

**THE GLASGOW
SCHOOL OF ART**



University
of Glasgow

EGGO REST

If distraction is a good thing while
working from home ?

DESIGN PROCESS JOURNAL

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MURAL LINK: <https://app.mural.co/invitation/mural/mscpdestudio/1622524995474?sender=u042933cd6a133ec4a3116325&key=f22314d7-3abe-4f38-885e-0e458fdb2895>

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DISCOVER

01 Background & research

THE DANGERS OF OVERWORK

In 2016, **488 million** people were exposed to the risks of working long hours.



"Between 2000 and 2016, the number of deaths from heart disease due to working long hours increased by **42%**, and from stroke by **19%.**"



In all, more than **745,000** people died that year from overwork that resulted in stroke and heart disease, according to the WHO.

IF YOU WORK MORE THAN 11 HOURS A DAY, YOU..



2.5 x

more likely to develop depression



67%

raise the risk of heart attack



44%

more likely to develop obesity

This does not take into account the lack of sleep, the toll on the social life, fatigue, poor memory.

TYPICAL SCENARIOS (WHF)

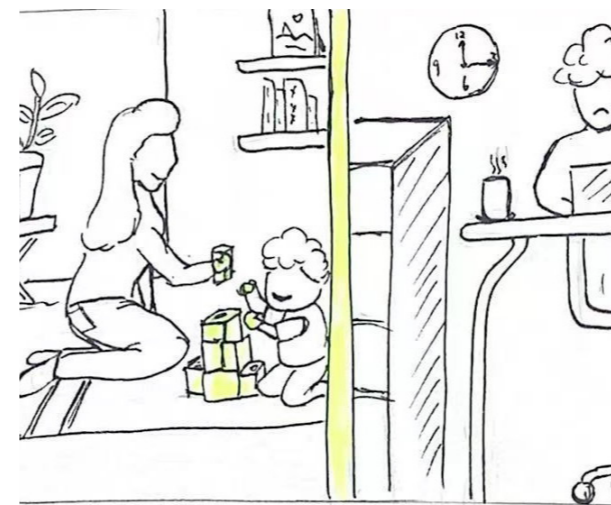
Current situation



1. People living alone
Unstructured work schedule;
blurred her work-life balance.



2. Working couple
Interact with each other; some-
times need personal spaces.



3. Family with a young child
Wait for children to rest before
working; split childcare time.



WFH - Remote workers say they work more than **40 hours** per week **43%** more than on-site workers do.

DISCOVER

02 Results & evaluation

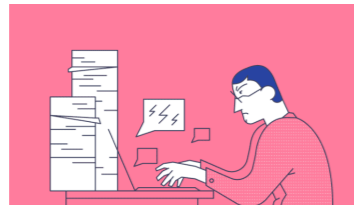
CAUSE OF OVERWORK AT HOME

Motivational



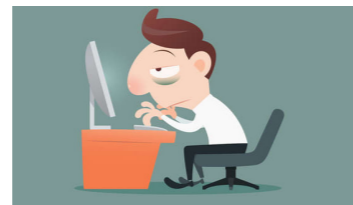
“ Everyone knows someone who’s been furloughed, laid off, or lost their position. I was afraid to become one of them”

Cognitive



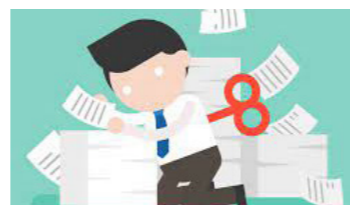
“ The home quarantine has blurred my work-life balance, and leading to disrupted my regular sleep patterns and exercise”

Emotional



“During the COVID-19 pandemic, I have to work more to compensate for the job losses”

Behavioral



“I have a really high-stress job... I’m usually on overdrive”
“I gradually get used to the high intensity of work”

EXISTING PRODUCTS

By recording and comparing the using processes and experiences of them.

| | Daily Planner Book | Eisenhower Method | POMODORO Technique | Freedom | DeskTime |
|-----------------|--------------------|-------------------|--------------------|---------|----------|
| Operability | ✓ | ✓ | ✓ | ✓ | |
| Complexity | | | ✓ | ✓ | ✓ |
| Work Efficiency | | ✓ | | ✓ | ✓ |
| Fluency | ✓ | ✓ | | ✓ | |
| Interestingness | ✓ | | ✓ | | ✓ |
| Decompress | ✓ | ✓ | ✓ | | |
| Functionality | | | | ✓ | ✓ |

SoftWare and APP: more functions, complex system, no helping with relieving the pressure
Handwritten schedule: not accurate in controlling the time spent, the highest level of participation

By observing and interviewing the process and status of people working at home, we can understand the needs and potential problems of different user groups.

User needs



- To monitor and regulate work and rest balance
- Alleviate mood swings
- The positive effects of interruptions and distractions
- Independent working environment
- Reduce stress and improve mood
- Stay productive and creative

Key insight

The main problem is that people sit in front of the computer for a long time without physical and mental relaxation. At the same time, most of the existing products on the market rely on users to complete them consciously, which cannot effectively detach the user from the working state.

Opportunity

A design that allows people to escape from the working state, away from the computer screen or mobile phone and other electronic devices, fully relax the body and mind. Considering the different workplaces, it needs to be portable, easy for people to use and carry to different work station.

PERSONA



A full-time worker, she was forced to work from home after the outbreak. She has a six-year-old boy who has been at home since the school was closed due to the COVID-19.

Goals:

- When she is stressed or worked long hours, ensuring get adequate rest.
- Easy to use and carry to a variety of workplaces.

