

CityU-EE Gifted Education Fund Programme:
AIoT Coding, Engineering and Entrepreneurial Skills Education for
Gifted Students



Department of
Electrical Engineering
香港城市大學
City University of Hong Kong



A glowing blue eye is centered in the image, surrounded by a futuristic, glowing blue interface. The interface includes a circular dial on the left, a horizontal bar at the top, and a large, stylized text area in the center. The text reads "At night
FOR PROTECT
OUR EYES" in a bold, sans-serif font. The entire scene is set against a dark, textured background that suggests a digital or futuristic environment.

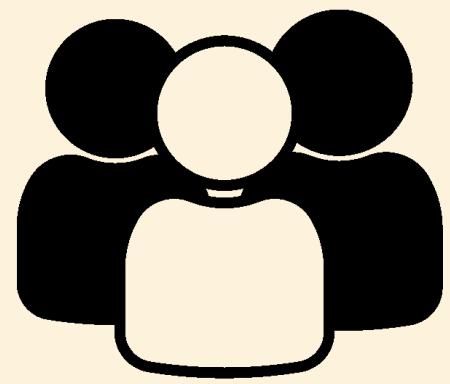
At night
FOR PROTECT
OUR EYES

Project ID : P10

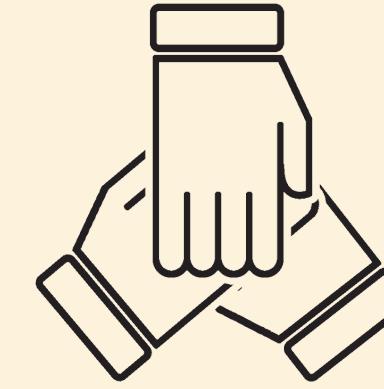
Students : 25 Li Kin Man, Manna

37 Wong Lam Yeung, Yoyo

40 Yang Yuen Ting, Wendy



Team

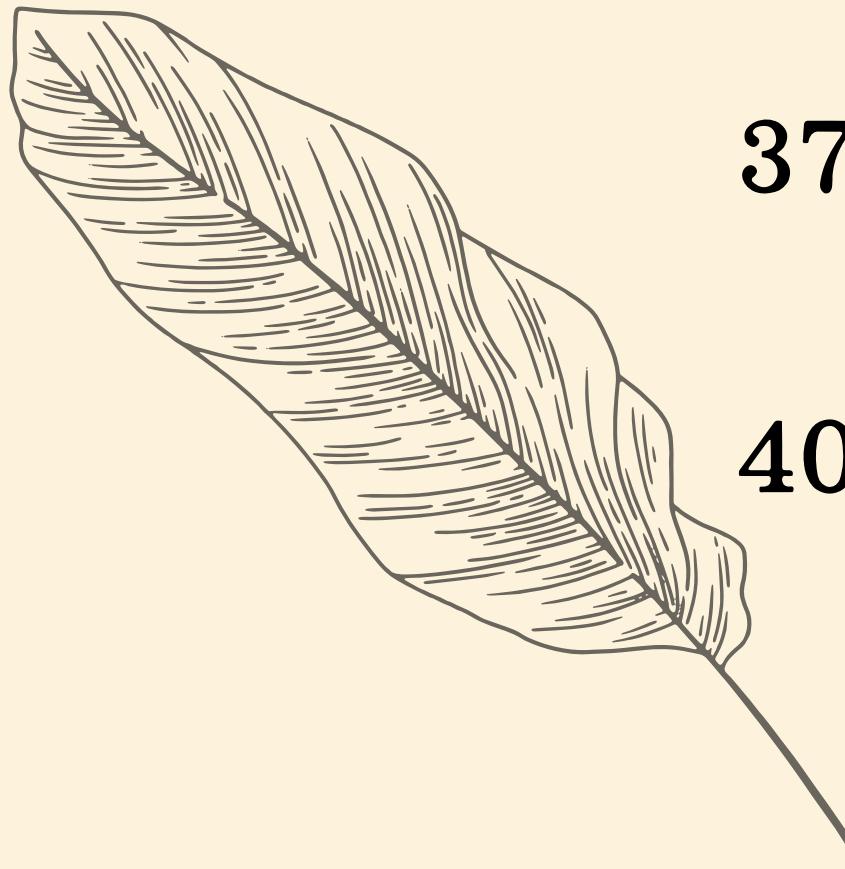


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Problems : eyes disease

Background

Having eyes disease nowadays is hugely popular which is mainly caused by using the phone without blinking in a dark environment for a long time.

