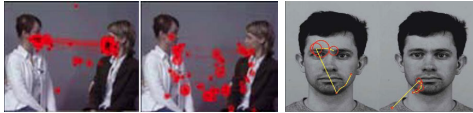




1. Overview

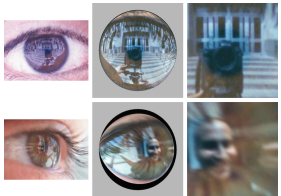
a. Gaze behavior and autism



Children with autism tend to avoid looking into another person's eyes

b. Corneal Reflections

The environment around us reflects in our eyes

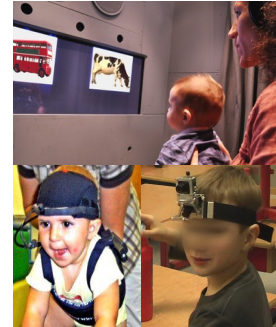


The world in an eye, K. Nishino, S.K. Nayar CVPR 2004.

2. Limitations of Existing Systems

a. Monitor-based

- : Restriction on movement
- : Unnaturalistic
- : Not interactive



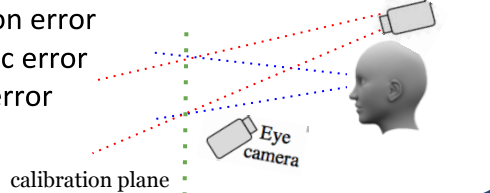
b. Wearable

- : Body attached devices
- : Distracting, safety hazard



c. System errors

- : Calibration error
- : Geometric error
- : Parallax error



3. Proposed Solution



* We propose a new camera system to measure a person's gaze behavior in naturalistic settings through direct corneal image analysis.

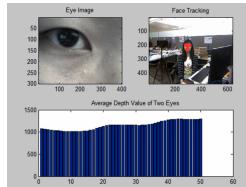
* It should be portable, easy to set up on the floor or a table.

* It creates eye video (+ PoG) for psychologists to watch and examine.



4. System Design

Background Autofocus Loop:
Measure subject's movement in terms of depth



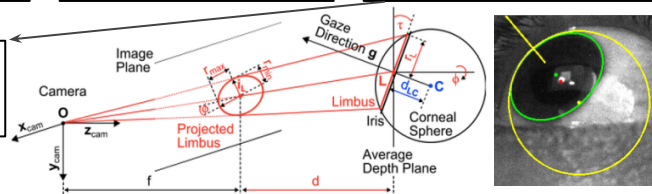
Face Detection:
Determine eye location and size

Camera Selection:
Select subset of narrow-view cameras

Eye localization:
Crop the eyes in high-resolution image

Image Enhancement:
Histogram equalization
Video Stabilization

Point of Regard Estimation:
3D eye pose estimation by ellipse fitting



5. Work in Progress

- System evaluation
- Experiments with adults
- More compact prototype development
- Study with children

References

- 1.a, 2.a Babylab, Oxford University
- 1.a Brendon Nacewicz, University of Wisconsin-Madison
- 2.b Positive Science Eyetracker
- 2.b Wearcam, EPFL