

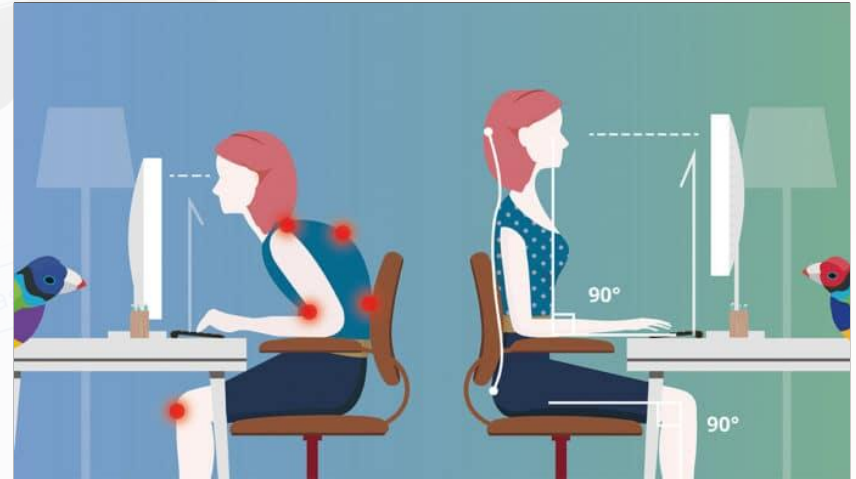
Because eyes are the  
window to colours in your life



# Netra: Safe Screen Distance Detection

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## Objectives

- Assist user in maintaining a safe distance from the screen to drive them to sit in a comfortable posture, lessening stress on both eyes and body
- Assist in managing eye breaks or to understand their level of distraction by showing total screen viewing time

# Limitations of Current Practices



Distance detection  
using LiDAR



Expensive to use  
sensors like LiDAR, for  
accurate  
measurements



Detection using  
SoundWave by  
Microsoft Research



A single speaker  
cannot detect the  
sound waves from  
multiple sources.



Other solutions



Applications have been  
made only for android  
phones

# Benefits of our Approach

Not just find distance,  
advise the user from a  
health standpoint

A minimal software  
(browser extension)  
needs to be installed

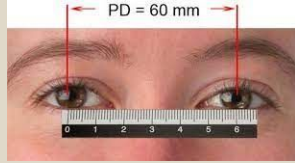
Can be extended to  
multi-user scenario

Works on laptops  
extendable to mobile  
phones



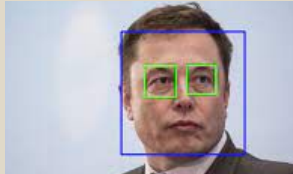
# Approach

## IPD: Inter Pupillary Distance



Using OpenCV, find IPD from reference image whose distance from screen is known.

Found IPD\_ref = 260 pixels for an image taken 30 cms far away from the screen.

