

# TTA for SE Beyond Denoising: RemixIT

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Thesis FA/MA  
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## Motivation

Speech enhancement (SE) studies improving the quality of spoken language and finds applications as a front-end in automatic speech recognition, telecommunication or hearing aids. SE systems have shown remarkable success in controlled environments but often struggle when faced with domain shifts in real-world deployments [1, 2].

Recent advances in test-time adaptation (TTA) for speech denoising have demonstrated promising results by enabling models to adapt on-the-fly to new acoustic environments without requiring labeled data [2, 3]. However, so far there are no works exploring TTA for dereverberation. The goal of this thesis is to translate RemixIT [4] to dereverberation and other corruptions.

## Objectives

- Adapt RemixIT to signal models other than additive noise ( $y = x + n$ ).
- Explore how the teacher-student approach needs to be adapted.
- Explore regularization techniques for general corruptions.

## Prerequisites

- Took the Deep Learning exam with good results
- Good programming skills in Python
- Experience in ML-frameworks (Preferably PyTorch)
- *Optional*: Experience in speech processing
- *Optional*: Participated in the ISS Deep Learning Lab

If this topic has sparked your interest, write me an email and we can discuss the proposal in more detail. Please include your current transcript and CV.

## References

- [1] Ruizhe Cao, Sherif Abdulatif, and Bin Yang. “CMGAN: Conformer-based Metric GAN for Speech Enhancement”. In: *INTERSPEECH*. 2022.
- [2] Tobias Raichle, Niels Edinger, and Bin Yang. “Test-Time Adaptation for Speech Enhancement Via Domain Invariant Embedding Transformation”. In: *IEEE Open Journal of Signal Processing* (2026), pp. 1–10. DOI: 10.1109/OJSP.2026.3656059.
- [3] Tobias Raichle, Erfan Amini, and Bin Yang. “Test-Time Adaptation for Speech Enhancement via Mask Polarization”. In: *ICASSP 2026 - 2026 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*. 2026, pp. 18882–18886. DOI: 10.1109/ICASSP55912.2026.11464881.
- [4] Efthymios Tzinis et al. “Remixit: Continual self-training of speech enhancement models via bootstrapped remixing”. In: *IEEE Journal of Selected Topics in Signal Processing* 16.6 (2022), pp. 1329–1341.