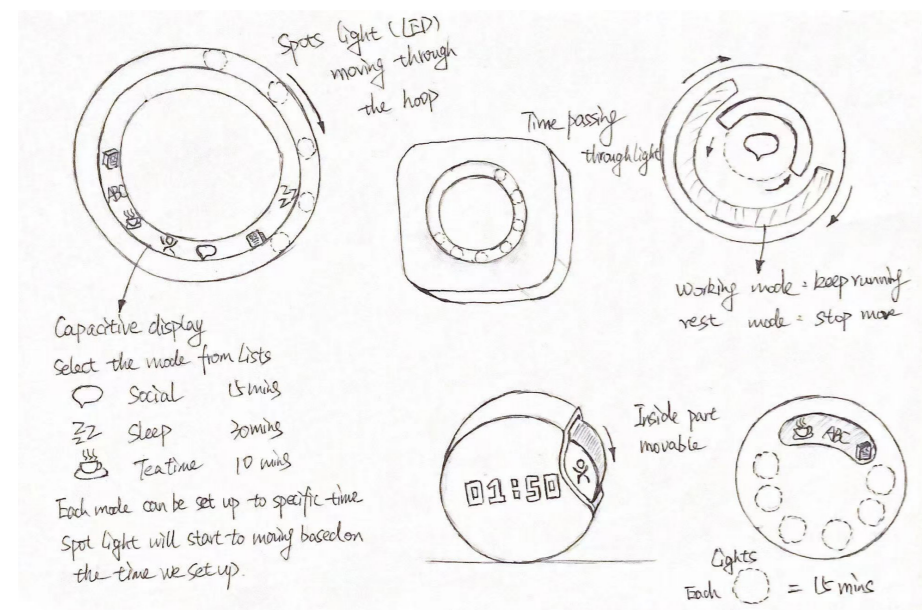
DEFINE

03 Concept development

Based on the needs of users and the design possibilities, it comes up with conceptions and basic technical research of the design. A more detailed process is shown in the Mural.

INITIAL CONCEPT

Design a desktop product that resembles a multifunctional alarm clock. Users can choose the mode they want, such as rest, work, exercise.



Reason:

People need sound to remind them to rest or do exercise, need to be distracted.

Requirement:

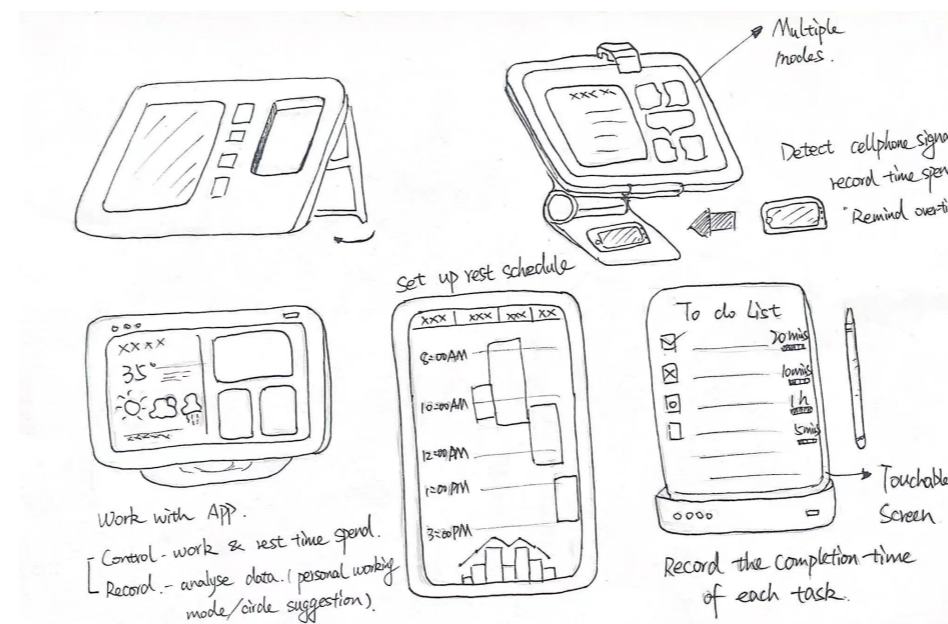
- Users need to set their desired mode and time
- Create visual attraction by changing the colour of the light (LED lights)
- Requires user interaction with the product

Evaluation:

- There is no guarantee that users will follow the mode setting strictly, they are able to turn off the alerts and continue working
- The different mode settings may need to be controlled by the APP

FURTHER CONCEPT 1

Design an intelligent schedule for the housekeeper to monitor and record the daily work process and time using for each task.



Reason:

Users can observe and record the time of focus, and planning a reasonable rest time.

Requirement:

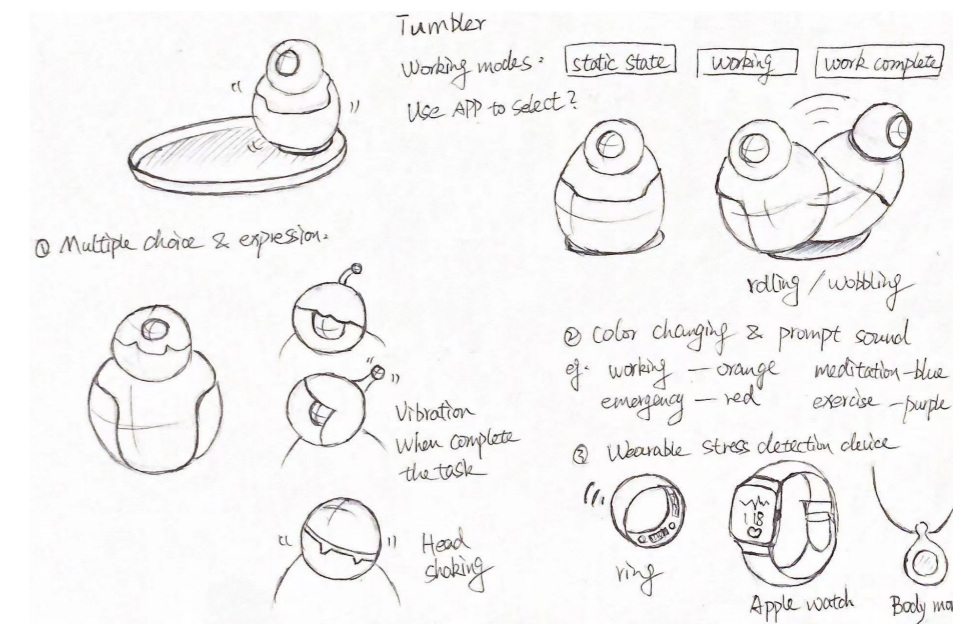
- A touch-screen display is required;
- Allow people to record the completion time of tasks and assigned lists;
- Include switch & sound adjustment button