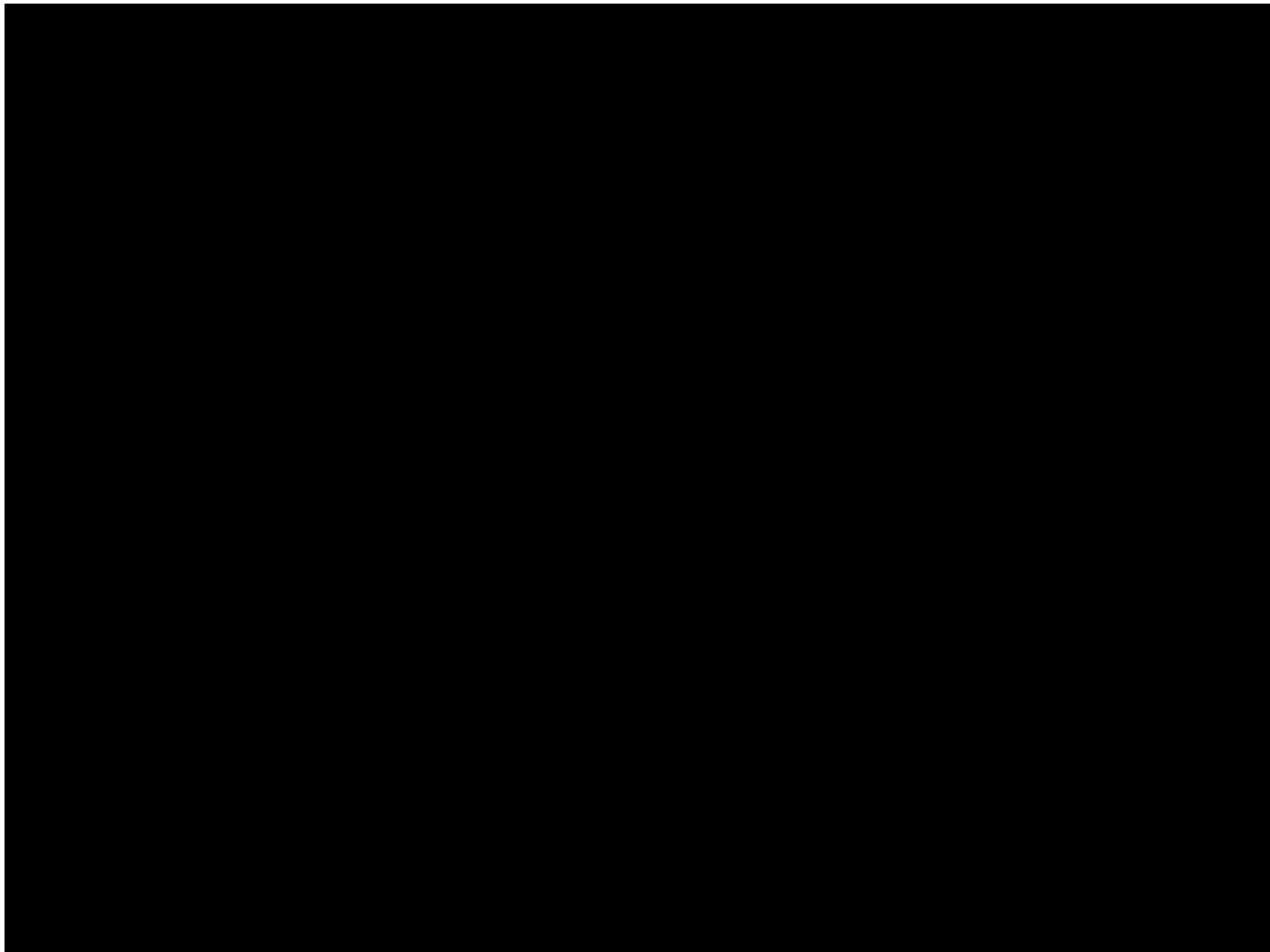


For every user, calibrate the hard coded values for specific screen size. Perform Eye Detection using webcam to measure IPD thus find distance from screen. Compare with safe distance of 51 cm.

$$\frac{\text{Unknown Distance(cm)} * \text{est. IPD(px)}}{\text{Avg human IPD(cm)}} = \frac{\text{Known Distance(cm)} * \text{Ref IPD(px)}}{\text{Known IPD(cm)}} = F$$

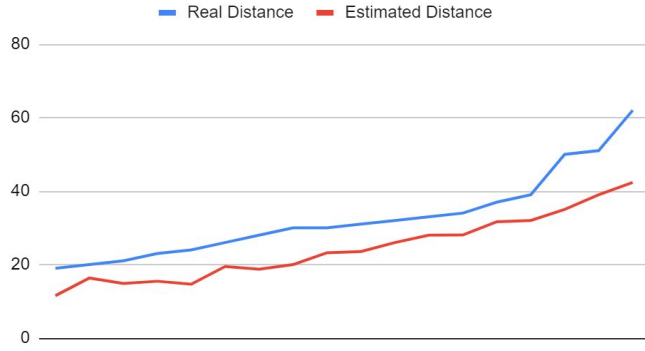


Enabling timer in background that increments only when you look at the screen



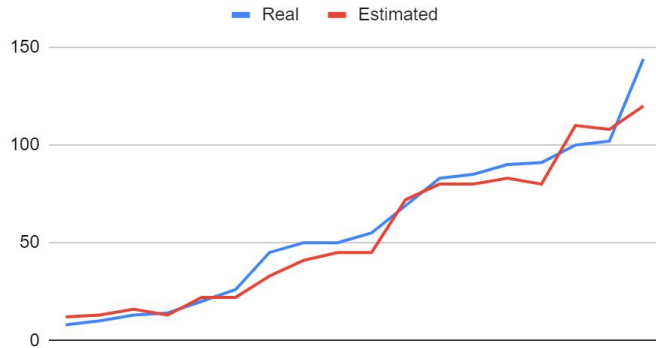
# Evaluation

Real Distance(cm) Vs. Estimated Distance(cm)



Mean Error: 7.58cm

Real Vs. Estimated Total Time(sec)



Mean Squared Error: 8.41sec

What Users think??