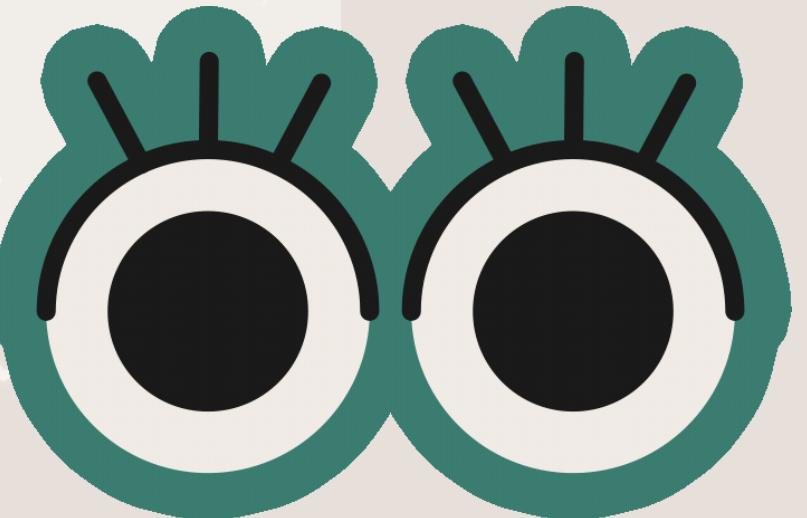


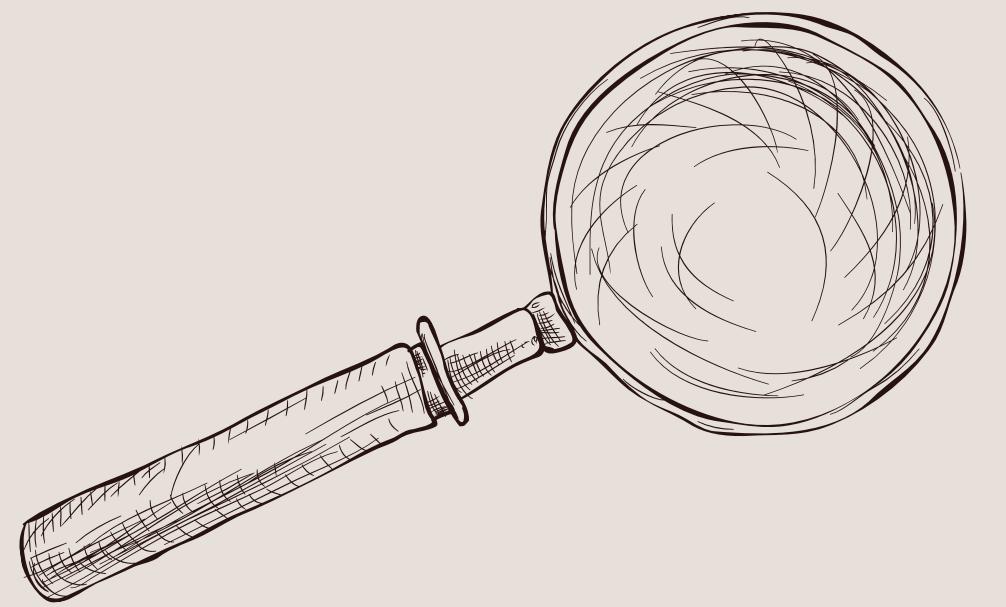


Blink Eyes

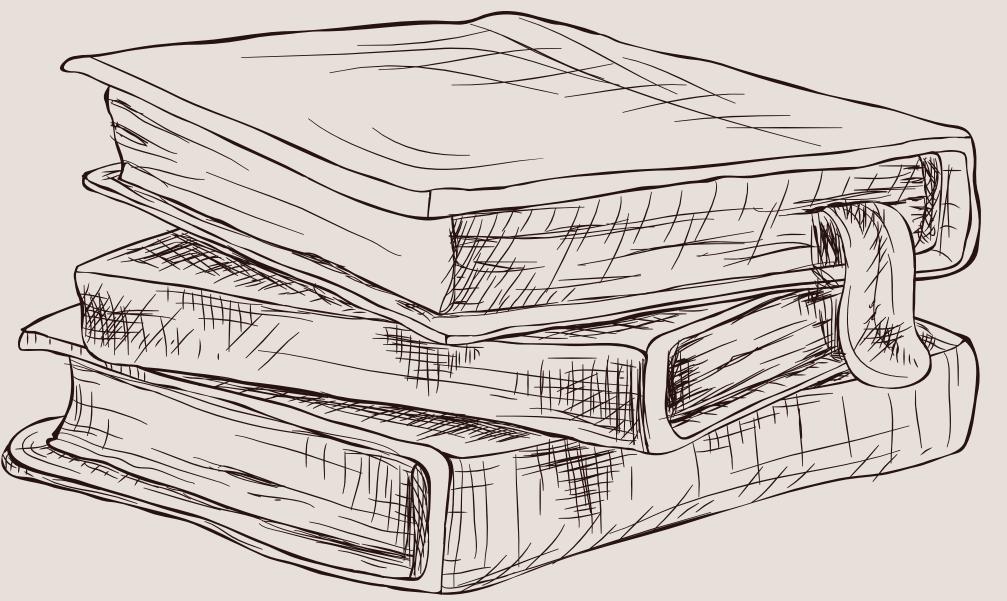


- people often forget to blink their eyes while watching electronic devices concentrate.
- A healthy man blinks around 15-20 times per minute
- eyes will lack water and feel dry
- increase the risk of eye infection in the long term





Research



DeArk Medical Center



- On the light spectrum, blue light has a shorter wavelength, and thus carries more energy than red, yellow or green light. That extra energy (more intense in the dark) is why blue light can be bad for your eyes.
- Exposure to the blue end of the light spectrum could cause serious long term damage to your eyes.
- According to the Bright Focus Foundation, as many as 11 million people in the U.S. currently have some form of age-related macular degeneration. This number is expected to reach 22 million by 2050.



Intense Focus Can Reduce Blinking Frequency

When we're focusing hard on a task or something interesting like a book, game, or show, we tend to blink a lot less. In fact, under these conditions, we may blink as little as three to eight times per minute — nearly 60% less frequently than the normal, healthy rate!

Over time, that can add up to problems like eye strain and dry eye.

The Discovery Eye Foundation

Blinking to avoid digital eye strain

All these benefits are especially important to your eyes when sitting in front of a computer or using another screen. When you're doing focused digital work, your blink rate typically decreases, meaning your eyes are losing out on cleaning and nourishment. Making a conscious effort to blink every 10 to 15 seconds will keep your vision sharper while you work and prevent your eyes from feeling as strained at the end of your work.

Besides keeping your eyes lubricated, the tear film also:

- Helps form an almost perfectly smooth front optical surface on the cornea helping light to focus properly.
- Washes away debris.
- Transfers oxygen from the atmosphere to the cornea, since the cornea lacks blood vessels to deliver it directly.
- Provides a pathway for white blood cells when there is an injury to the eye's surface.
- Prevents infection due to presence of lysozyme and other antibacterial enzymes.

Spindal Eye Associates

Exclusively Eyecare



Changes in blink rate and ocular symptoms during different reading tasks

Normal blinking is essential to ensure the normal distribution of the tear film and to protect the ocular surface.¹ Blinking abnormalities may result in poor tear distribution and hence cause damage to the ocular surface.² Several studies have investigated the blink rate and the interval between blinks. It has been reported that the normal spontaneous blink rate is between 12 and 15/min.³ Other studies showed that the interval between blinks ranges from 2.8 to 4 and from 2 to 10 s.³⁻⁵ A mean blink rate of up to 22 blinks/min has been reported under relaxed conditions.⁶ The variability in the blinking measurements of previous studies may be due to differences in experimental conditions.

