ICASSP 2020
Show & Tell Demos

# User Tuneable Sound Zones

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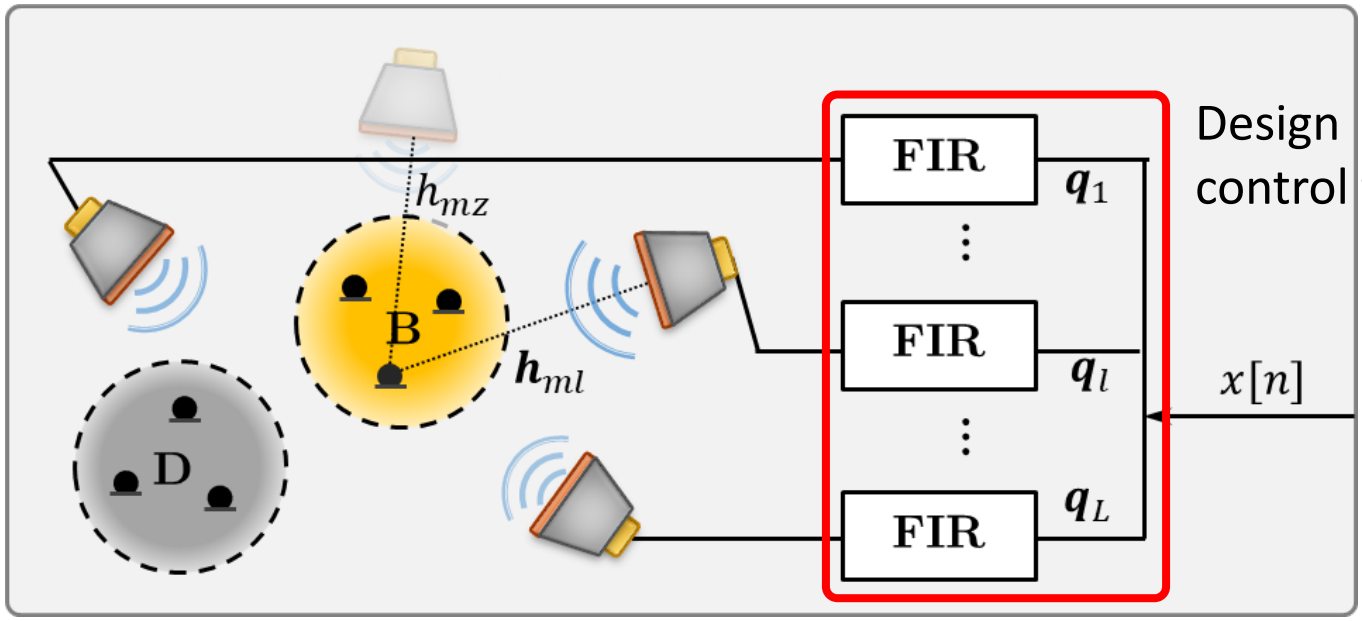
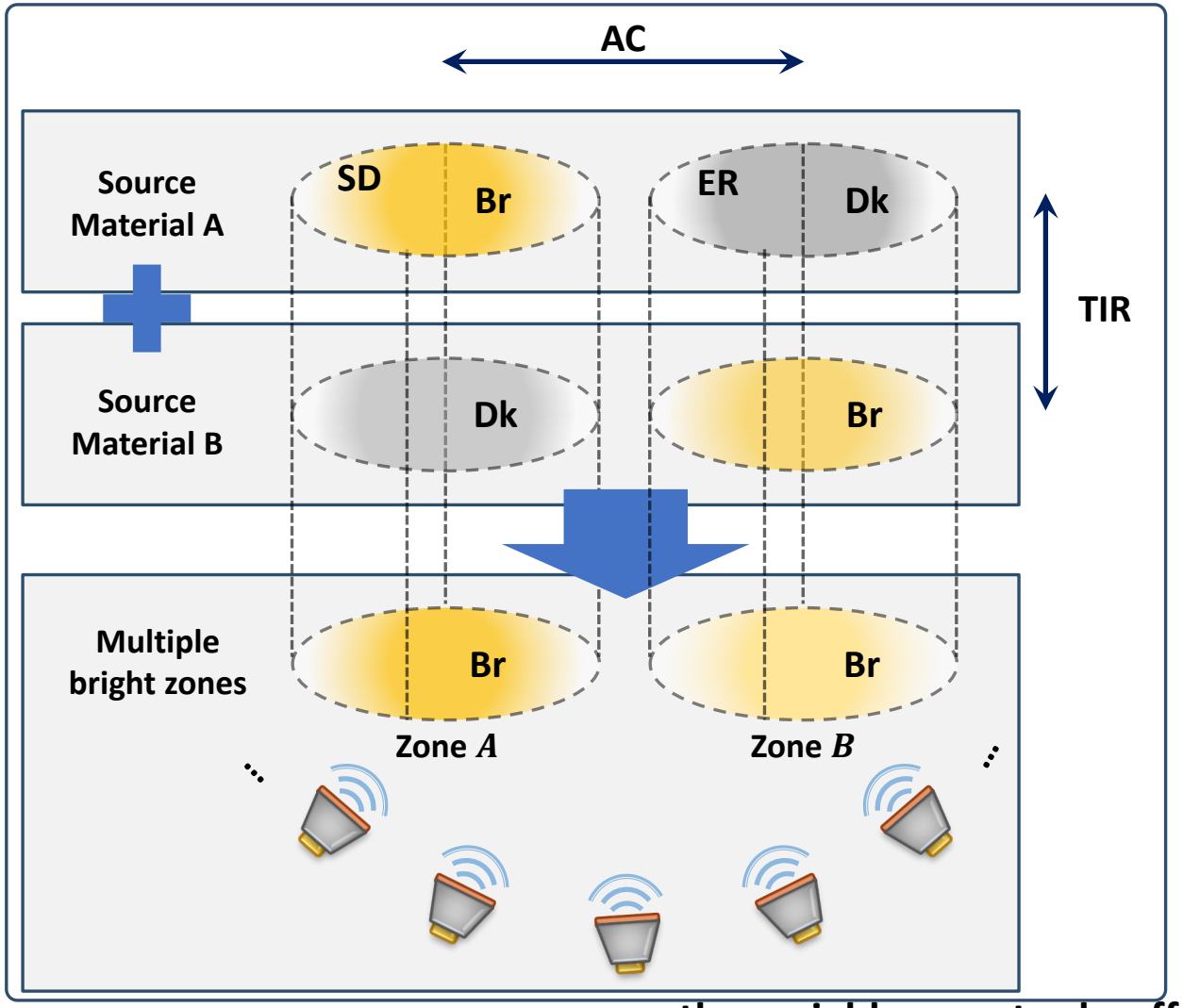
# Motivation – Sound zones

