



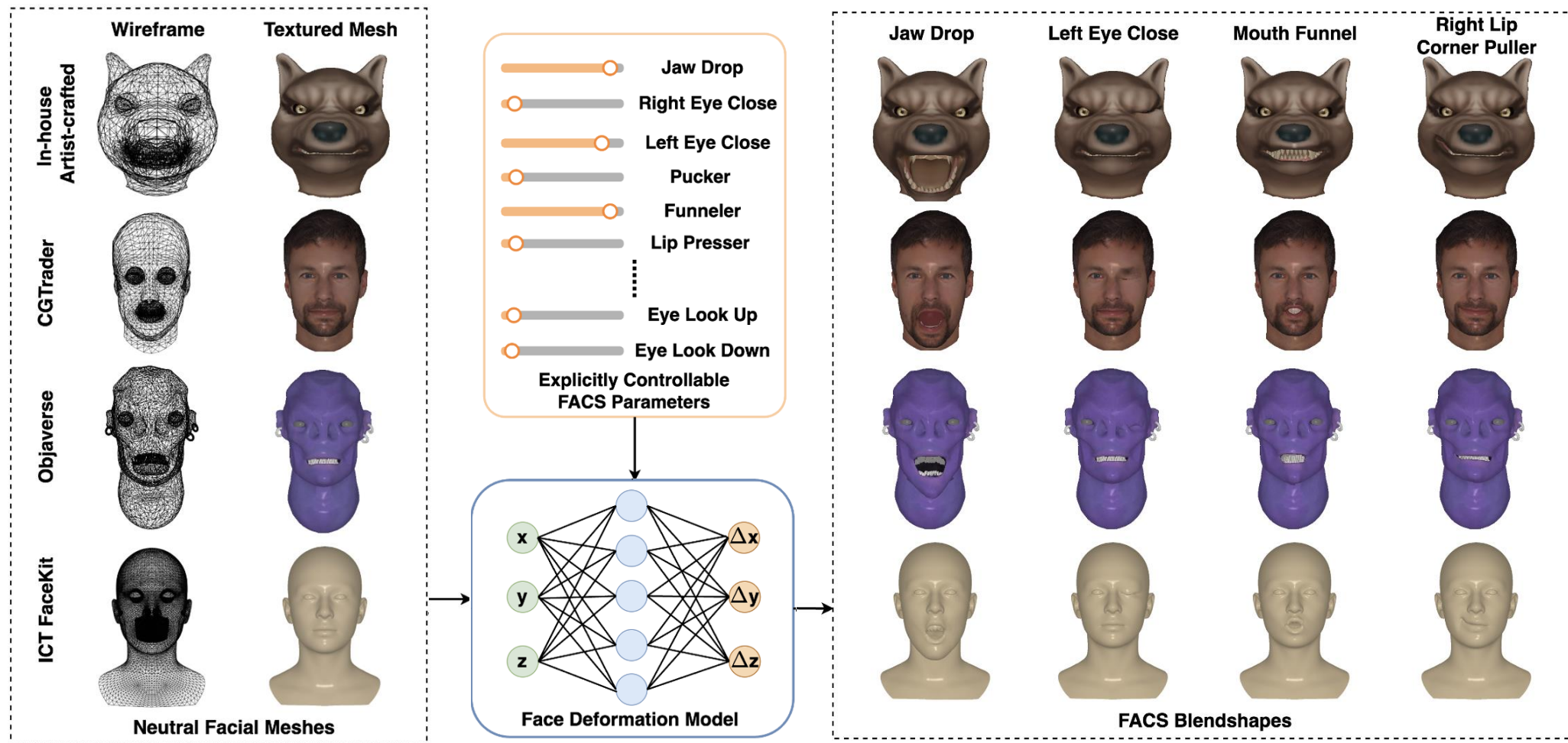
# RigAnyFace: Scaling Neural Facial Auto-Rigging with Unlabeled Data

