Towards A Better Camera

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Snap Research

Please encourage your students to apply to our internship program!
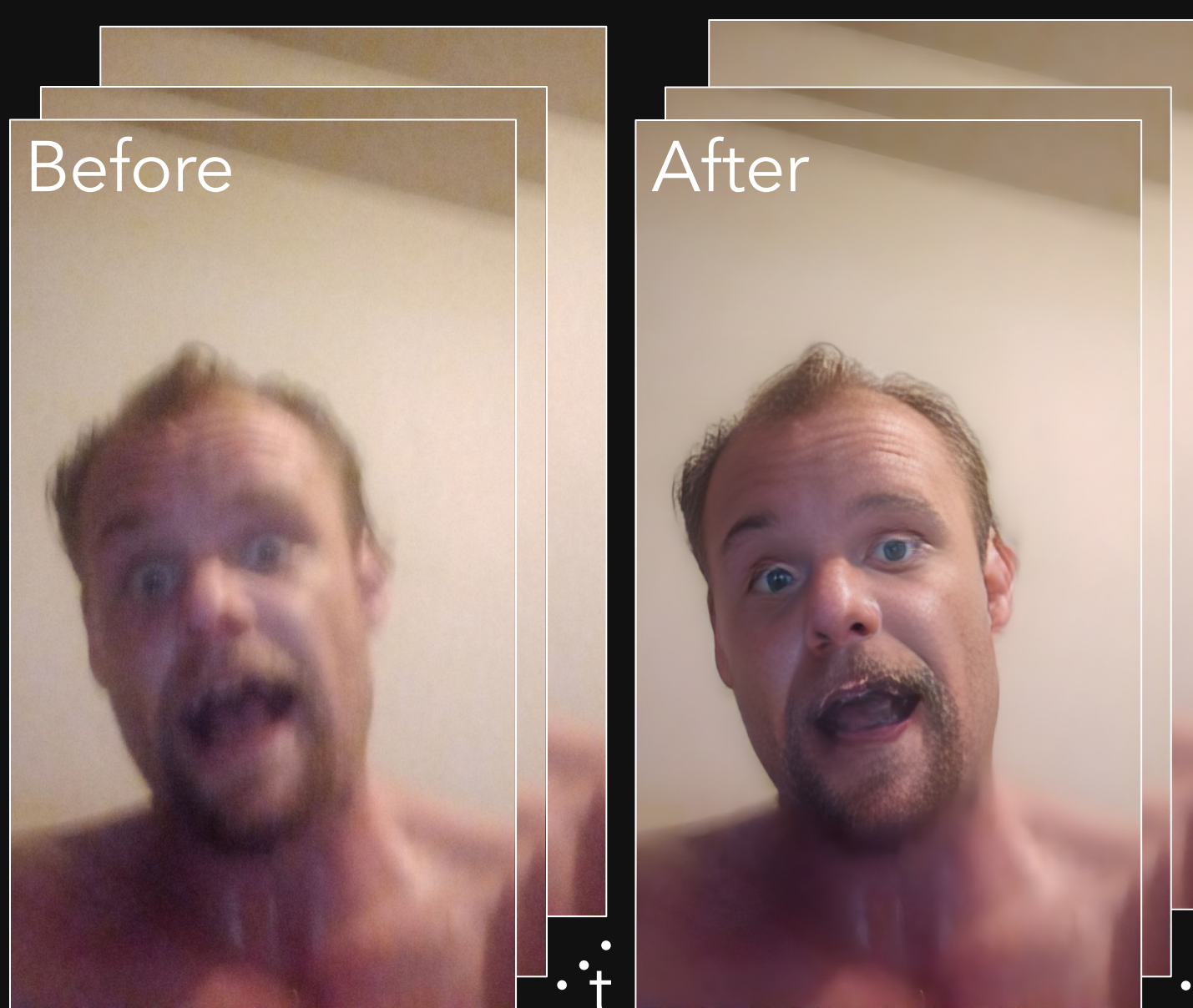
CVPR
JUNE 17-21, 2024
SEATTLE, WA
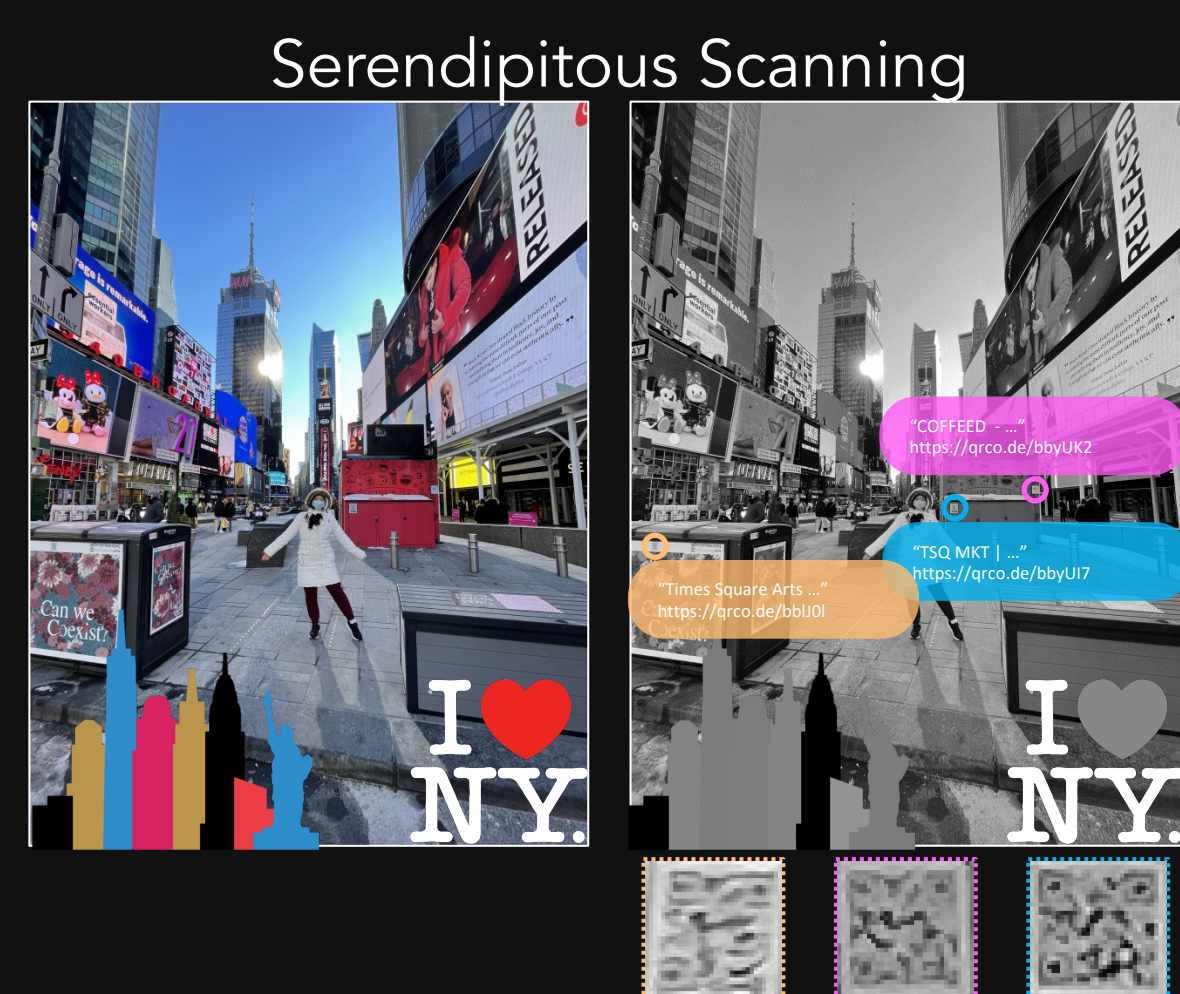
A Higher-Quality Camera