Evaluation:

- The features are too tedious and take a long time to set up;
- Compared with the existing online APP, the development cost is too high;
- Not considering user's emotional problems

FURTHER CONCEPT 2

Ease people's tension by making the product more interesting, like completing missions to unlock different states and expressions.



Reason:

To attract people to take a break, which further affects people's working habits.

Requirement:

- By changing the centre of gravity of the roly-poly toy to maintain its wing frequency
- The application of human body pressure detection devices and technologies;
- Signal transmission between the wearable device and the roly-poly toy

Evaluation:

- Effectively attract the users' attention, mental relaxation, but it is not physically detached from user's work state

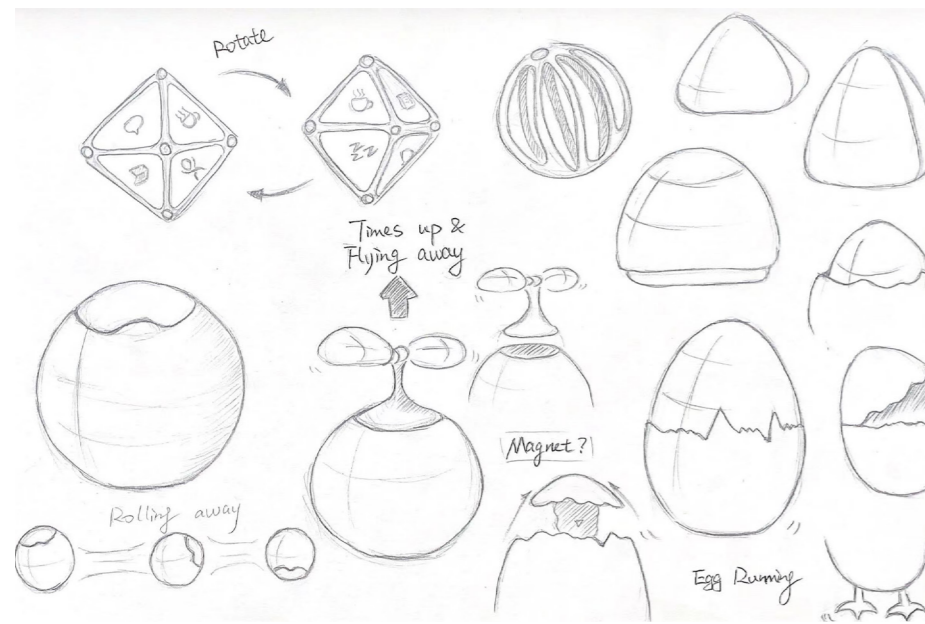
DEFINE

04 Final concept generation

CONCEPT SCENARIO

FINAL CONCEPT

Continuing the idea that can be used on the desktop, further optimizing the appearance and functionality to meet the needs of users.



Reason:

By encouraging users to move away from their desks and break away from overwork state.

Requirement:

- A wearable body pressure measurement device
- Blue-tooth signals transmit and receive data
- Research on technology of product vibration and dis-colouration.