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\* Equal Contribution

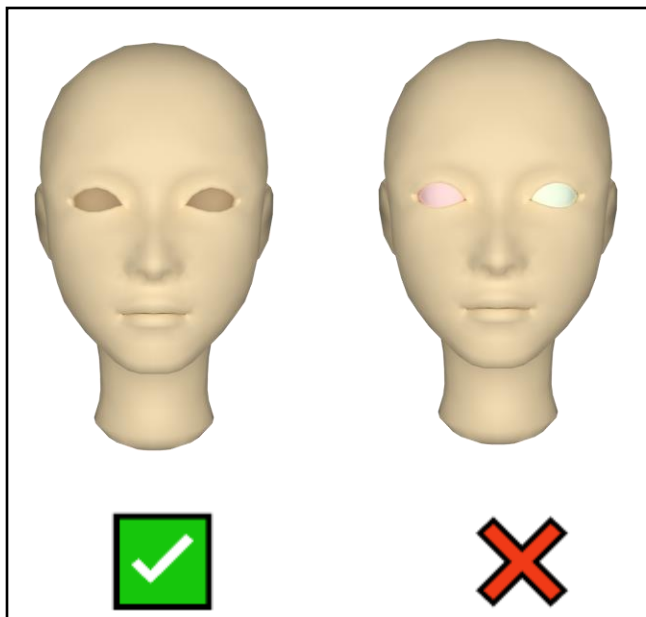
1.  PennState
2.  ROBLOX

# Motivation & Objective



# Motivation & Objective

## Challenges in Previous Works:



**Supports only a single connected component without detailed facial parts (e.g., eyeballs).**



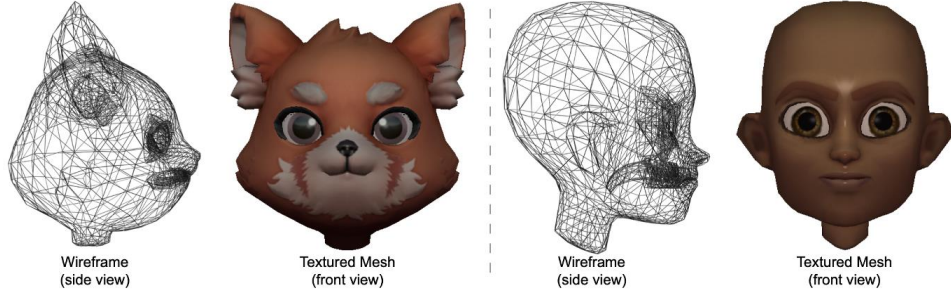
**Limited Generalization Ability (only works on humanoid heads)**

## Our Solution:

- **Curated dataset and scalable training pipeline to improve generalization.**
- **Introduced a tailored deformation network for handling multiple disconnected components.**

# Data Collection

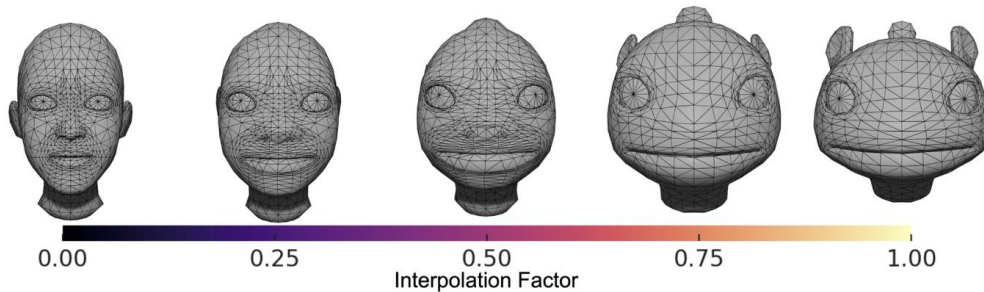
## 3D Facial Mesh Rig Dataset:



(a) Neutral head meshes from our dataset, each consisting of multiple disconnected components.