# Motivation – Sound zone control



# Motivation – Sound zone control




**the variable span trade-off (VAST) filter**

AC: Acoustic Contrast
TIR: Target-to-Interferer Ratio
SD: Signal Distortion
ER: Energy Reduction

# Optimization problems

- We pose different optimization problems depending on the constraint

- **ER (Energy Reduction) constraint**

  Minimize **SD** with a constraint on **ER**

- **SD (Signal Distortion) constraint**

  Maximize **ER** with a constraint on **SD**

- **AC (Acoustic Contrast) constraint**

  Minimize **SD** with a constraint on **AC**

- **TIR (Target-to-Interferer Ratio) constraint**

  Minimize **SD** with a constraint on **TIR**

AC: Acoustic Contrast
TIR: Target-to-Interferer Ratio
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# Perceptually Optimized Sound Zones

- Sound zones can be generated in a perceptually optimized way

- The interference in a given zone is perceptually shaped so that it becomes less audible or ideally inaudible

- The details can be found from

**[Lee 2019]** T. Lee, J. K. Nielsen, and M. G. Christensen, "Towards Perceptually Optimized Sound Zones: A Proof-of-Concept Study," in *Proc. IEEE Int. Conf. Acoust., Speech, Signal Process. (ICASSP)*, Brighton, UK, pp. 136-140, May 2019. DOI: 10.1109/icassp.2019.8682902.

**[Lee 2020]** T. Lee, J. K. Nielsen, and M. G. Christensen, "Signal-Adaptive and Perceptually Optimized Sound Zones with Variable Span Trade-Off Filters," *IEEE/ACM Trans. Audio, Speech, Language Process.*, 2020, in review.

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# Thanks for your attention

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