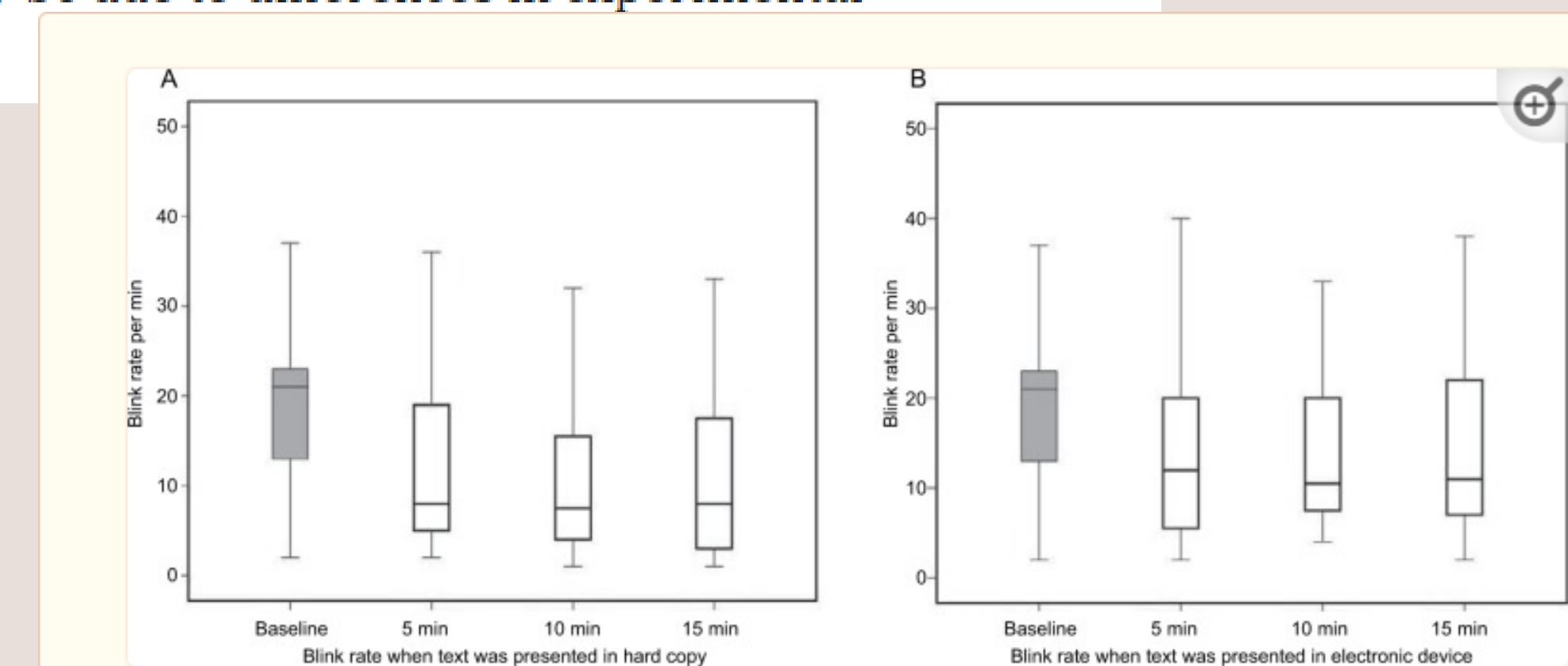
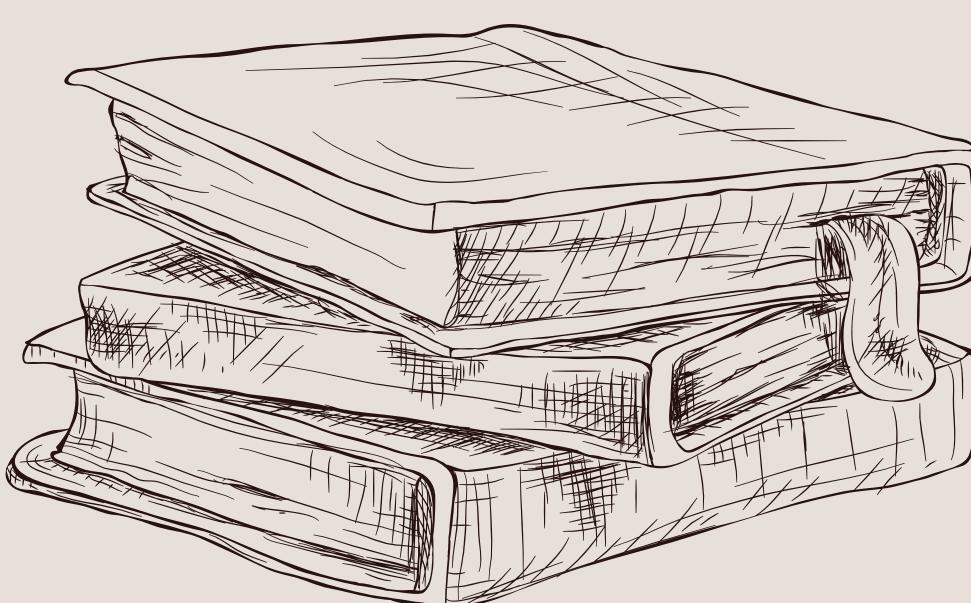
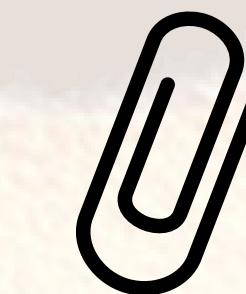


Figure 1

A box plot showing blink rate measured at different time points during reading from hard copy (A) and electronic device (B). The box represents the interquartile range that contains 50% of the values. The whiskers are lines that extend from the box to the highest and lowest values. The line across the box indicates the median value.

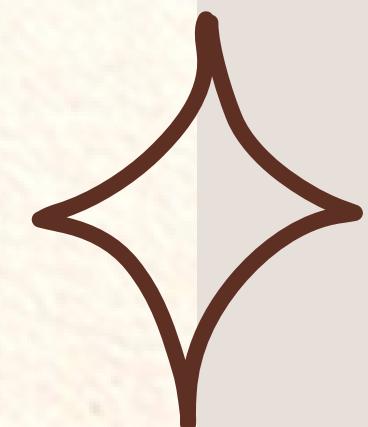


EXISTING SOLUTIONS

According to nowadays smartphone, it already has a similar function which is automatically adjust the light, even after adjusting the light, it still hurts eyes in dark environment because it still have the bleak light.

Therefore, our product might solve this problem.

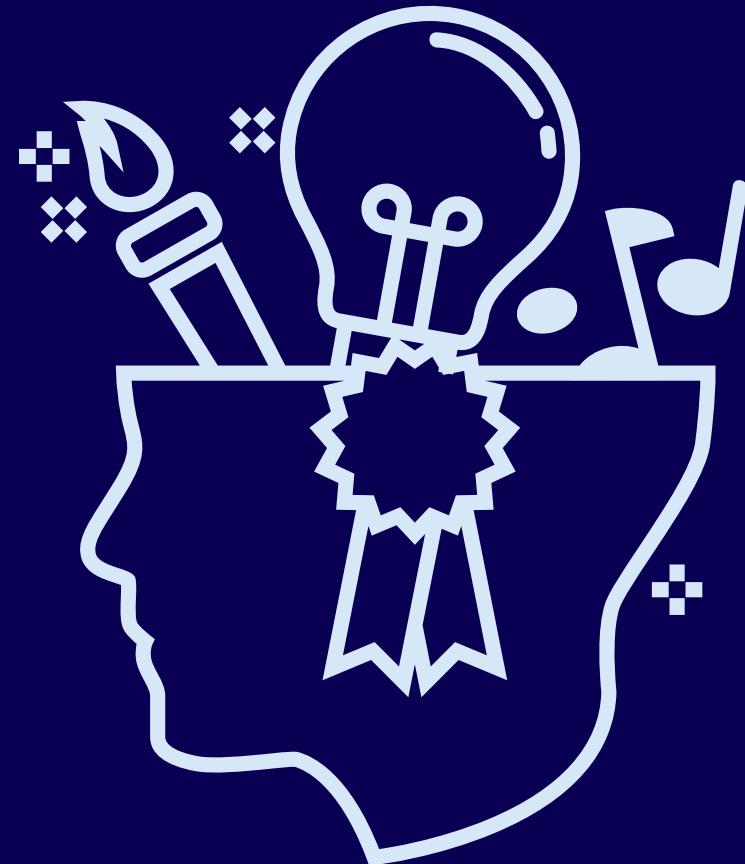
Reason





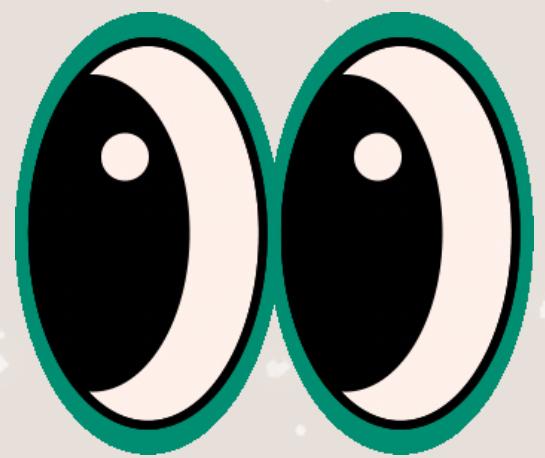
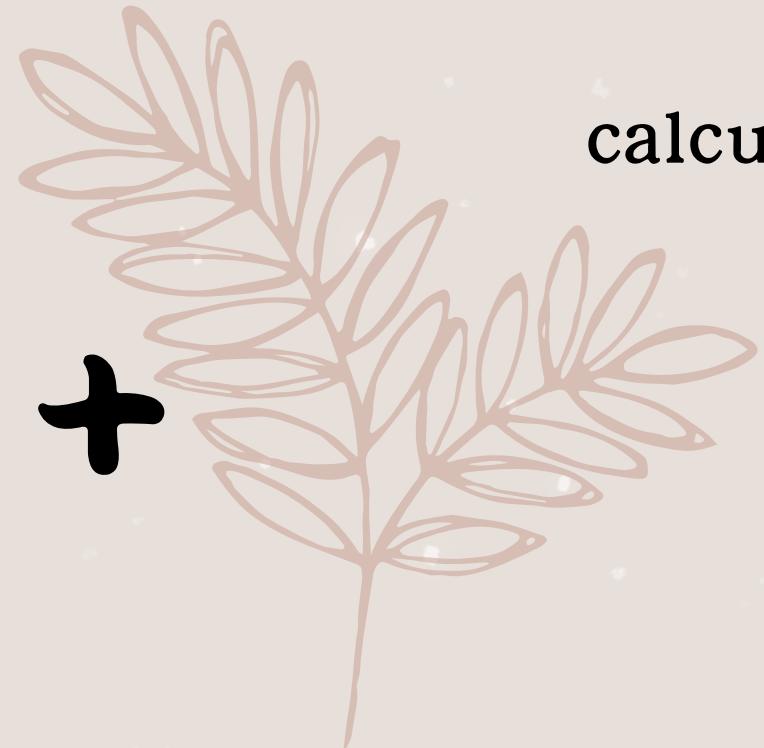
We want to produce a product to reduce
the risk of eye infection and disease.





