USC Institute for Creative Technologies

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DiTaiListener: Controllable High Fidelity Listener Video Generation with Diffusion

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Listener Behavior Generation

Generate listener response given speaker's cues: head motions, facial expression, voice

speaker

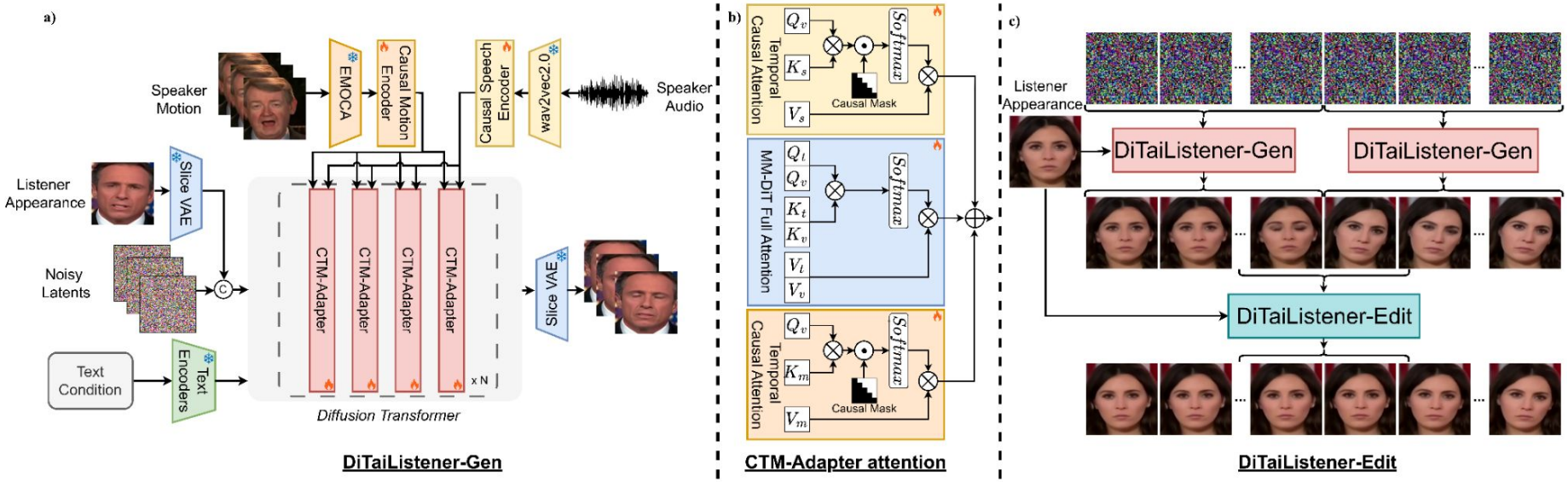
listener

Background & Challenges

Existing listener generation methods:

- rely on low-dimensional motion codes (3DMMs) with limited expressiveness and visual realism
- work on short clips, causing fragmented transitions and poor long-term coherence
- often lack temporal causality between cues and reactions

Method


a)
Speaker Motion
EMOCA
Causal Motion Encoder
Causal Speech Encoder
wav2vec2.0
Speaker Audio
Listener Appearance
Slice VAE
Noisy Latents
CTM-Adapter
CTM-Adapter
CTM-Adapter
CTM-Adapter
x N
Slice VAE
Text Condition
Text Encoders
Diffusion Transformer
DiTaiListener-Gen
b)
Temporal Causal Attention
Softmax
Causal Mask
MM-DIT Full Attention
Softmax
Temporal Causal Attention
Softmax
Causal Mask
CTM-Adapter attention
c)
Listener Appearance
DiTaiListener-Gen
DiTaiListener-Gen
DiTaiListener-Edit
DiTaiListener-Edit