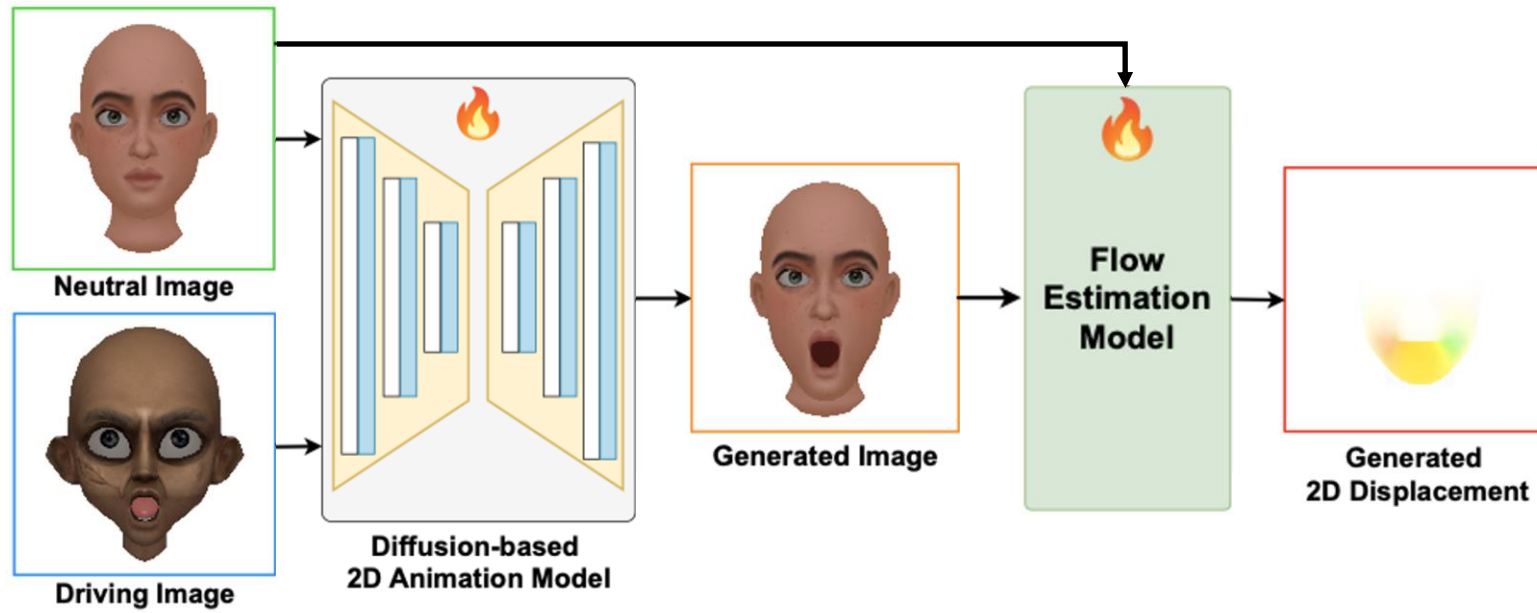


(b) A subset of neutral head meshes is annotated with blendshape rigs by professional artists.



(c) To augment the dataset, we develop a head interpolation strategy based on standardized UV layouts.

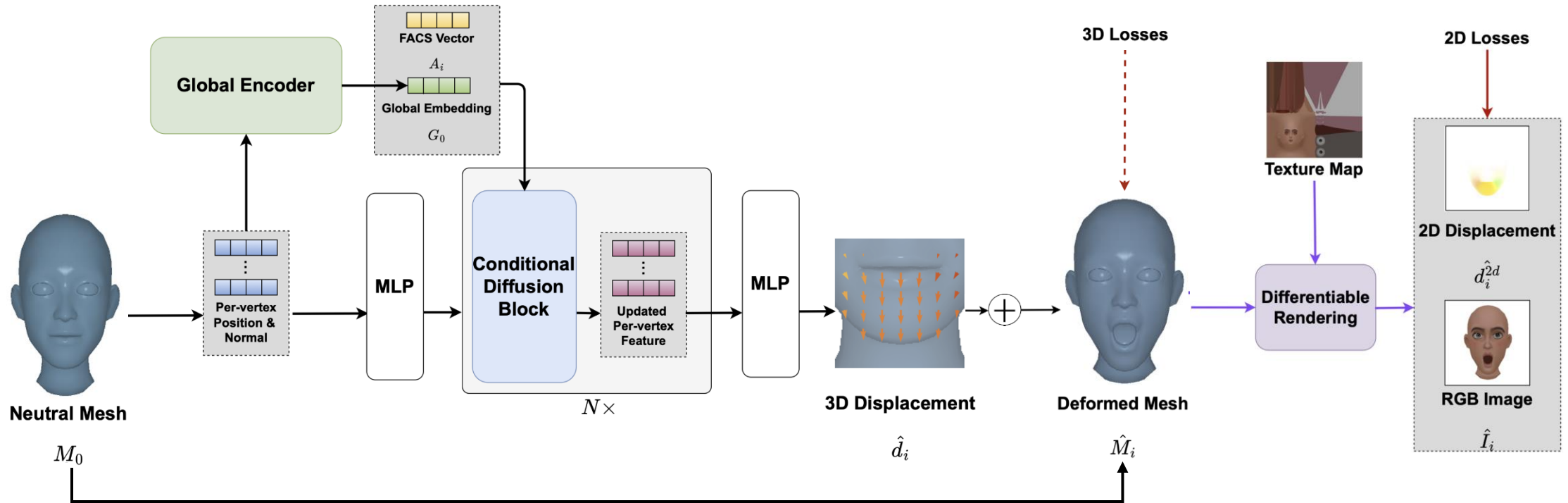
# Data Collection



## 2D Supervision Generation for Unrigged Heads:

- Transfer expressions from rigged to unrigged heads using a 2D animation model
- Flow model predicts pixel-wise displacements between neutral and posed images

