estimator for this model has to be developed.
- The feedback path will then be simulated using, for example, the RIR Generator.
- A method for sparse adaptive filtering, using, for example, the principle of sparse linear prediction will be developed.
- The method should run in subbands, so a subband decomposition must be applied.
- It is critical that the sparse approximation method is fast, as it has to run for each sample at, say, 44.1 kHz sampling frequency! Maybe use iterative, greedy principles like matching pursuit.



Literature

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