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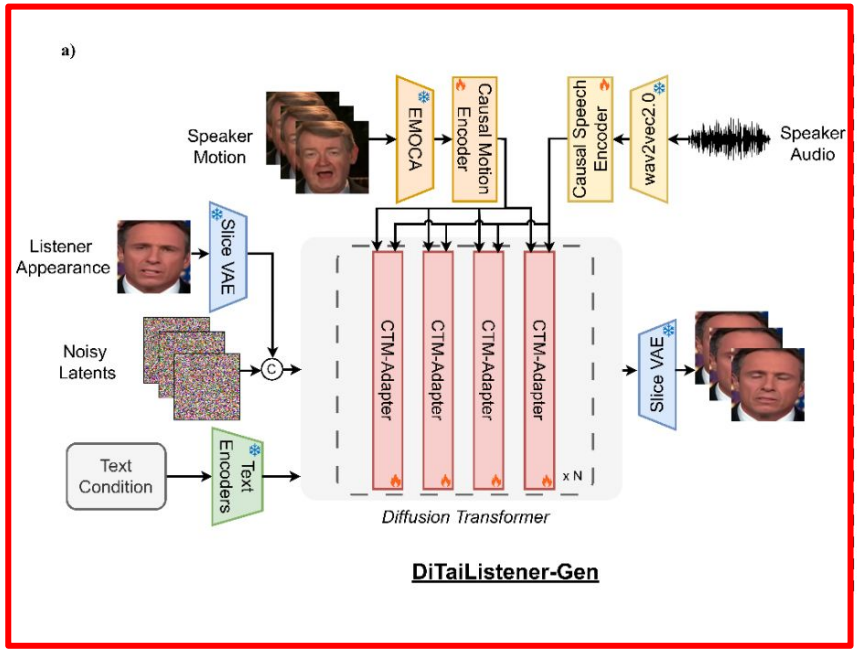
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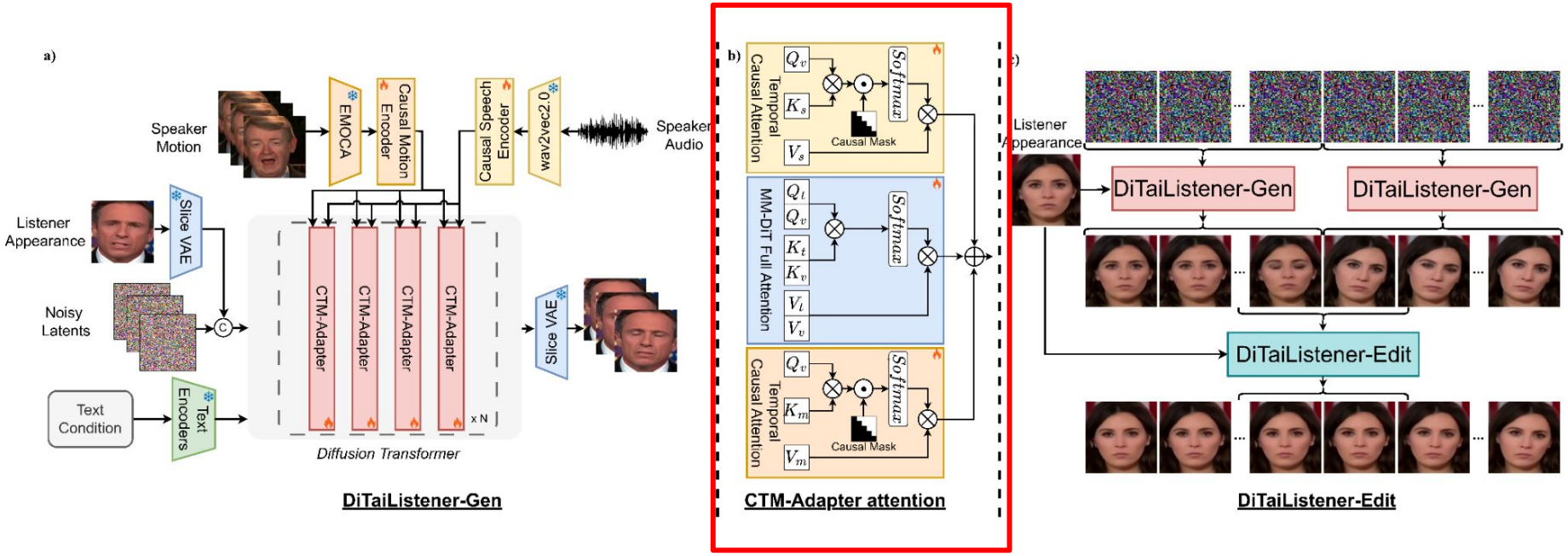