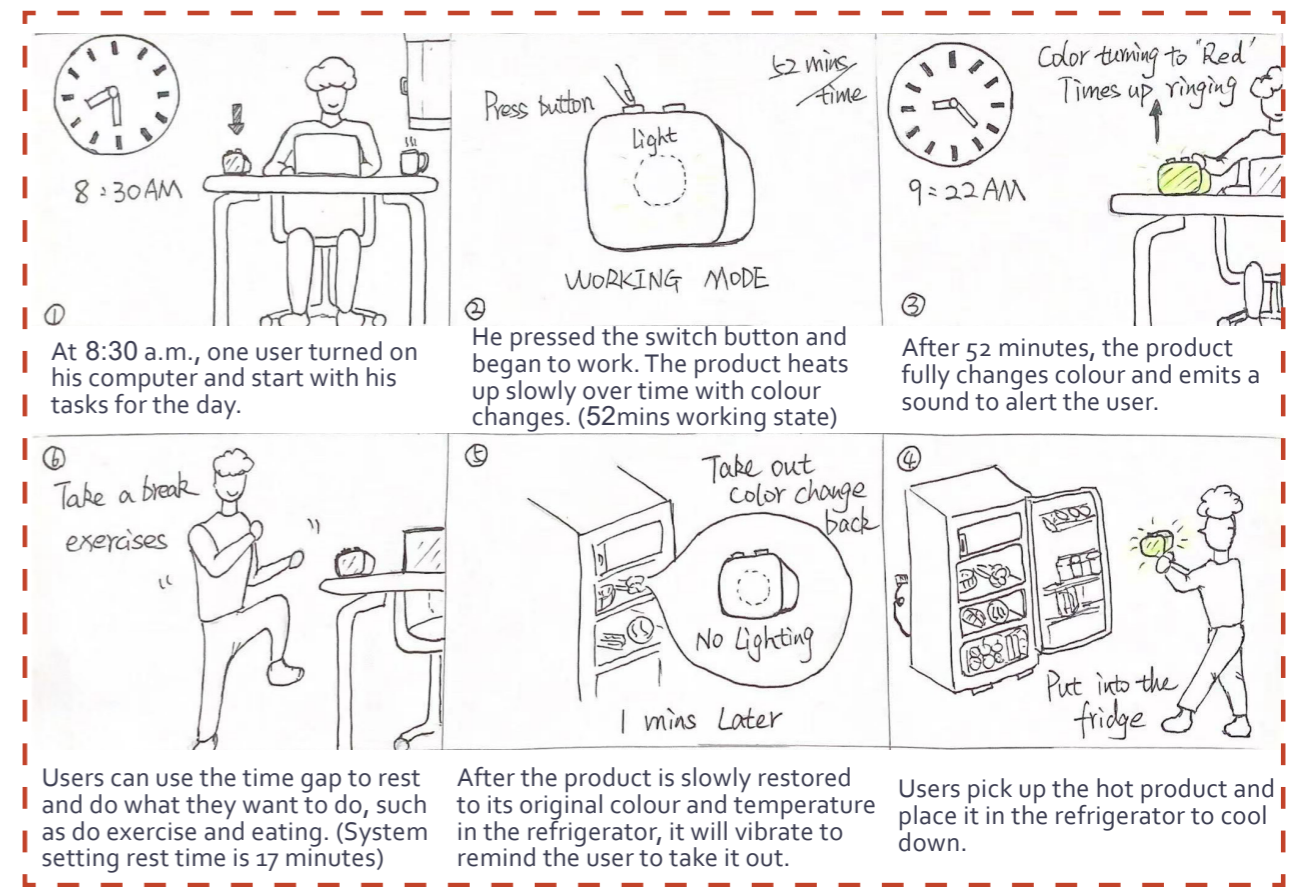
Evaluation:

- Effectively ensure that people switch from work mode to rest mode;
- Capture the user's attention with visual and auditory changes;
- Test and find the best closure method for users

Human pressure detection device conception

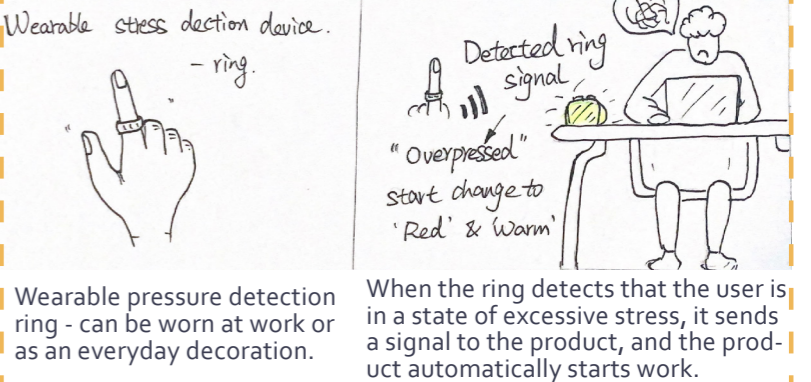


Pressure Detection Method: Due to technical limitations, considering the size of the product and the feeling of use, the wearable detection method is the most appropriate direction.



Two modes:

- Mode 1**-Based on the survey data, the system set the rest time of 17 minutes after every 52 minutes of work.
- Mode 2**-The wearable device monitors the user's pressure change in real-time, and the product automatically starts when the pressure is too high or the working time is too long.



VIDEO PROTOTYPING

Start by trying to simulate using the product with a video record based on the storyboard.



DEVELOP

05 Technology & refinement

The technical part is mainly divided into two directions: the external material of the product (like temperature change colour) and the program that implements functions within the product.

THERMOCHROMIC EFFECTS

"Red Hot" to "Cool Blue"

Reason:

- Visually let the user experience that the colour of the product changes with the temperature
- Increase the rationality of putting the product in the refrigerator or cooling it with cold water
- Increase the users' interest when they interact with the product
- Attract people to take the initiative to leave their works and take a rest;

Principle:

Thermochromic paints and pigments can have an activation temperature, below which they are one colour and above which they are a different colour (Thermochromic Technology | TMC Hallcrest)



Sent an email to ask Marabu about the printing materials.



Transition from coloured to transparent

Following temperature ranges are available:

| | |
|---------|------------------------|
| 0 °C | + 31 °C |
| + 5 °C | + 45 °C |
| + 15 °C | + 60 °C |
| + 18 °C | + 65 °C (upon request) |

In order to be able to produce this effect without the use of bisphenol A, we do not offer change-over temperatures below 0 °C.