Before | After

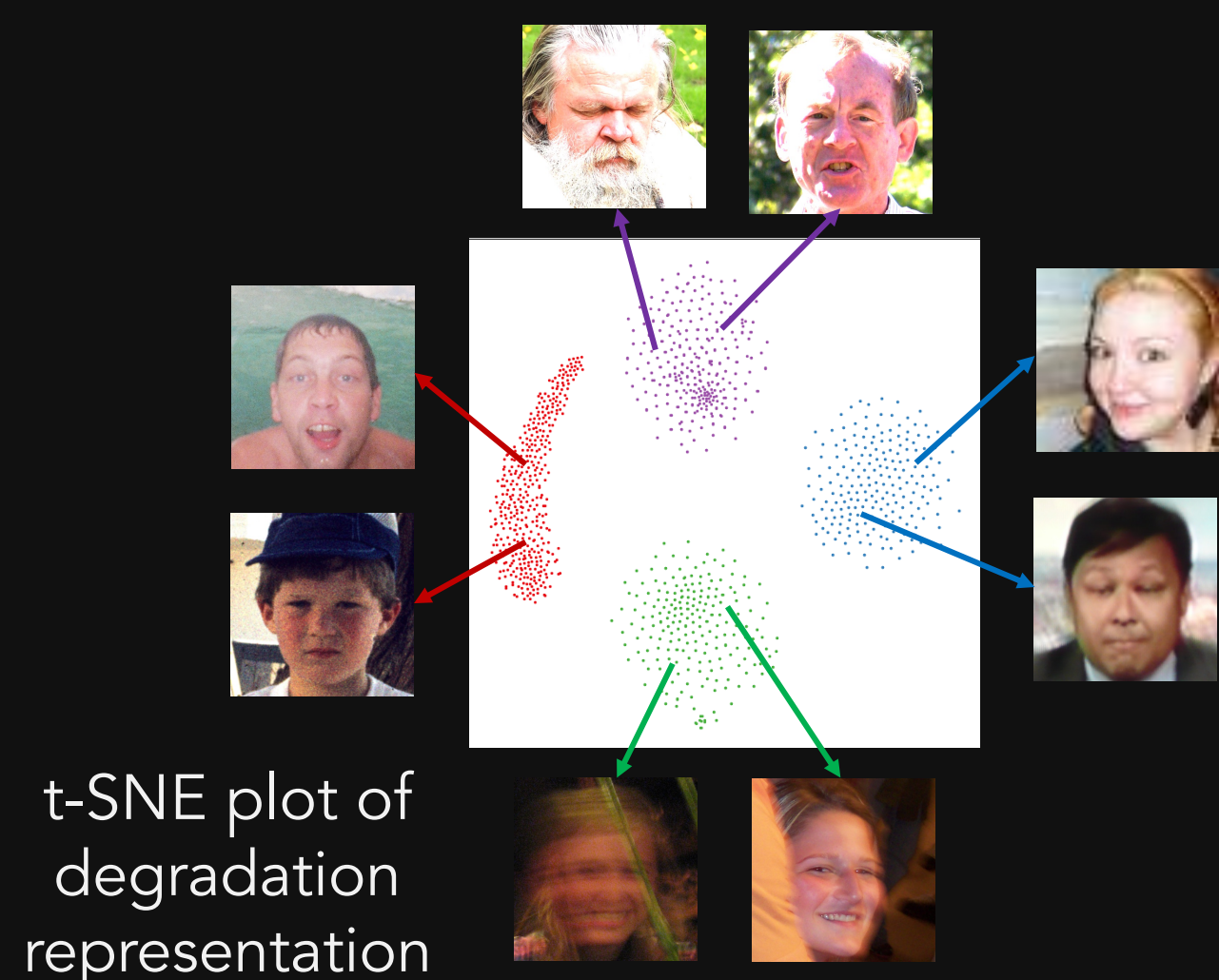### Image / Video Restoration
Challenges:
- Image/video quality assessment
- sRGB domain (not RAW)
- Real complicated degradations
- Fast (on low-end devices)
- Restoration vs. generation
- Inclusive
- Natural output