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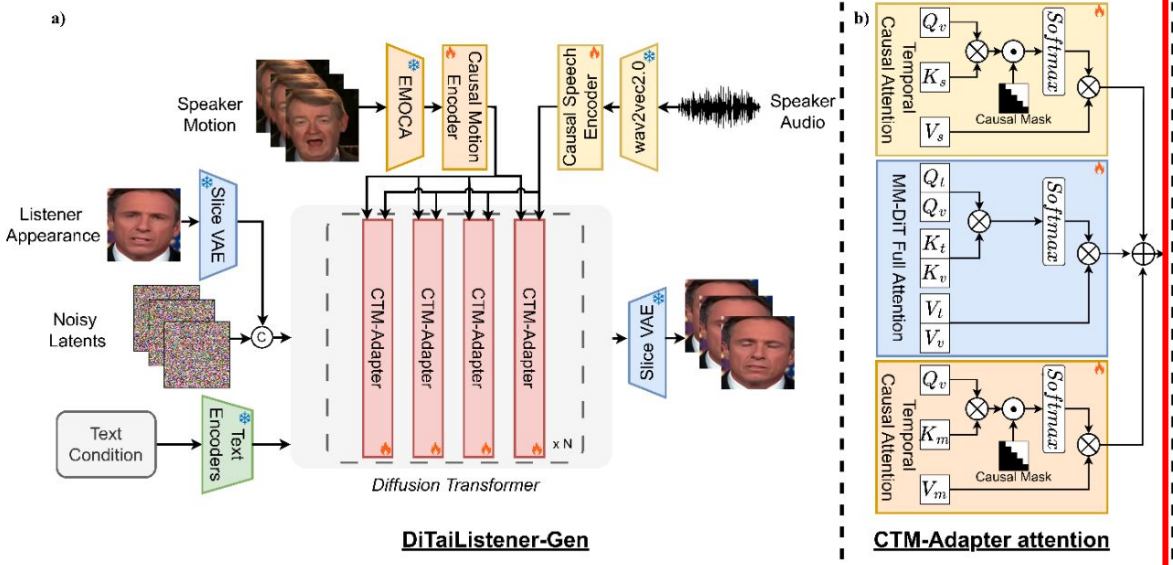
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