Our ideas and solutions

Function_1

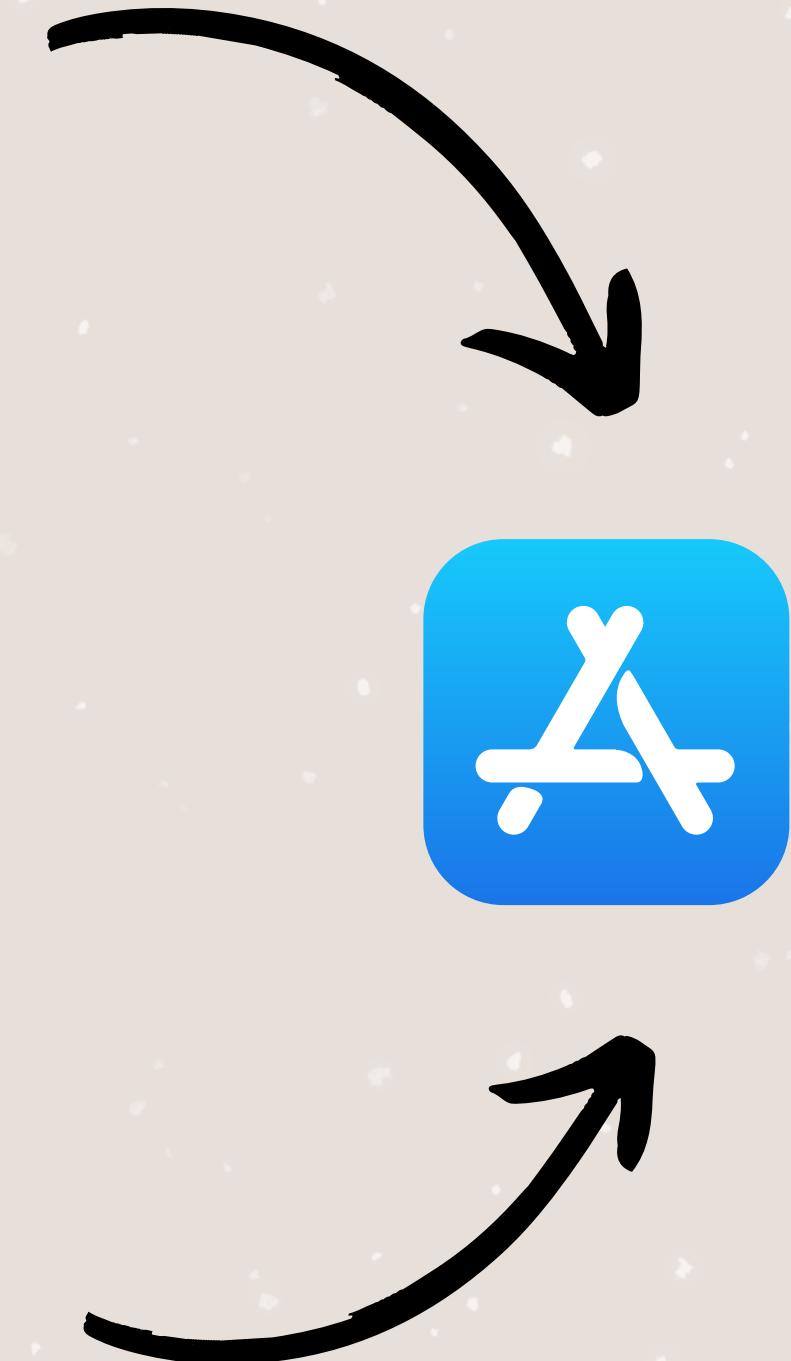


calculate the frequency of blinking.

Function_2



Detecting the light intensity.



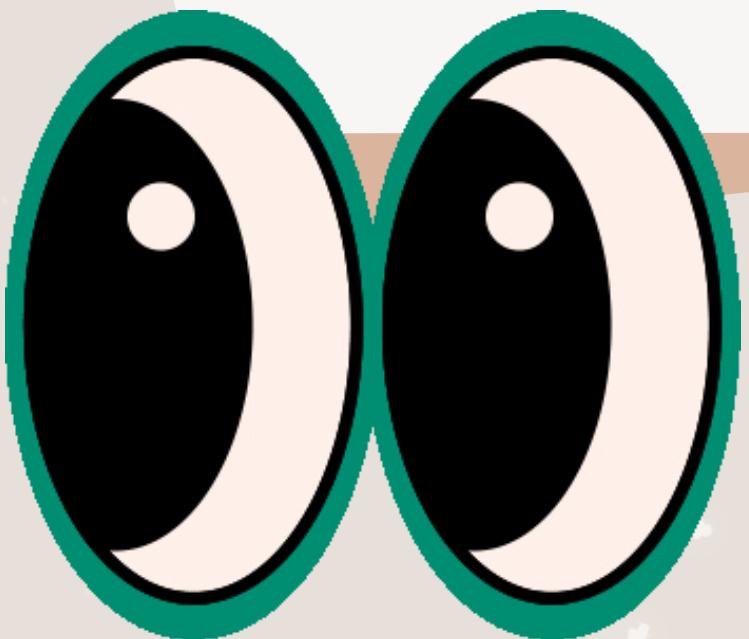
Function_1

Use AI to detect :
whether user blink their eyes, calculate the frequency of blinking.