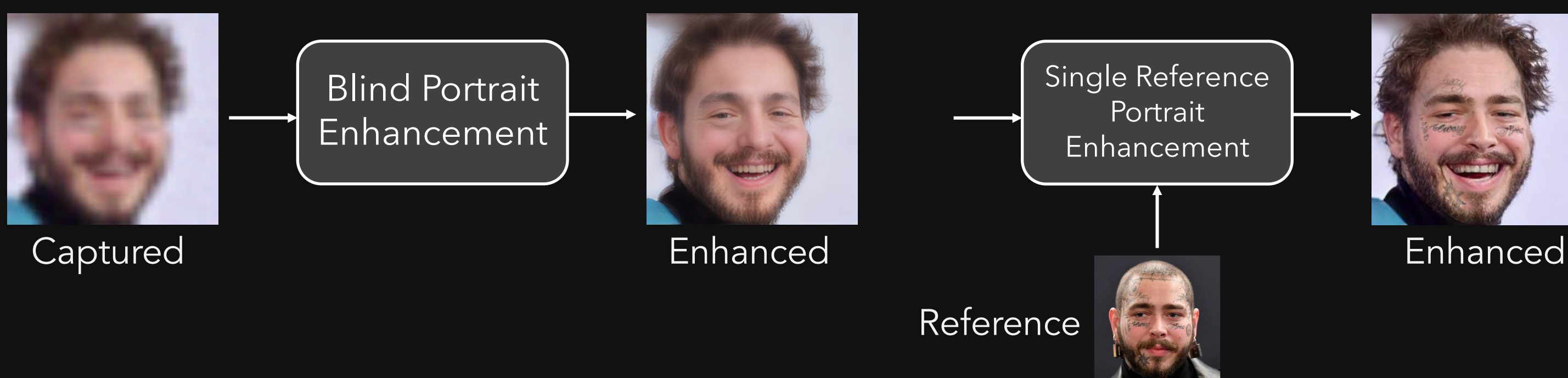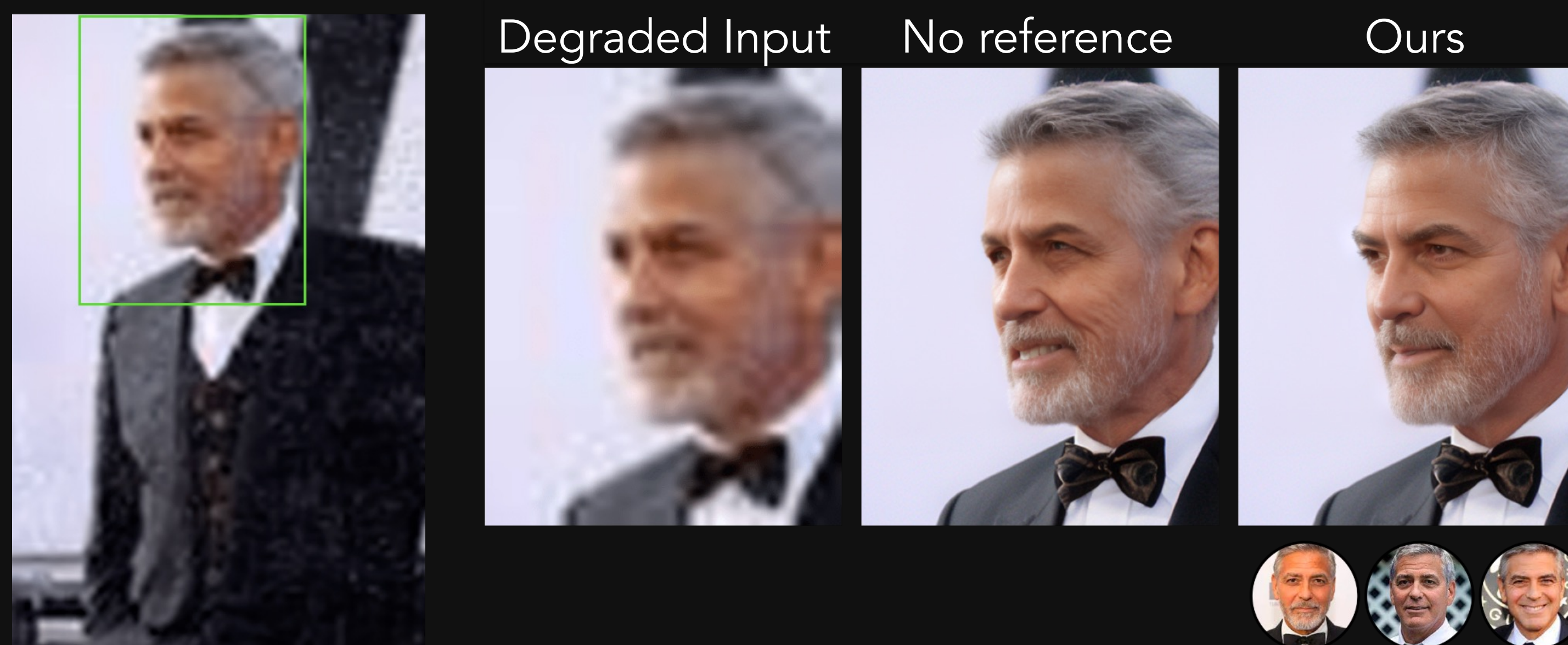Before | After