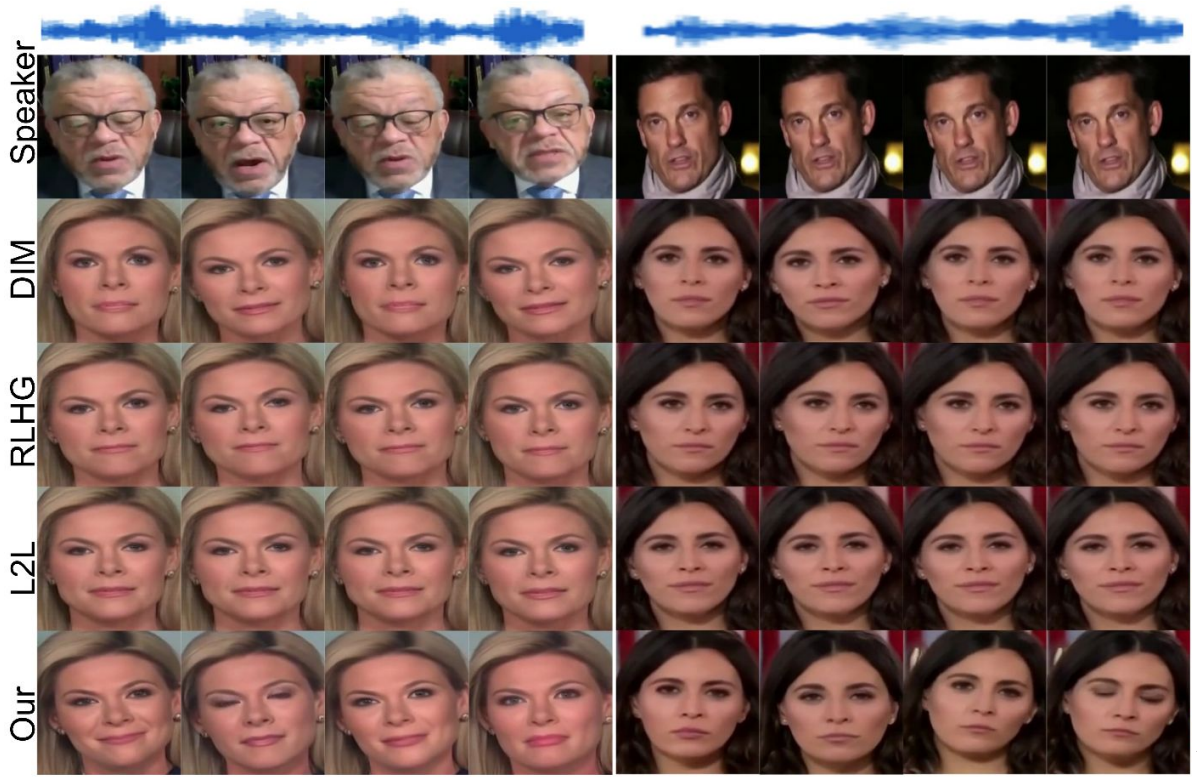
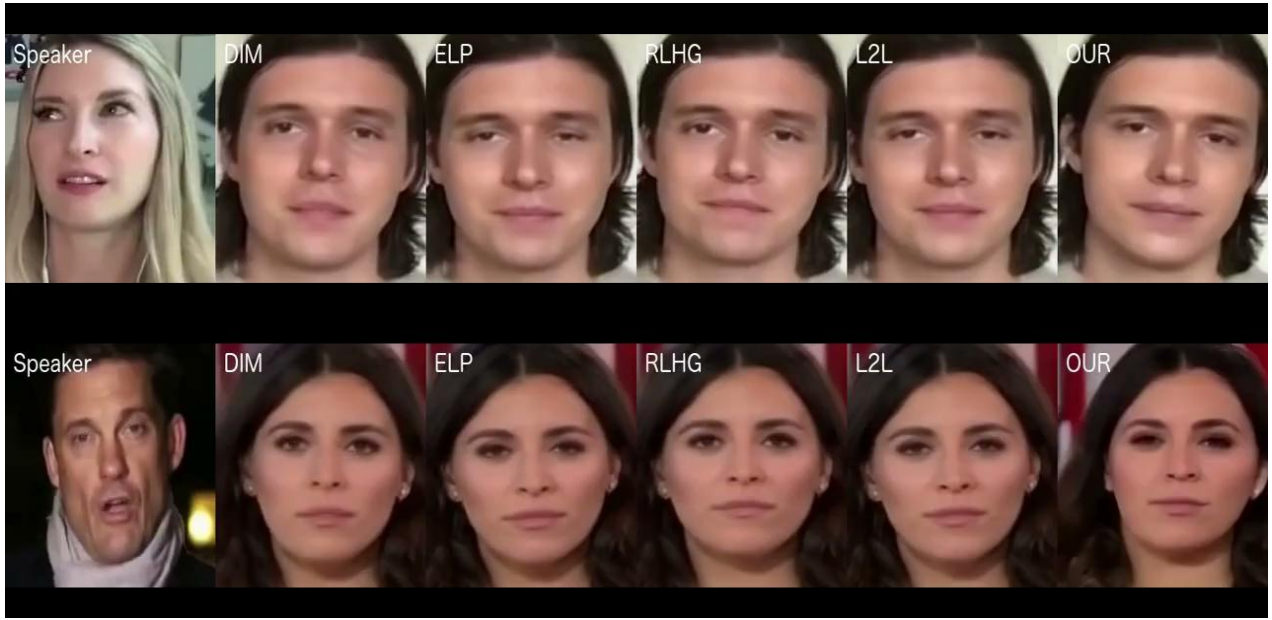
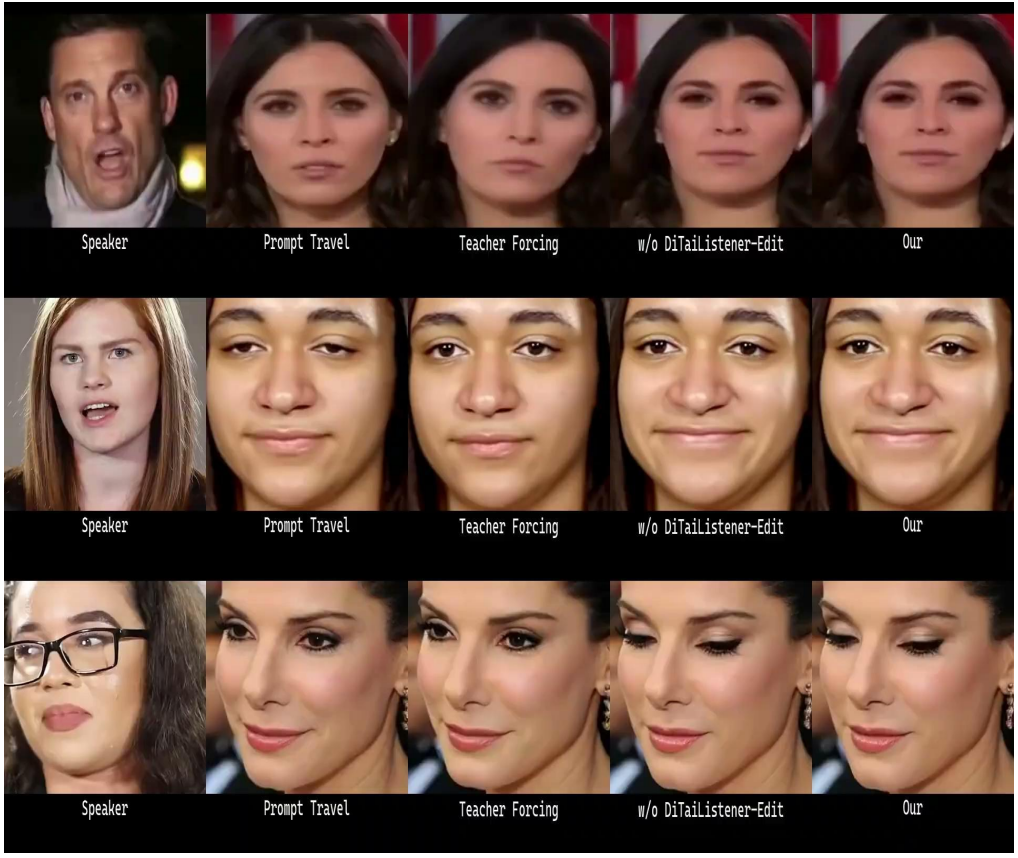
Results. Qualitative Comparison