Function_1

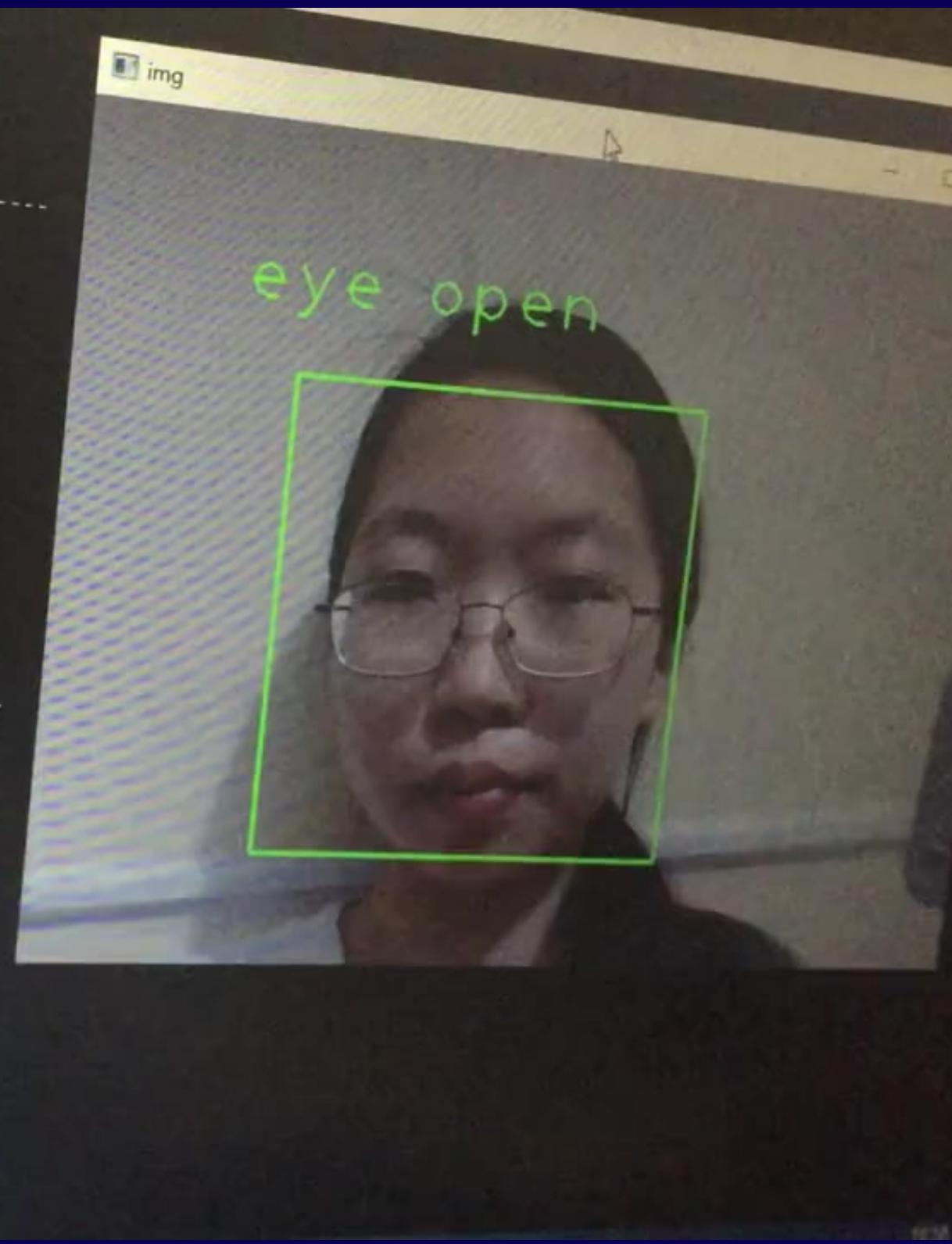


- AI will detect whether users have blinked their eyes or not.
- If not for a long time, just also send a message to remind them.
- The message will disappear after it detects that the user blinks.

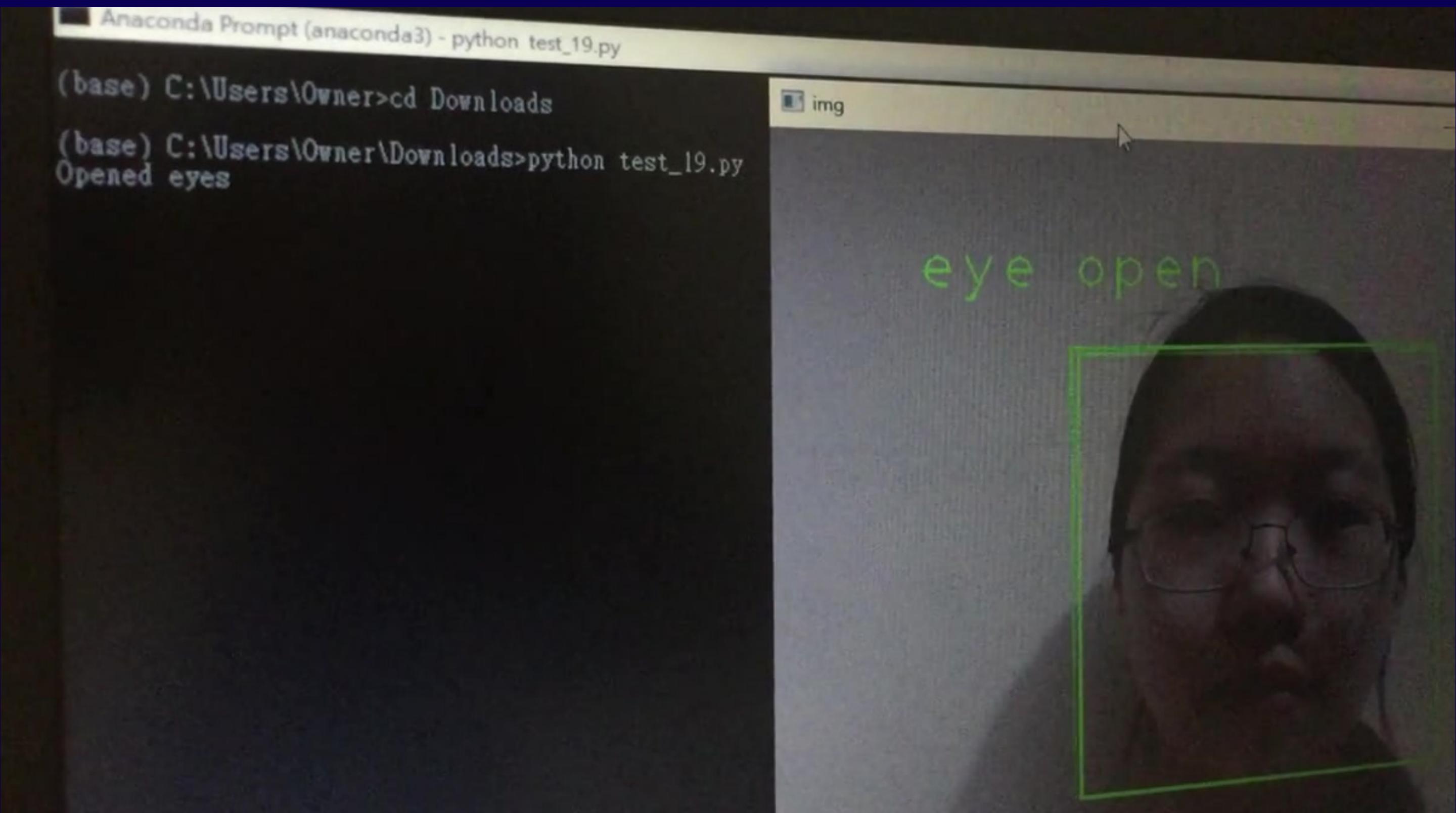


Version_1

Opened eyes
closed eyes
Opened eyes
closed eyes -
Opened eyes
closed eyes --
closed eyes --
Opened eyes
Opened eyes
Opened eyes
Opened eyes
Opened eyes
Opened eyes