Available Colour Shades

| | |
|--------------|-----------|
| Light Yellow | Blue |
| Red | Turquoise |
| Magenta | Black |
| Dark Blue | |

The results of the investigation show that



Refrigerator temperature is generally set at 4°



Indoor temperature is generally 15°-24°



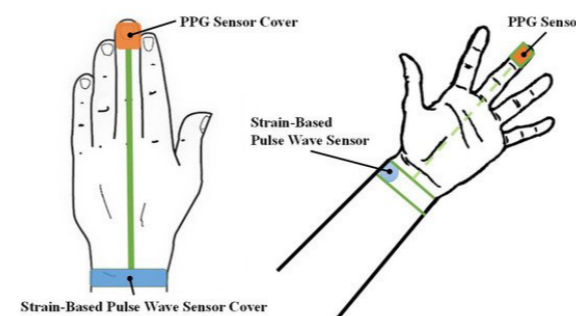
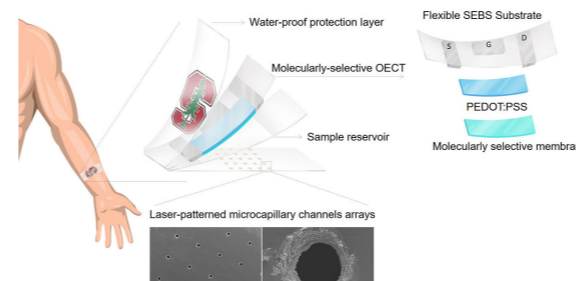
Cold water tap temperature is between 4°-15°

The temperature range around 5°-45° is determined by combining the temperature data and the company's suggestions.

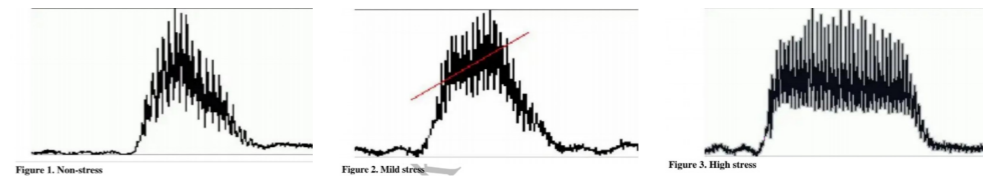
PRESSURE DETECTION

Pressure Detection Method:

1. Voice stress analysis
2. Wearable physiological sensors
3. Blood oxygen/heart rate



Functionality
Resting Heart Rate
Heart Rate Variability (HRV)
Respiratory Rate
Body Temperature



Method One - Computer Voice Stress Analysis (CVSA) is a technology that aims to infer the deception from the stress measured in voice; that is studied is MMT (Micro Muscle Tremors).

Method Two - cortisol is key to tracking stress; use sweat to detect stress typically track temperature, heart rate, and perspiration levels as markers for stress.

Method Three - is to collect PPG pulse wave and ECG electrocardiograph signals at the same time to analyse the status of autonomic nerve to determine the fatigue degree of the body.

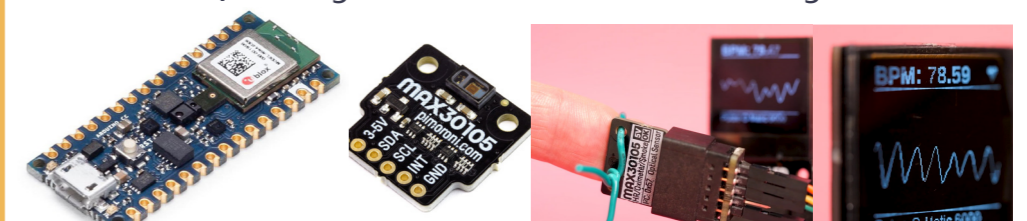
Reason:

Based on the three common methods in the market, after comparing the user's simulated experience, the heart rate measuring ring is selected as the final wearable detection device.

- There is no need to keep talking to capture Micro Muscle Tremors due to specific quiet situations and crowds;
- Cortisol is a useful method, but it is not applicable to WFH, because it tends to be a sportsman or outdoor worker.
- Due to the miniature size of the ring, it received unanimous praise by the interviewers;
- As well as aesthetic and comfort design, no need to take it often

Prototype considering:

Due to cost and technical limitations, I considered using Arduino and program to simulate the functionality inside the product (like using MAX30105 sensor to measure user's heart rates).
- Attach the sensor to the fingertip (the fleshy side) with a piece of wire or rubber band looped through the mounting holes on the breakout, it will get much more reliable readings.



DEVELOP

06 Prototyping & testing

This part mainly shows the development process of the prototypes and the testing of the temperature change pigment. The functional and technical tests and operations are described in more detail in the technical report.

APPEARANCE & FORM

Considerations:

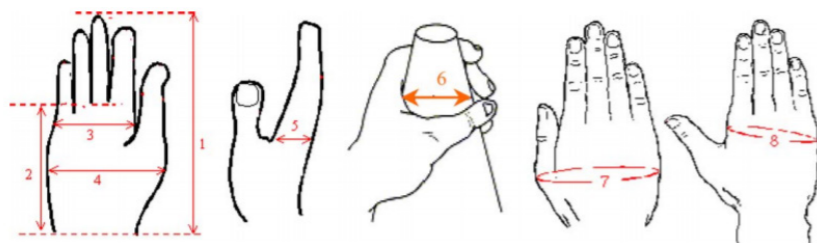
- Consider the application scenario of the product: different room, design more portable and easy to use product
- A variety of operating modes to balance the distribution of people's work and rest time
- The iterative conceptions of appearance is concise & amusing



Physical testing and user experience:



Y.A.A. Mohammad / International Journal of Industrial Ergonomics 35 (2005) 747-754



1. Hand Length
2. Palm Length
3. Hand Breadth
4. Maximum Hand Breadth
5. Hand Thickness
6. Grip Diameter
7. Maximum Hand Circumference
8. Hand Circumference

(Data shows on Mural)

From a geometric shape to a round shape, through the process of physical testing and user experience. In addition, based on the ergonomic data support, the final determination of the 'egg' form is the most suitable for the user's hand to hold and take.

THERMOCHROMIC PAINT TESTING

Based on the previous research of thermochromic pigments, it is found that these pigments have limited requirements for printing materials. After contacting the company that produced the paint, it was found that the paint was difficult to be printed on the silicone material. At the suggestion of the technical supervisor, it decided to print on other materials and pasted it to the inside of the silicone shell to realize the colour change function.