Do you think it is useful?

What privacy issues concern you?

Will you use it given its current state?

Thoughts on total viewing time?

Challenge as of current technology

Especially people with high power

As long as there is nothing in cache and there is clear transparency of data collected

Sure! If concerns are solved

Better than iPhone screen time which keeps counting time even when phone is idle with just screen on based on how many time you pick up the phone.

With spectacles on, Netra had a hard time detecting eyes, especially in dim light, No detection when not in browser



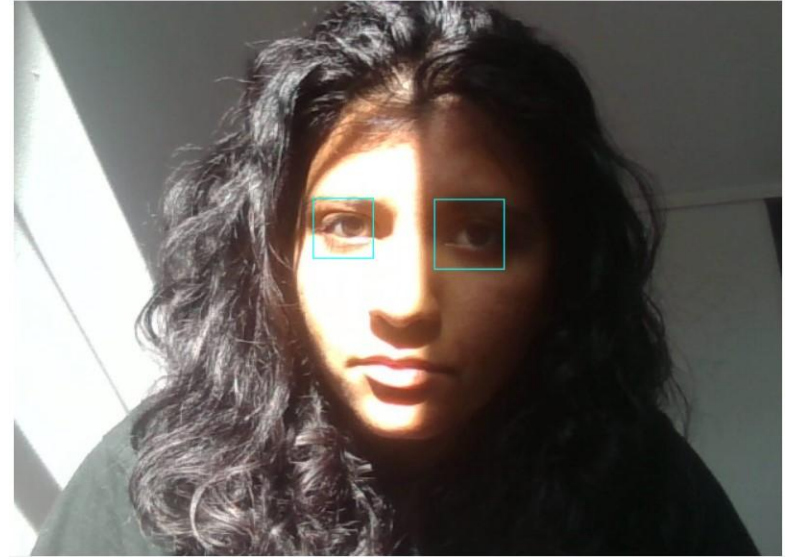
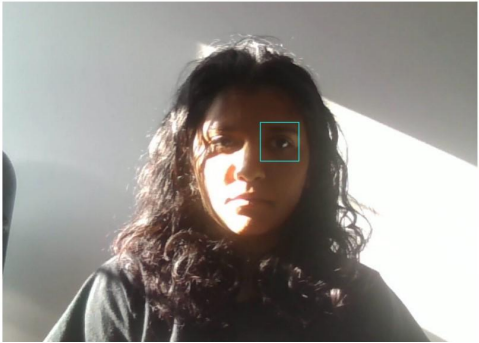
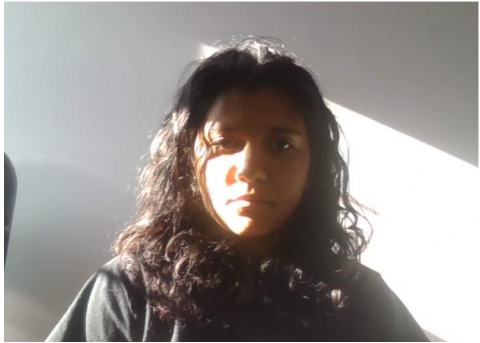
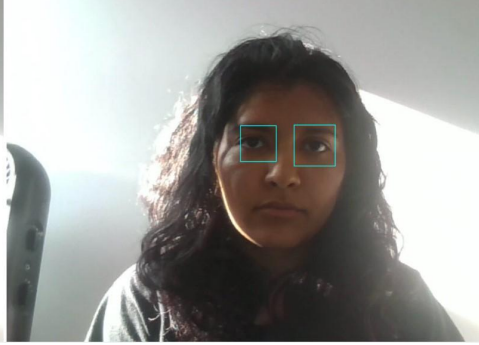