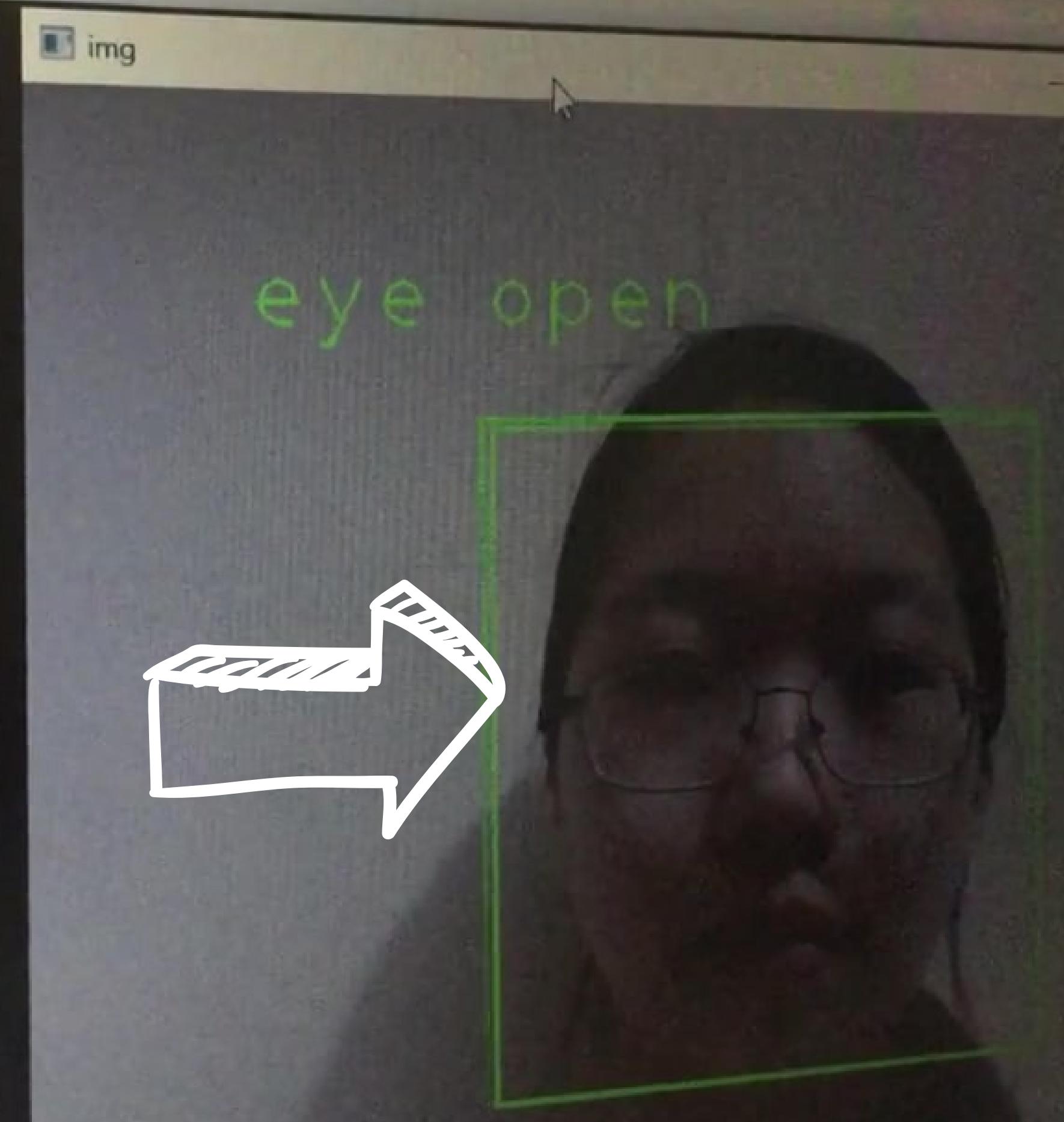
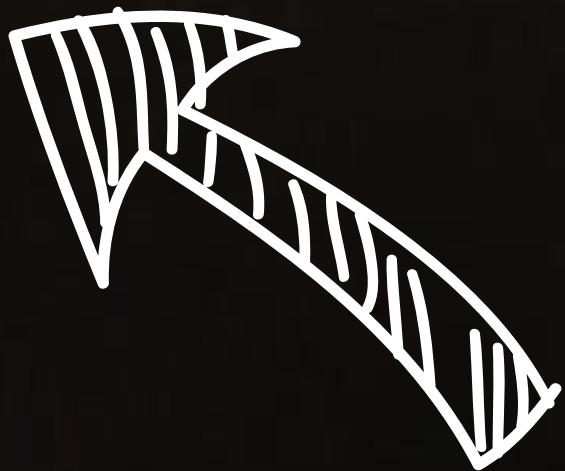
Version_2



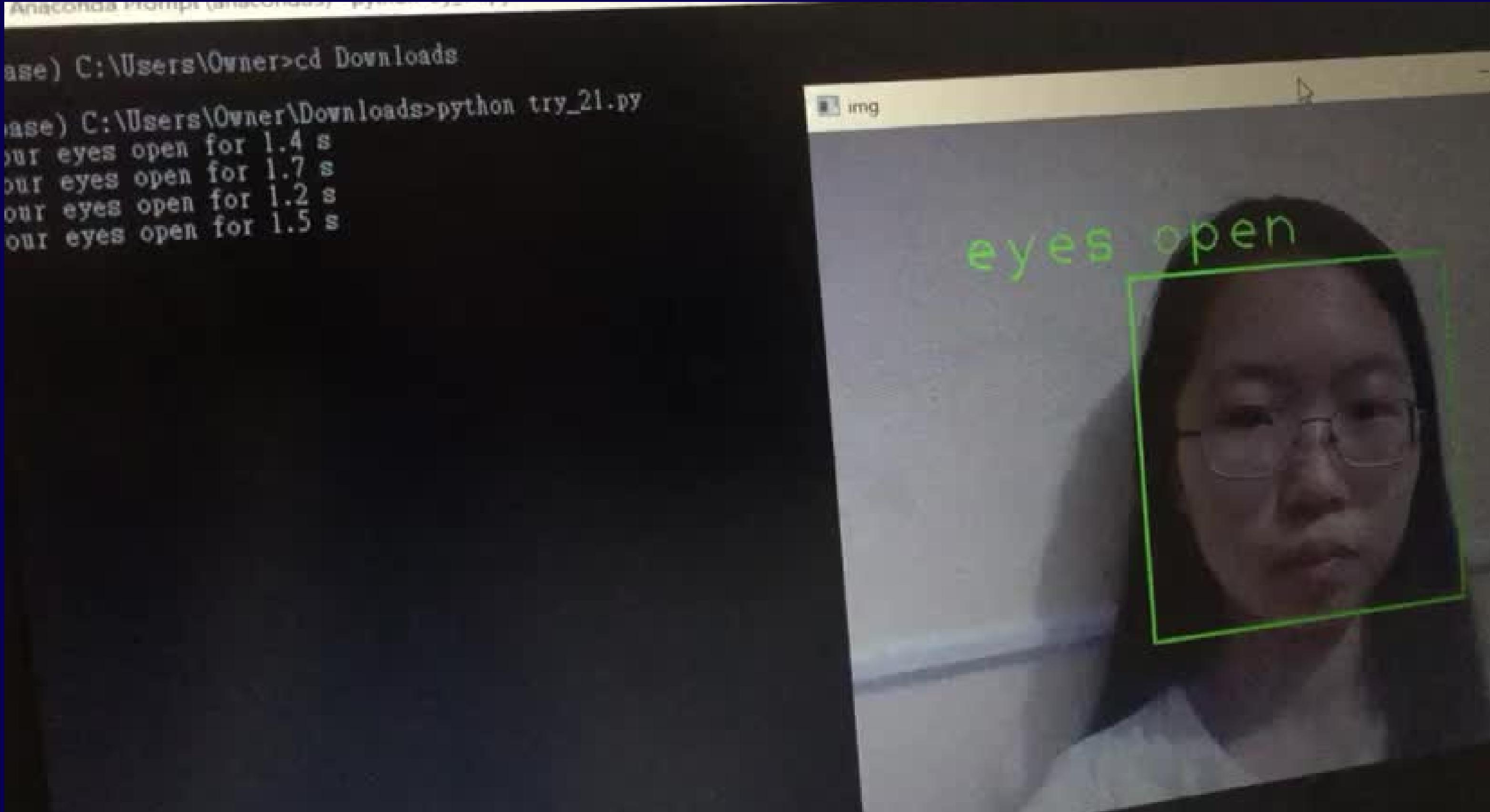
Anaconda Prompt (anaconda3) - python test_19.py

