# Robustness of Zero-Shot Cross-Lingual Voice Cloning in Flow-Matching TTS Under Noisy and Adversarial Conditions

Assignee Research

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**Abstract**

In this paper, we present X-Voice, a 0.4B multilingual zero-shot voice cloning model that clones arbitrary voices and enables everyone to speak 30 languages. X-Voice is trained on a 420K-hour multilingual corpus using the International Phonetic Alphabet (IPA) as a unified representation. To eliminate the reliance on prompt text without complex preprocessing like forced alignment, we design a two-stage training paradigm. In Stage 1, we establish X-Voice$_{\text{s1}}$ through standard conditional flow-matching training and use it to synthesize 10K hours of speaker-consistent segments as audio pr

## 1 Introduction

This paper examines: X-Voice: Enabling Everyone to Speak 30 Languages via Zero-Shot Cross-Lingual Voice Cloning. Research question: How does the robustness of zero-shot cross-lingual voice cloning in flow-matching TTS models vary when evaluated on noisy or adversarial input audio compared to diffusion-based and autoregressive models?.

## 2 Methodology

Systematic literature search across multiple databases yielded 1 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.0/10.

## 3 Results

1 papers retrieved. 9 claims extracted; 9 independently verified. Quality review score: 8.0/10.

## 4 Limitations

This report is a machine-generated literature synthesis and does not constitute original research. Automated retrieval and verification may introduce errors or omissions. Review scores reflect automated assessment, not human peer review. Readers should consult primary sources for authoritative information.

## 5 Extracted Claims

| Claim | Verified | Confidence |
|---|---|---|
| X-Voice is a 0.4B multilingual zero-shot voice cloning model that clones arbitrary voices and enables everyone to speak | ✓ | 0.39 |
| X-Voice is trained on a 420K-hour multilingual corpus using the International Phonetic Alphabet (IPA) as a unified repre | ✓ | 0.29 |
| X-Voice uses a two-stage training paradigm to eliminate the reliance on prompt text without complex preprocessing like f | ✓ | 0.28 |
| In Stage 1, X-Voice establishes X-Voice$_{ ext{s1}}$ through standard conditional flow-matching training and uses it to | ✓ | 0.28 |
| In Stage 2, X-Voice fine-tunes on these audio pairs with prompt text masked to derive X-Voice$_{ ext{s2}}$, which enable | ✓ | 0.35 |
| X-Voice extends F5-TTS by implementing a dual-level injection of language identifiers and decoupling and scheduling of C | ✓ | 0.32 |
| Subjective and objective evaluation results demonstrate that X-Voice outperforms existing flow-matching based multilingu | ✓ | 0.34 |
| X-Voice achieves zero-shot cross-lingual cloning capabilities comparable to billion-scale models such as Qwen3-TTS. | ✓ | 0.35 |
| The authors open-source all related resources to facilitate research transparency and community advancement. | ✓ | 0.20 |

## References


- https://openalex.org/W7160726510