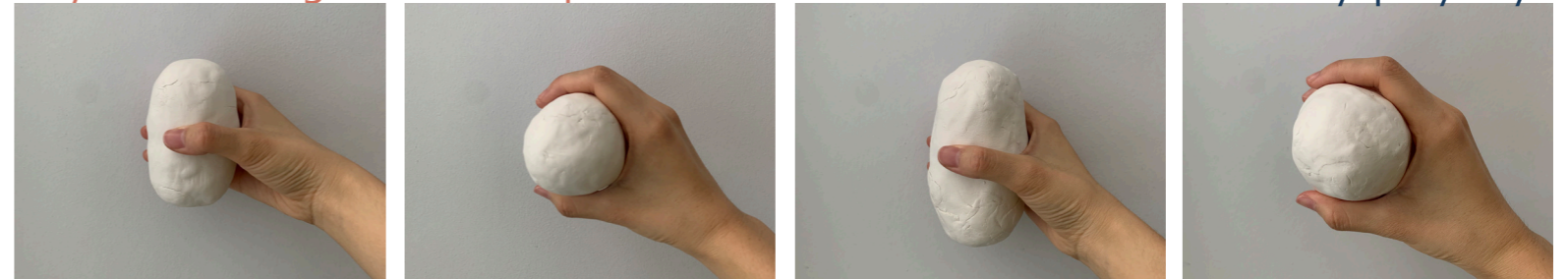


Final conceptions of form:



Inspired by roly-poly toy

Physical testing and user experience:



Based on the experience and research, the product size is determined to be between 8-8.5cm x10-10.5cm. In addition, according to the structure and size of the internal parts of the product, the final size of the product needs to be adjusted.

DELIVER

07 3D CAD model & rendering

THERMOCHROMIC EFFECTS

External design:

- Silicone shell - relax body and mind from the tactile decompression material and meet the premise of making the tumbler
- Bottom shell - ABS plastic, low production cost and lightweight

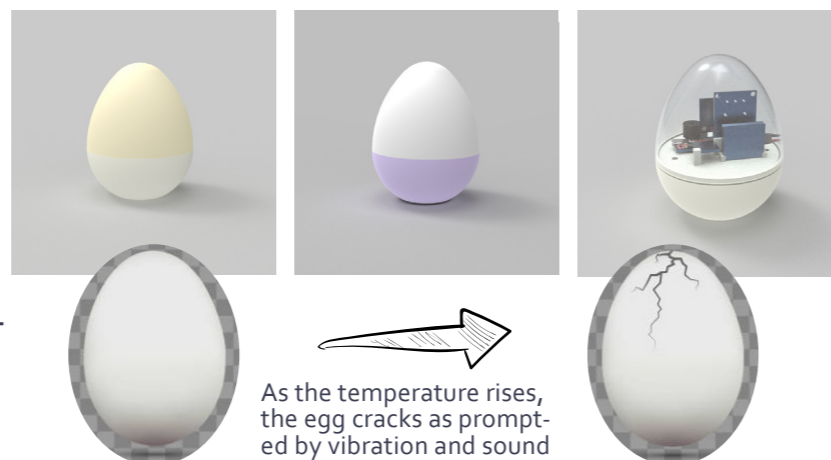
Internal structure:

- **MicroController** - Controls functions by setting the program
- **Vibration & buzzer** - Attracts the user's attention to remind people that the current mode is complete.
- **Heating element** - The change of temperature brings users a more intuitive sense of touching experiences. At the same time to satisfy the colour change of shell pattern.
- **Tilt sensor & temperature sensor** - Assist in the operation and use of functions. The sensor detects the user shaking the 'egg' and suspends the background operation to achieve the purpose of reminding rest in the first stage.
- **Wearable ring** - Existing technologies are used to detect various human health indicators, such as heart rate, body temperature, Respiratory Rate. (OURA RING Company product)
Data is transmitted to the Microcontroller through **Bluetooth** for background monitoring and comparison of health indicators.