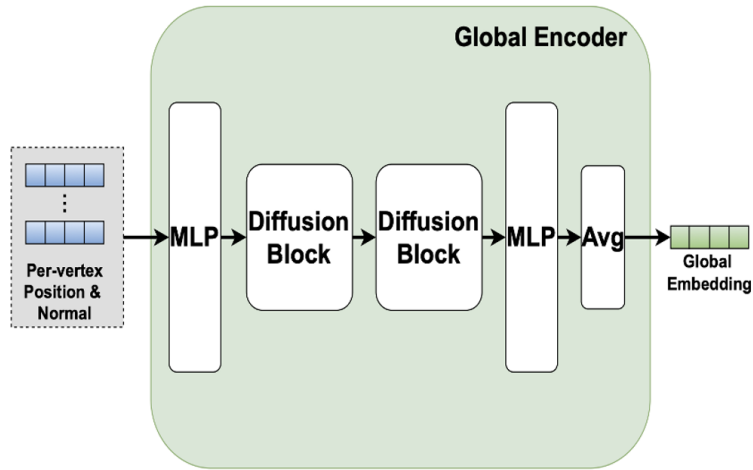
# Proposed Method



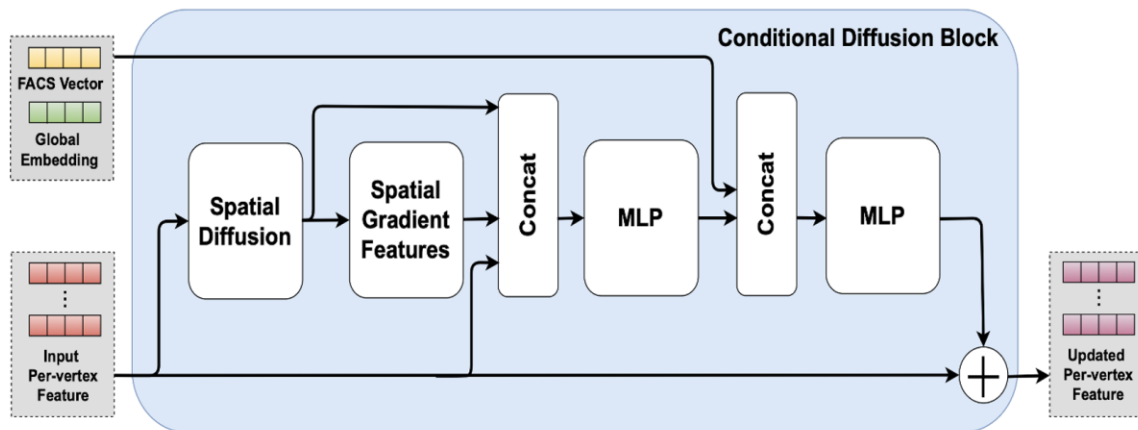
## Neural Facial Mesh Deformation Model:

- Given a neutral facial mesh, the model predicts 3D displacements to produce different expressions conditioned on a FACS vector.
- During training, 2D supervision is applied to both rigged and unrigged heads, while 3D supervision is used only for rigged heads.

# Proposed Method



- The global encoder captures holistic shape information across disconnected components.



- Modified DiffusionNet block accepts the FACS vector as an additional conditioning input.



# Applications:

## User-Controlled Animation:



Artist-crafted Head



In-the-wild Head  
from CGTrader

Ours

NFR<sup>[1]</sup>



# Applications:

## Video-to-Mesh Retargeting:



**Example Video**



**Ours**



**Artist-crafted Head**

**In-the-wild Head  
from CGTrader**

**NFR<sup>[1]</sup>**

# Applications:

## Animating Generated Meshes:

Hanamichi Sakuragi, a character from the anime "Slam Dunk," appears with short red hair, a well-defined facial structure, a determined expression, thick eyebrows.

Text-to-3D  
Generation



**Neutral Facial Mesh**

RigAnyFace



**Animatable Facial Mesh**

**Thanks for watching!**