A Better SnapCode / QR code Scanner

Serendipitous Scanning

Face IQA

Medium Quality | Good Quality

t-SNE plot of degradation representation

DSL-FIQA: Assessing Facial Image Quality via Dual-Set Degradation Learning and Landmark-Guided Transformer, CVPR 24
QfaR: Location-Guided Scanning of Visual Codes from Long Distances, MobiCom 23

A Personalized Camera

Single-reference Based Face Restoration

Captured → Blind Portrait Enhancement → Enhanced

Single Reference Portrait Enhancement → Enhanced
Reference

Copy or not? Reference-based Face Image Restoration with Focus on Fine Details

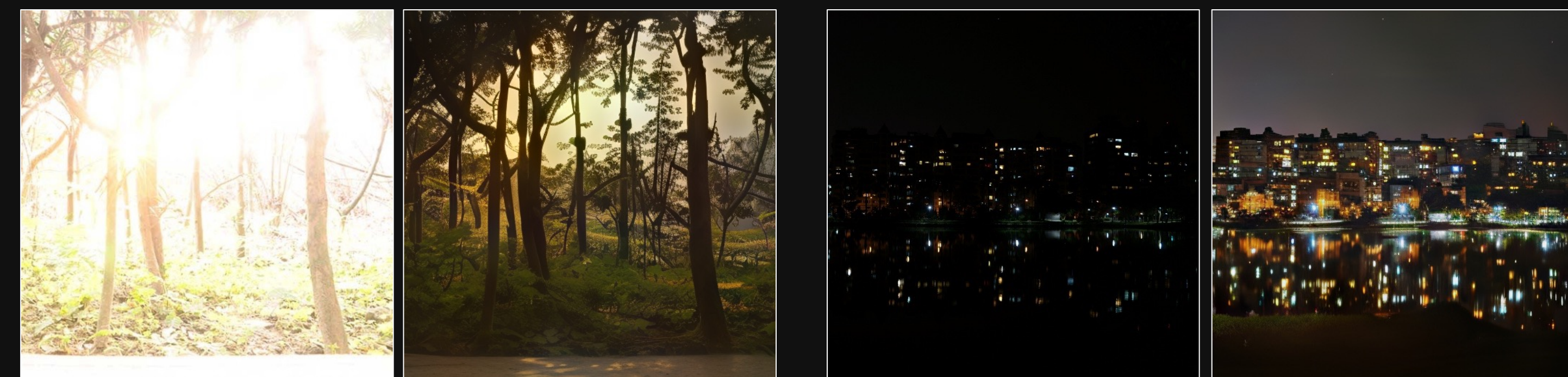### Multiple-references Based Face Restoration