Results. Qualitative Comparison



Results. Long video generation



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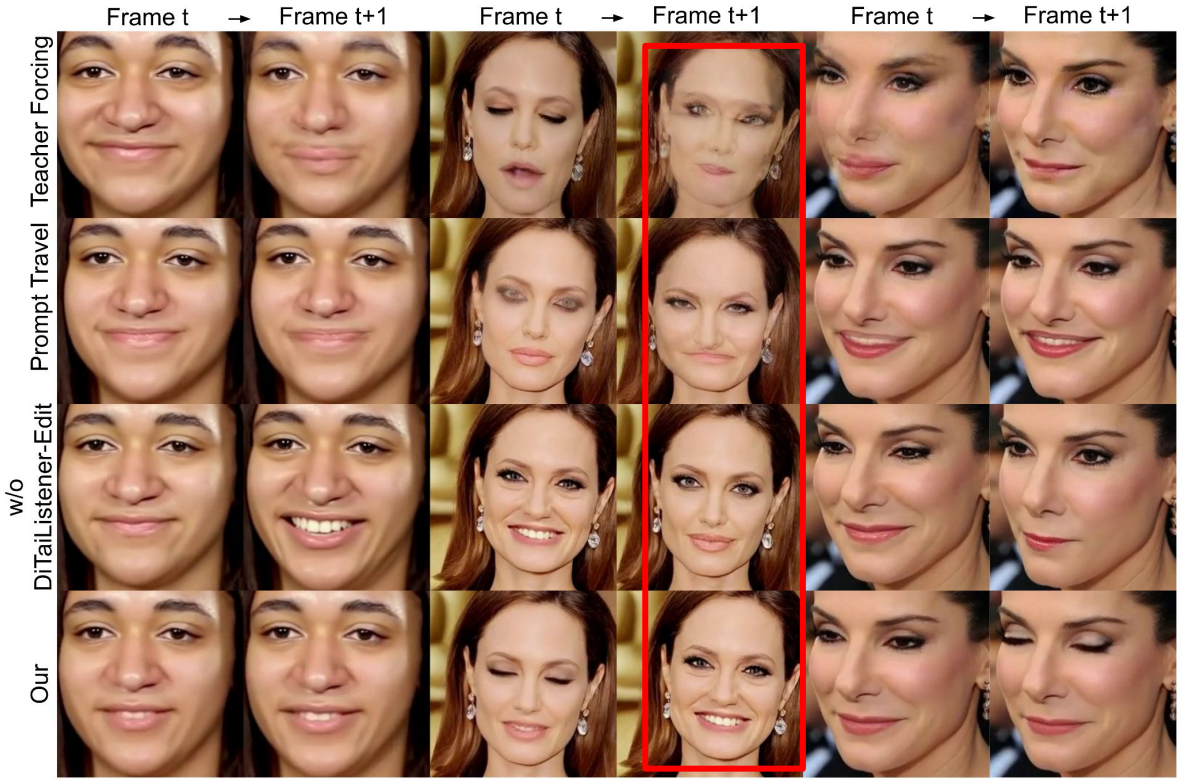

