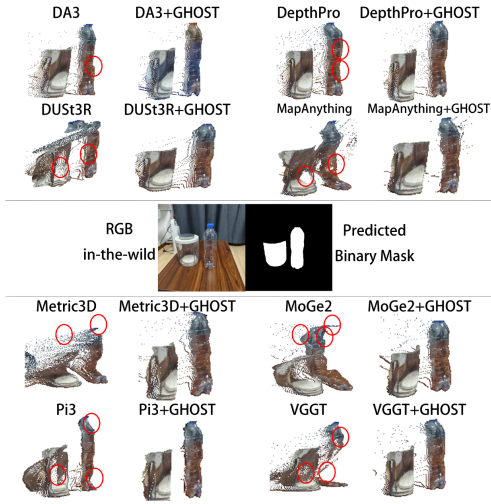


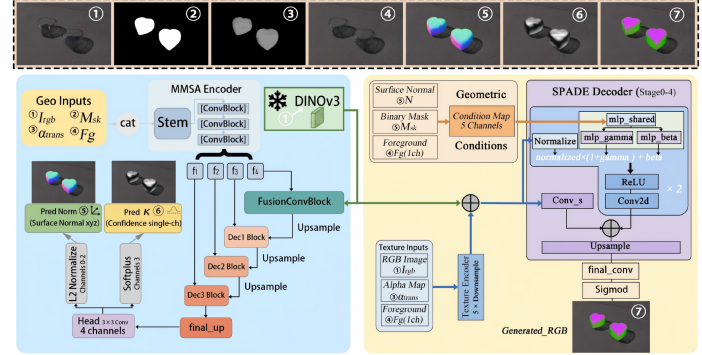
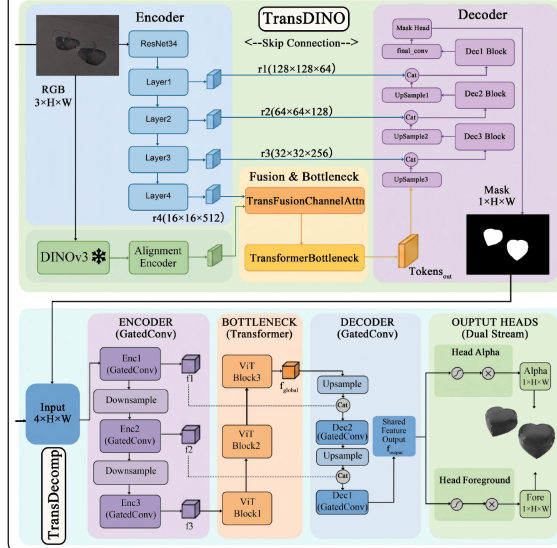
## 1. Motivation



Transparent objects pose a fundamental challenge for **depth estimation** and **3D reconstruction** due to their violation of Lambertian assumptions, leading to **severe geometry degradation in downstream tasks**.

To address this, we propose a novel geometry-guided preprocessing framework **GH<sub>OST</sub>** that leverages visual foundation models to transform transparent regions into opaque, structurally consistent representations without requiring downstream model retraining.

## 2. Method: GH<sub>OST</sub>



**TransDINO** & **TransDecomp** to disentangle masks and transparency physical properties.

**DAF-Net** recovers surface normal priors to encode geometric curvature.

**GeoSemTransNet** integrates these multi-modal cues to synthesize a texture-rich opaque RGB image that preserves the transparent object's 3D structure.

## 3. Results

DATASET	METHOD	mIOU (%)	Lab Homepage			Research Group			Author Wechat						
CLEARGRASP	EBLNET	64.99													
	TROSNET (RGB-D <sub>input</sub> )	71.40													
	TRANSDINO (OURS)	<b>92.44</b>													
CLEARPOSE	MODEST	<b>90.98</b>													
	EGSA-RGB (RGB <sub>E<sub>depth</sub></sub> )	85.04													
	EGSA-RGB (DEPTH <sub>E<sub>depth</sub></sub> )	87.30													
	TRANSDINO (OURS)	85.21													
TRANS10KV2	TRANS LAB	69.00													
	TRANS2SEG	72.15													
	TRANS4TRANS M	75.14													
	TOSQ-256	77.47													
	TRANSDINO (OURS)	<b>86.82</b>													
TROS	TRANS LAB	50.72													
	TRANS4TRANS M	39.22													
	EBLNET	50.12													
	TROSNET (RGB-D <sub>input</sub> )	57.23													
	VGGT	0.021	0.028	0.015	0.334	0.701	0.846	0.955	0.996	31.24	27.06	37.30	18.99	45.59	58.80
	VGGT + GH <sub>OST</sub>	<b>0.020</b>	<b>0.022</b>	<b>0.012</b>	<b>0.427</b>	<b>0.787</b>	<b>0.904</b>	<b>0.977</b>	<b>0.996</b>	<b>20.20</b>	<b>16.60</b>	<b>25.09</b>	<b>33.62</b>	<b>67.46</b>	<b>79.98</b>

Method	Acc <sub>↓</sub>	Comp <sub>↓</sub>	CD <sub>↓</sub>	ND <sub>↓</sub>	F-Score <sub>↑</sub>
DA3	1.17	3.28	2.23	6.90	45.91
DA3 <sub>ghost</sub>	<b>0.79</b>	<b>1.73</b>	<b>1.26</b>	<b>5.71</b>	<b>60.49</b>
DUS3R	0.57	1.63	1.10	8.37	77.36
DUST3R <sub>ghost</sub>	<b>0.25</b>	<b>0.77</b>	<b>0.51</b>	<b>7.01</b>	<b>88.66</b>
MapAnything	1.76	1.58	8.70	8.11	21.94
MapAnything <sub>ghost</sub>	<b>1.54</b>	<b>1.24</b>	<b>7.02</b>	<b>7.59</b>	<b>22.60</b>
$\pi^3$	1.60	1.34	7.44	8.27	61.60
$\pi^3_{ghost}$	<b>1.43</b>	<b>1.20</b>	<b>6.70</b>	<b>7.89</b>	<b>75.26</b>
VGGT	0.76	2.81	1.78	7.18	57.28
VGGT <sub>ghost</sub>	<b>0.45</b>	<b>0.64</b>	<b>0.55</b>	<b>4.96</b>	<b>86.72</b>