Degraded Input | No reference | Ours

Personalized Restoration via Dual-Pivot Tuning

Video Engagement Prediction

Video 1 | Video 2 | Video 3

Video 1

Video_duration	Predicted_ECR	ECR	Predicted_NAWP	NAWP	AWT
22.033	0.721	0.732	0.841	0.814	17.153

An interesting video

Video 2

Video_duration	Predicted_ECR	ECR	Predicted_NAWP	NAWP	AWT
24.791	0.710	0.695	0.806	0.819	18.517

An interesting video

Video 3

Video_duration	Predicted_ECR	ECR	Predicted_NAWP	NAWP	AWT
30.333	0.087	0.114	0.105	0.111	2.837

An uninteresting video
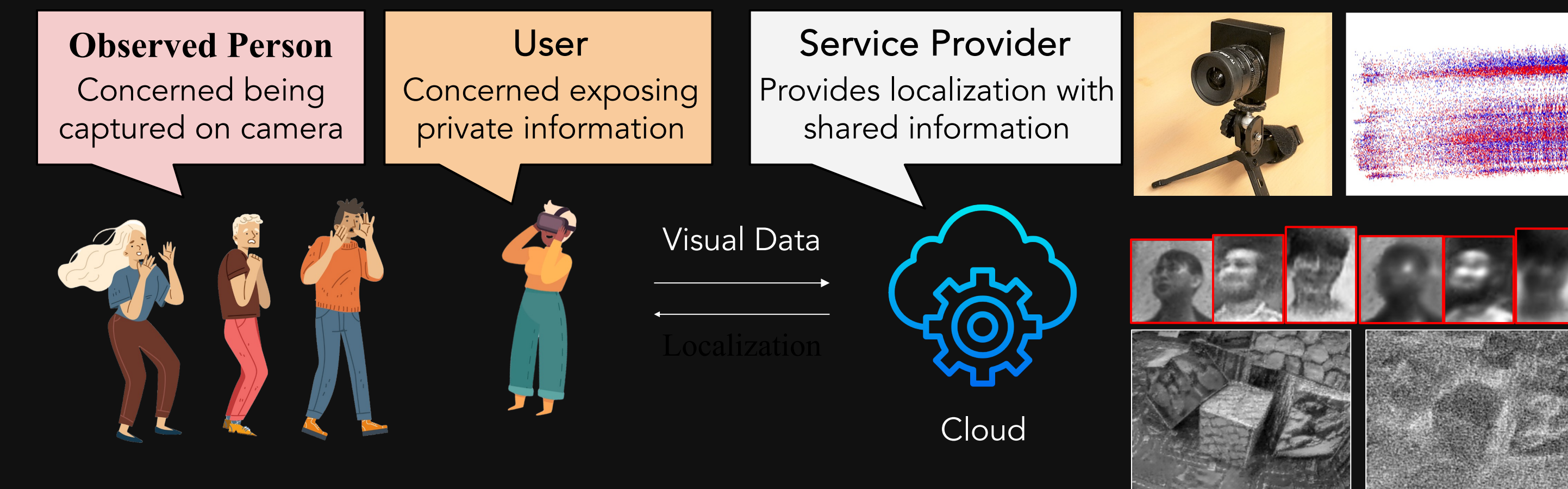
Delving Deep into Engagement Prediction of Short Videos