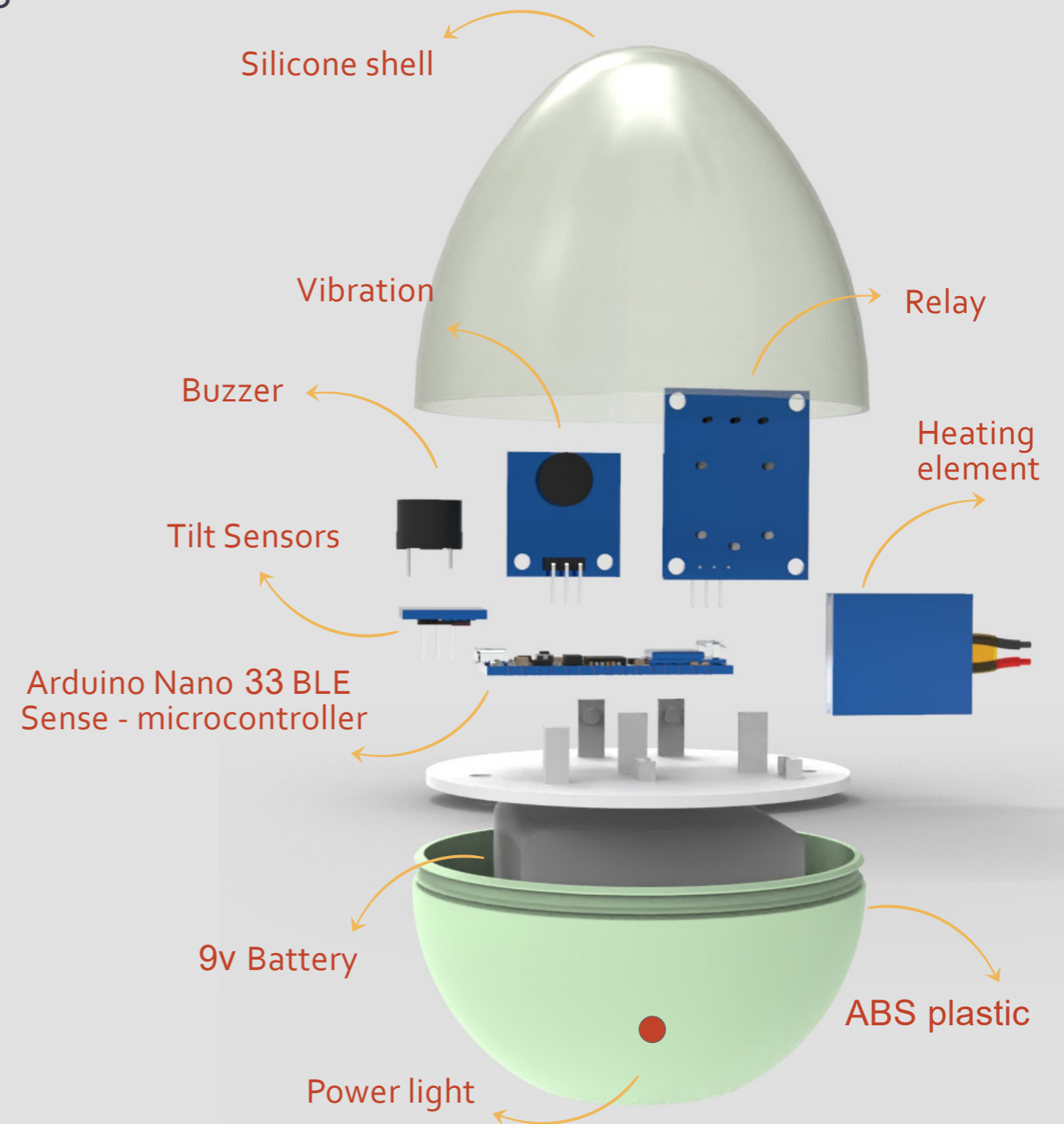
Feature & dimension:

Shell-10cm X 8cm (H x W)

- A variety of colour options
- The pattern of broken eggshells showing through temperature change.



COMPONENTS



Wearable ring
Detecting users'
pressure



DELIVER

08 User journey

Mode 1 is mainly based on the results of comparison between the data of pressure detection and the background, and higher than the predetermined pressure value will be considered as excessive pressure. The system will start automatically, the EGGO begins to heat up and the pattern on the shell gradually emerges. (More technical details - please check the Technical Report for circuit link design and Arduino connection.)

STAGE 1

The function is triggered by a heart rate detector, which maintains real-time monitoring of human health.



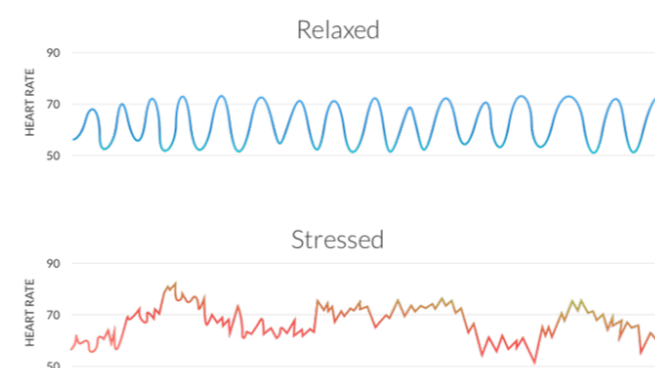
Users wear the detecting ring on a daily basis



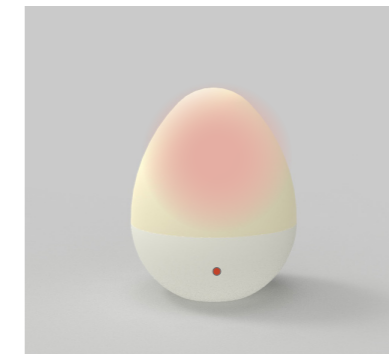
The user turns on her computer and get ready for today's work



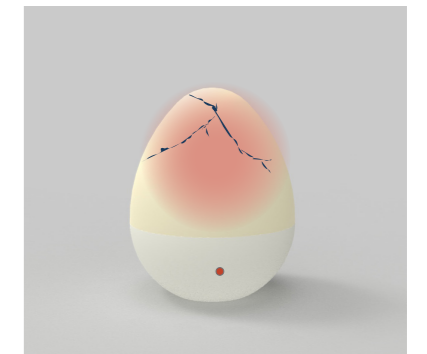
Time passed quickly, two hours later



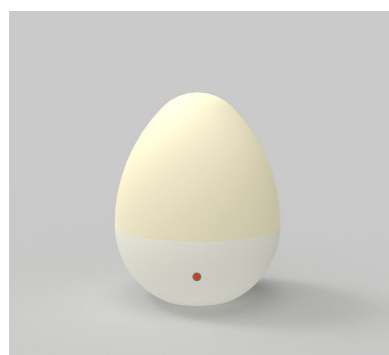
The ring detects abnormal heart rate, excessive stress and starts the EGGO Rest



EGGO start to work and the temperature goes up



The EGGO shell shows a pattern of cracks, accompanied by sound and vibration



After the break, take out the EGGO and start a new round



Temperature sensors inside the EGGO detecting a normal temperature and stop shaking and sound