Results. Quantitative Comparison

RealTalk Dataset

Method	FID↓	FVD↓	LPIPS↓	PSNR↑	SSIM↑
RLHG [71]	30.55	217.48	0.41	17.23	0.53
L2L [39]	56.43	522.67	0.46	16.49	0.53
DIM [56]	30.75	204.49	0.40	17.74	0.54
w/o Text-Control	8.05	49.88	0.27	18.70	0.59
w/o CTM-Adapter	8.16	45.62	0.27	18.60	0.55
DiTaiListener	**7.99**	**45.42**	**0.26**	**18.73**	**0.60**

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Quantitative Comparison in 3DMM-space

VICO Dataset

Method	FD↓		P-FD↓		MSE↓		SID↑		Var↑	
	Exp	**Pose**	**Exp**	**Pose**	**Exp**	**Pose**	**Exp**	**Pose**	**Exp**	**Pose**
RLHG [81]	69.04	0.05	69.09	0.06	1.37	**0.01**	0.35	3.23	0.14	**0.01**
L2L [40]	72.89	0.10	72.94	0.10	1.44	0.02	0.10	2.42	0.07	**0.01**
DIM [56]	77.97	0.15	78.70	0.15	1.52	0.02	3.49	3.29	0.74	**0.01**
GT	-	-	-	-	-	-	5.13	3.95	1.36	0.02
w/o Text-Control	15.62	**0.02**	16.35	**0.02**	0.67	**0.01**	5.01	3.94	1.30	**0.01**
w/o CTM-Adapter	15.10	**0.02**	15.82	**0.02**	0.66	**0.01**	**5.11**	**3.98**	1.30	**0.01**
DiTaiListener	**14.28**	**0.02**	**15.07**	**0.02**	**0.65**	**0.01**	5.09	3.95	**1.31**	**0.01**

Results. User Study

User study. We ask the participants to choose the best video among all methods

Method	Feedback↑	Diversity↑	Smoothness↑	Overall↑
ELP [49]	2.93%	4.04%	5.65%	4.21%
RLHG [81]	10.45%	12.14%	13.00%	11.86%
L2L [39]	4.20%	6.06%	10.95%	7.07%
DIM [56]	10.25%	12.12%	16.11%	12.83%
Ours	**72.17%**	**65.64%**	**54.29%**	**64.03%**

Results. Out-of-domain generation

Results. Text-Conditioned Listener Generation

Summary

- Introduced pixel-space **video diffusion** model for listener response generation, achieving **73.8%** improvement in photorealism
- Proposed DiTaiListener-Edit: coherent **long video** generation method
- Introduced Causal Temporal **Multimodal Adapter** (CTMAdapter) for diffusion transformer that allows controllable face video generation and **aligns** listener responses with speaker cues
- Demonstrated the potential of video generation methods for socially intelligent, coordinated, and controlled face and head gestures
- Allowed free-form text control to guide the listener's behaviors

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