# Challenges

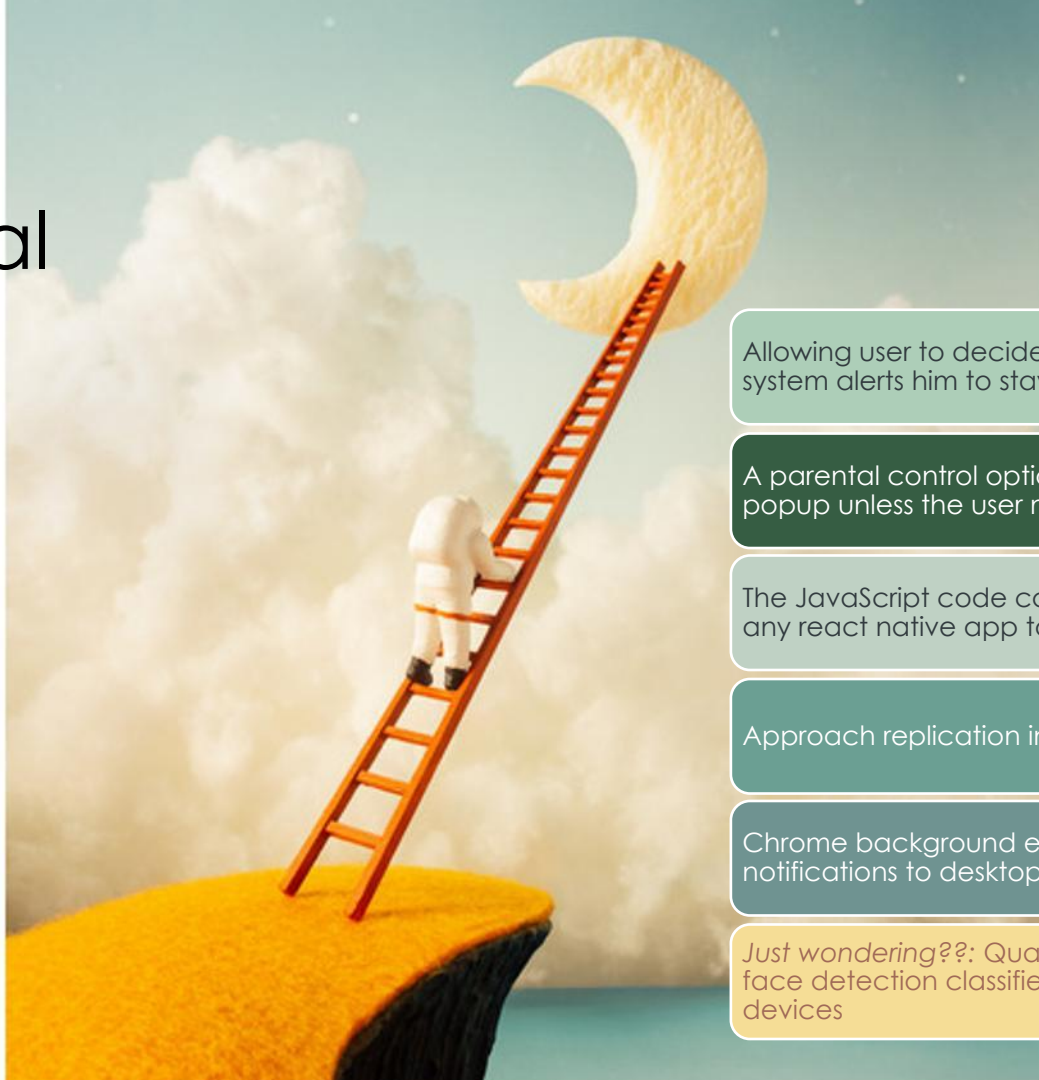
- BUILDING TWO NEW SKILLS: OPENCV, BROWSER EXTENSION BUILDING IN TIME CONSTRAINT
- HUGE TIME TAKEN BY EACH RUN OF FACE DETECTION CLASSIFIER
- WEBCAM NEEDS TO BE ON ALL THE TIME CAUSING HIGH POWER CONSUMPTION AND PRIVACY CONCERNS
- DOESN'T WORK WHEN BROWSER IS CLOSED
- TIME INCREASED WHEN I LOOKED AT KEYBOARD WHILE TYPING
- SINCE EYES ARE DETECTED BY CIRCLES, THE SYSTEM IS SET TO FREEZE WHEN MORE THAN 2 EYES ARE DETECTED



# Lighting Issues



# Future Potential



Allowing user to decide the time after which the system alerts him to stay at a safe distance

A parental control option to freeze the STAY AWAY popup unless the user moves to a safe distance

The JavaScript code can be migrated easily to any react native app to work on cell phones

Approach replication in Java for desktop apps

Chrome background extensions that send notifications to desktop when browser is closed

*Just wondering??:* Quantization of harcascode face detection classifier to run optimally on mobile devices

Thank you



*Remember to keep your eyes healthy!*