(base) C:\Users\Owner>cd Downloads

(base) C:\Users\Owner\Downloads>python test_19.py
Opened eyes



Final_Version



```
Anconda Prompt (Windows Terminal) 100% 100%
```

```
base) C:\Users\Owner>cd Downloads
base) C:\Users\Owner\Downloads>python try_21.py
our eyes open for 1.4 s
our eyes open for 1.7 s
our eyes open for 1.2 s
our eyes open for 1.5 s
```

img

eyes open

Function_2

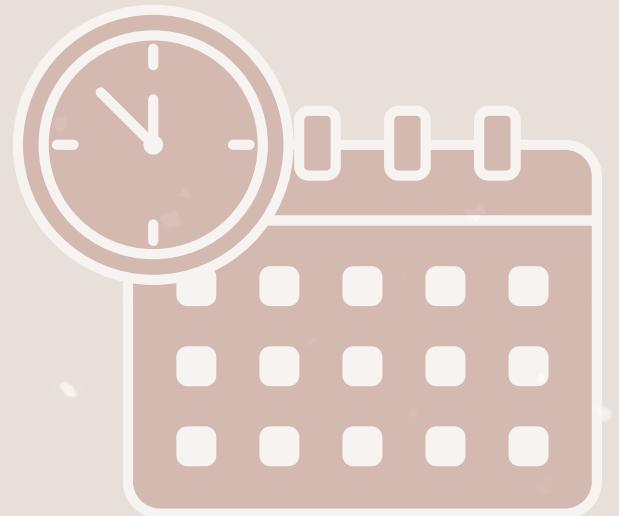
Use AppInventor to detect :
whether the light intensity is appropriate for human eyes.

Function_2

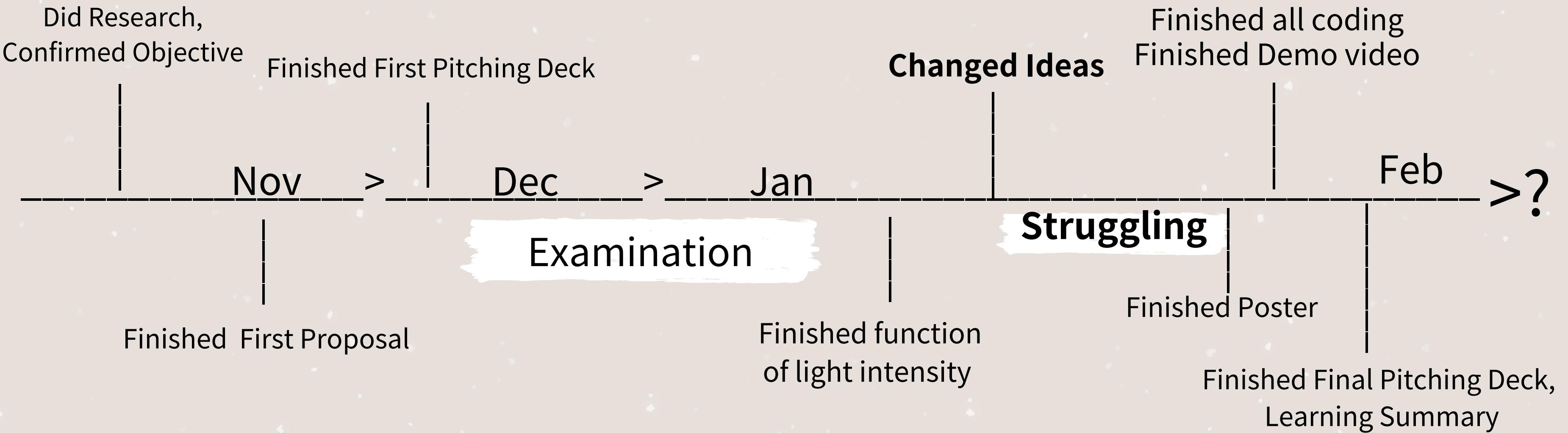
- 1. If detected the user uses the phone without the light,
- 2. send them a message which is about reminding them to turn on the light.
- 3. If they do not do so, just help them to turn on the light slowly and automatically.



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Timeline



Our Future Aspect



Future Aspect



- 1.adding the function of calculating the frequency of blinking**

- 2.combine the first function and the second function into one mobile phone app**

- 3.runs the app in the background without hindering the user from using the mobile phone**

TRACTION

60% of children use computers or mobile phones for more than 3 hours a day, and nine-and-a-half percent of parents worry that their children will develop myopia due to online teaching and reduced outdoor sports.

Therefore, parents will be more focus on how to protect their children's eyes. In order to reduce suffering from the eye diseases, our products can solve the problems.



Target market



Our customers : everyone

- technology is getting advanced
- nearly everyone has a phone
- the time spent facing electronic products is getting longer
- lead to more serious eye diseases,

so everyone is suitable for our product.



COMPETITION

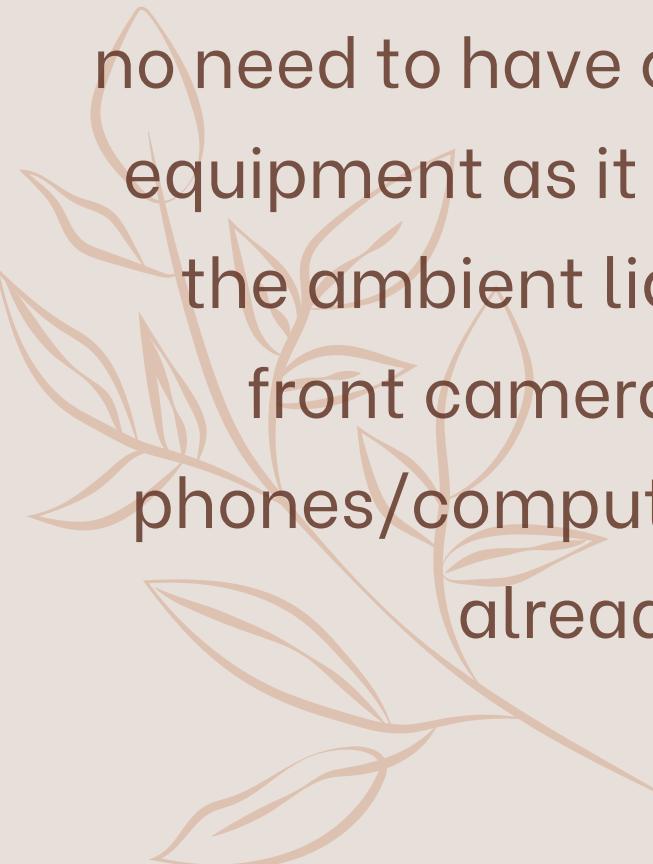


01

ease to use



no need to have other external equipment as it only requires the ambient light sensor/ front camera of users' phones/computer that have already.