A Generative Camera

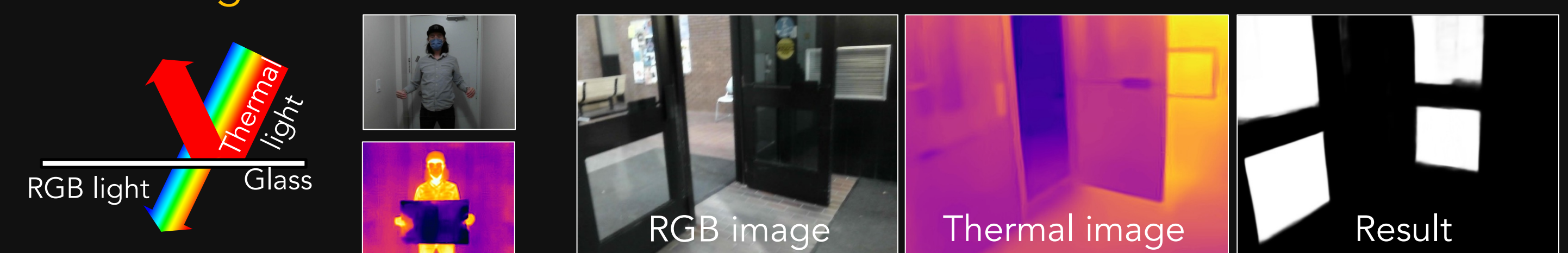Low Dynamic Range Image Enhancement with Generative Diffusion Prior

New Hardware
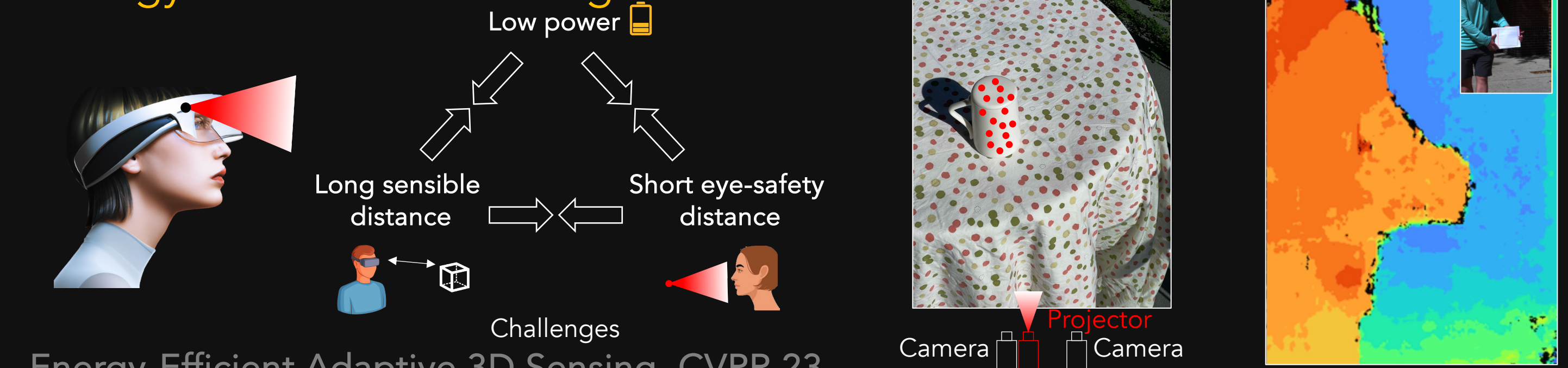
Visual Localization with Event Cam

Observed Person	User	Service Provider
Concerned being captured on camera	Concerned exposing private information	Provides localization with shared information

Visual Data → Cloud
Localization

Privacy-Preserving Visual Localization with Event Cameras

Before | After

Glass Segmentation

RGB light | Thermal light | Glass

RGB image | Thermal image | Result

Glass Segmentation with RGB-Thermal Image Pairs, TIP 23

Energy-Efficient 3D Sensing

Low power
Long sensible distance → Short eye-safety distance
Challenges

Camera | Projector | Camera

Energy-Efficient Adaptive 3D Sensing, CVPR 23