EyeConnect: Real-Time Gaze Redirection in the Browser for Video Communication Pengyu Cui

1. Introduction

- Task: real-time, browser-based gaze redirection for video calls.
- Motivation: improve eye contact in remote communication.
- Key insight: combine lightweight eye transformation with 3Daware gaze-redirection angle estimation.
- **Contribution**: fast, install-free app using TensorFlow.js and MediaPipe, with 90%+ model size and latency reduction.

2. Problem Statement

- Physical webcam \neq On-screen window \rightarrow Broken eye contact
- "Virtual Webcam" concept enables natural eye contact





OUTPUT

3. Method Pipeline & Implementation



Segmentation Formula



Original Frame



nysical Webcam on the top side e.g. laptops



Physical Webcam on the left side e.g. iPad

Virtual Webcam Enabled

Segmented Right Eye Image







Eye Mod

Face Dete

Tech

• Live Demo: https://pkucuipy.github.io/eye-connect-ui/ (open with Chrome or Firefox)





Landmark detection \rightarrow Eye Segmentation \rightarrow Redirection angle estimation \rightarrow Eye Transformation





Estimate the angles between eye to the physical webcam and eye to the virtual webcam

Redirected Eye Image

• Replaced DLib (99MB) with lightweight MediaPipe (10.5MB) for stable, real-time landmarks • Eye processing model with only 1.2 MB for TensorFlow.js, enabling fast inference on portable devices

4. Experiment Results

Eye Redirection Model Angle Input

VARIED



	Look at Me [Hsu et al. 2019]	Eye Connect	Improvement
del Size	12.4 MB	1.2 MB	Reduced by ↓91%
ector Size	DLib 99 MB	MediaPipe 10.5 MB	Reduced by <mark>↓89%</mark>
Stack	Python + TensorFlow GPU Server	React + TF.js Pure Browser	Install/config-free

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