02

prevent eye disease



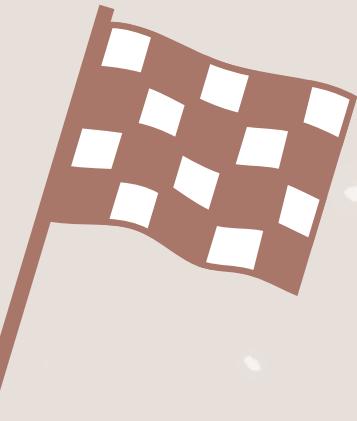
Using the smartphone with suitable light intensity of environment and blinking eye frequently could reduce the rate of worsening eye disease, which probably attracts many users to use as many people

03

free for charge



Our app is going to launch for free, the price of this product is \$0, so it is easy to promote and be more competitive



RISK AND CHALLENGES



01

Misrecognition by AI



the system may remind the users repeatedly and cause them annoyance

02

Unable equipment



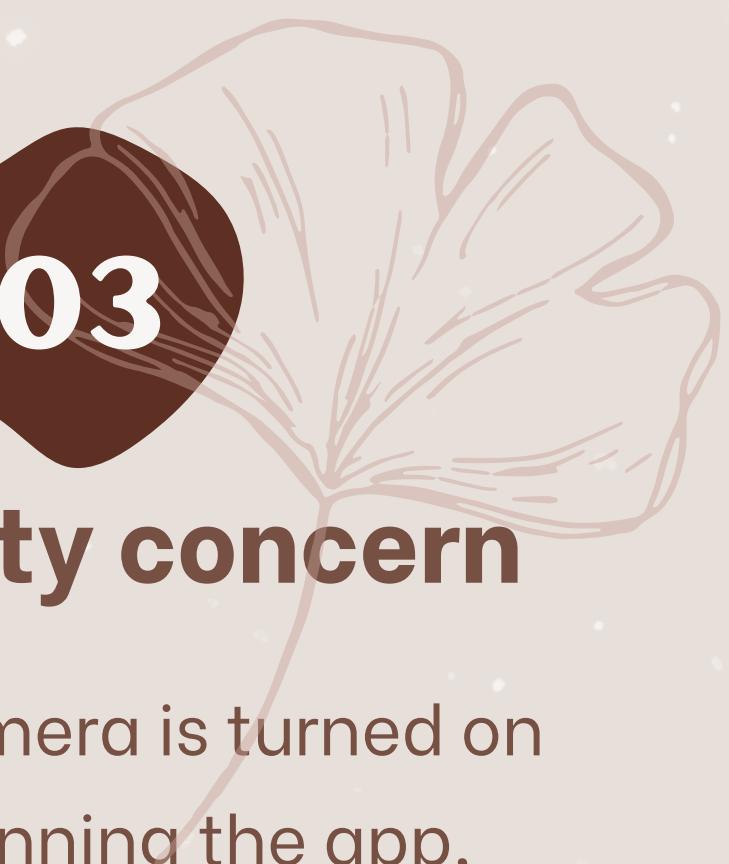
the function of turning on the light automatically (with slowly increasing the intensity of light) requires a light that already has this feature

03

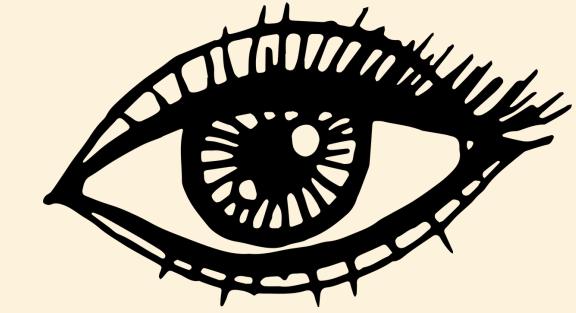
Security concern



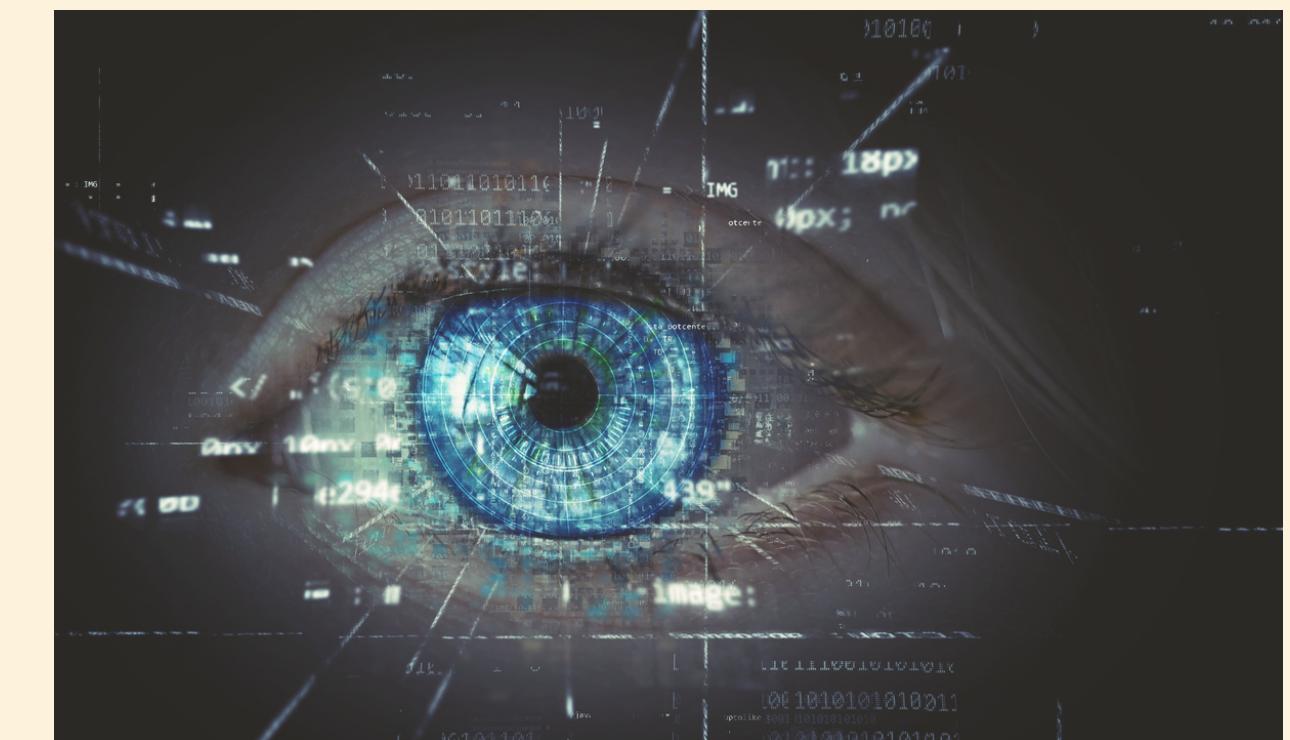
As the camera is turned on while running the app, users may be concerned about whether the data will be stolen or recorded by others.



Aims



We hope that everyone will pay attention to
the impact of eye diseases and do not take it lightly.



Thank you for watching!

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