Use this time to rest, such as reading, eating, or exercising



Users need to pick up the EGGO and place it in the refrigerator



After 5 minutes, the sound and vibration begin again



Shaking EGGO start Level 1 reminder - 5 minute intervals for functionality to pause



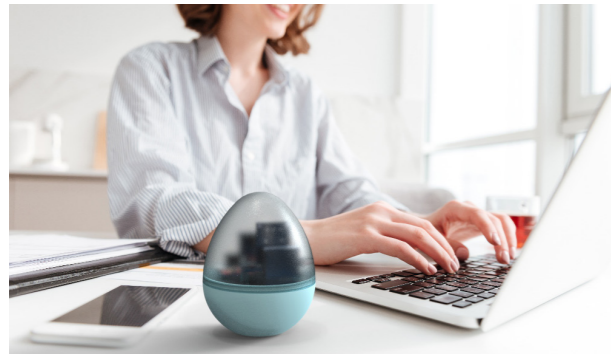
DELIVER

08 User journey

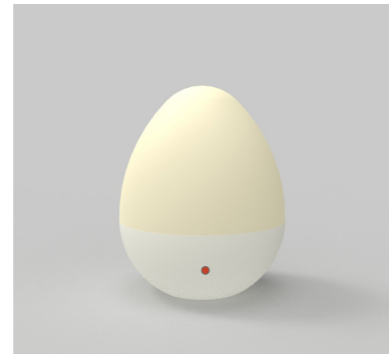
Mode 2 has no wearable pressure measurement, and the program is directly programmed to work for 52 minutes and rest for 17 minutes. Except for this difference, the functionality is the same as in Pattern 1. The specific time value is set from the early research results, based on the background system statistics users can focus on the reasonable work and rest time collocation.

STAGE 2

The function is triggered through the user to turn on the switch, set a work-rest ratio of 52:17 mins



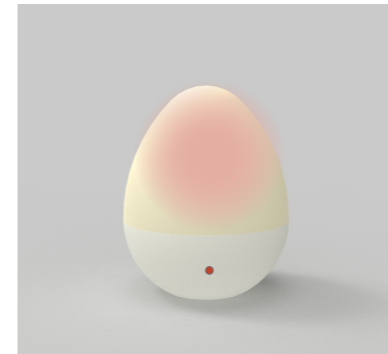
User turn on her computer and get ready for today's work



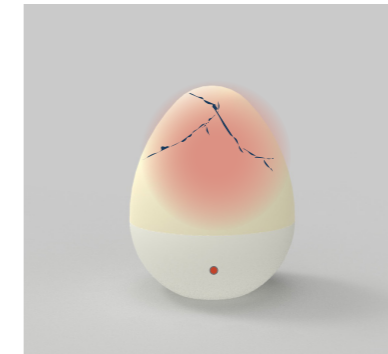
Tap the shell and the EGGO power is turned on



Time passed quickly, 52 mins later (system setting)



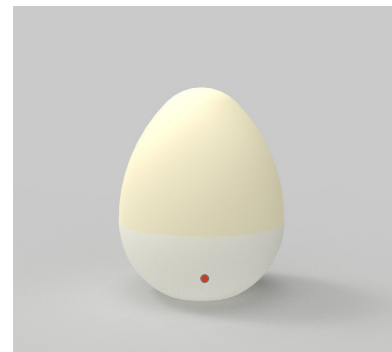
EGGO start to work and the temperature goes up



The EGGO shell shows a pattern of cracks, accompanied by sound and vibration



Shaking EGGO start Level 1 reminder - 5 minute intervals for functionality to pause



After the break, take out the EGGO and start a new round



Use this time to rest about 17 mins, such as reading, eating, or exercising



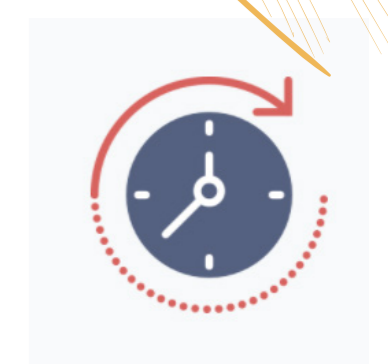
After 17 mins, EGGO returned to a normal temperature and started shaking and sound to remind the user to take out.



Or users can hold the EGGO and flush it with cold water



Users need to pick up the EGGO and place it in the refrigerator



After 5 minutes, the sound and vibration begin again



SUMMARIZE

10 Reflection

SUMMARY

As a desktop product, EGGO can be flexibly used in various scenarios. And help users better develop work and rest habits, by getting people out of the mode of overworking and unhealthy work habits. In discussion with the technical supervisors, Kevin was interested in its feature. Based on his daily work status, he looks forward to using and experience it, which can effectively remind him to take a rest.

Compared to existing designs on the market, EGGO encourages users to move away from the computer more effectively by increasing interaction with the product. At the same time, the broken eggshell pattern, further deepen the user's tension and sense of substitution. Let people take the initiative to realize the importance of taking a rest, and through visual, tactile and auditory cooperation, to the maximum extent to meet the user's experience. Although many technical details of the design need to be completed, EGGO is feasible in actual production and meets the user's requirements.

FURTHER WORK

Due to the limitations of time and technology, many design details need to be further improved. At the same time, the data in the user simulation scenario test is insufficient. Based on the universality of the user group, people of different ages need to experience and analyze the usage feelings. There were also several technical problems with the programming and control capabilities of Arduino. For example, Arduino series components are used in the construction of Prototype, and IC chipboard with lightweight and small volume is used in real life. In addition, the method of user stress detection is based on the measurement of the user's heart rate changes, although this data has a certain theoretical background to support it, more accurate data and detection results are needed.

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