Serious Games Addressing The Issue Of Workplace Violence/
A Research Of Squeeze Interaction

WORKING PROCESS HTTPS://YOUTU.BE/C8YORLWTFTY
GAME PROCESS HTTPS://YOUTU.BE/MQROOH9-SNK

MAIN SOFTWARE :

SQUEEZE FROM DREAM

2025.1–2025.10

4#

GitHub open-source library

A PERSONAL OPEN-SOURCE PROJECT

OVERVIEW

This project is a human-computer interaction research project that combines game design. Its inspiration comes from workplace violence (bullying at work). Its core objective is, on the one hand, to provide a low-cost and highly user-engaged solution for similar psychological disorders; on the other hand, it also offers a technologically innovative perspective for optimizing the therapeutic effect and user experience of serious games.

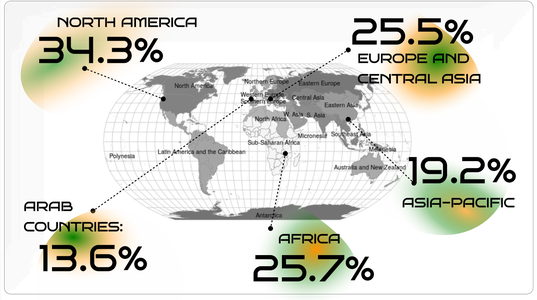
BACKGROUND

WHAT'S WORKPLACEVOILENCE

Workplace violence is any physical abuse, intimidation, harassment or threatening behavior that occurs in the workplace; It covers a range of acts from verbal abuse to homicide. Among the perpetrators, those who commit workplace violence include relatives of patients, patients, staff and managers

PROBLEM SCALE

Approximately 740 million people worldwide (estimated based on the global labor force) may have experienced at least one form of violence or harassment in the workplace. Its occurrence rate among workers is much higher than what is generally believed.



The percentages in the chart represent the approximate proportion of people in each region who have experienced "violence and harassment" (including physical, psychological, and sexual harassment, etc.) during their working lives as indicated by the survey.

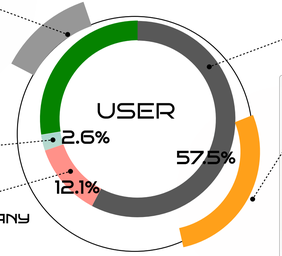
USER STUDY

USER GROUP DATA

Among the groups that have suffered from workplace violence, a large number have concealed the relevant circumstances for various reasons, and often accompanied by mental illnesses and suicidal tendencies.

40%

Among the employees who reported workplace bullying, approximately 40% indicated that they subsequently suffered retaliation / were treated unfairly at work.



CHOOSE TO ENDURE OR IGNORE

REPORT TO THE GOVERNMENT AGENCY

REPORT TO THE COMPANY OR THE UNION

15.6%

Among those who have suffered workplace violence, 15.6% have contemplated suicide.

USER INTERVIEW

1. STUDENT INTERN

"I have been bullied twice in my two long term jobs. My first job a girl befriended me ... then she starts to randomly turn on me by telling my boss 'the mistakes' I made to purposely undermine me ..."

2. TEACHERS ON THE JOB

"I was just bullied by my boss yesterday for stepping away from my phone for an urgent family emergency. Yelled at me in front of the office, ... He definitely had some choice words for me ... I came home crying last night ...

3. CLINICIAN

"Geriatric patient ... woke her up ... cussed me out, grabbed my arm, scratched me, kicked me and hit me ... When I tried to clean her up ... She would mock me and call me inappropriate names.

During the interview, I also gained a thorough understanding of the situation and needs of the relevant group.

RESEARCH

SERIOUS GAMES

Serious games, as an effective solution to workplace violence, have a highly overlapping user base and offer lower costs as well as a better user experience. This makes it an excellent solution for a user group with relatively mild symptoms.

THE USER GROUP OF WORKPLACE VIOLENCE

20-30 years old

People related to healthcare, education, social services, and public administration

CORE OVERLAPPING USER GROUP

THE USER GROUP OF SERIOUS GAMES

accounts for more than 50% in both of the two main groups.

Highly overlapping core users

THE ADVANTAGES OF THE SOLUTION

The Average Cost Of A Psychiatrist Visit Generally Runs Between

$100 – 300 Per Session

The Average Cost Of The Serious Games Generally Runs Between

$20 – 30

Reduce costs by approximately 75%

THE ROLE OF PHYSICAL HARDWARE IN SERIOUS GAMES

MOUSE/ KEYBOARD

Greater Immersion And User Engagement?

MOTION CONTROLLER

previous research on the design of educational games for children with autism has shown that special hardware that aligns with users' perceptions seems to have a certain impact on the effectiveness of the games.

CONCEPT

COMPRESSION-STYLE INTERACTION

The squeezing-style interaction utilizes an interaction method that mimics human natural behaviors, thereby strengthening the path for activating the emotional experience of the game.

AUTISM
relief symptom

ANXIETY DISORDER
relief symptom

relief symptom
PTSD

SEQUEEZE INTERACTION

in cases of individuals with autism, anxiety disorders, and post-traumatic stress disorder (ptsd), it has been demonstrated that sensory stimulation through squeezing can produce a certain degree of calming effect (grandin, 1992).

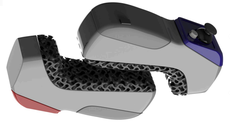
CBT THERAPY AND GAMES

Integrating CBT therapy into serious games can effectively enhance their therapeutic effects.

CBT	GAME
REVEALING COGNITIVE DISTORTIONS	DISCOVER THE DIFFICULT PUZZLES IN THE GAME
COGNITIVE RESTRUCTURING	RECONFIGURE THE SCENE WEATHER
DREAMS EXPOSED AND REWRITTEN	ELEMENTS OF A MULTI-FUNCTIONAL WORKPLACE

DESIGN SYSTEM

By designing a game interaction system that combines software and hardware, and through interaction methods that are more in line with human perception, interaction between humans and machines can be achieved.



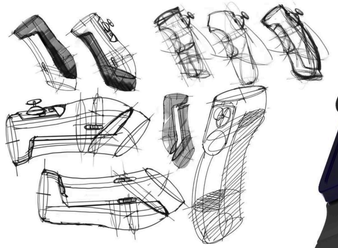
HARDWARE SYSTEM

SERIOUS GAME

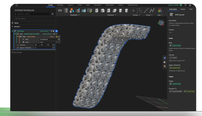
PRODUCT DESIGN

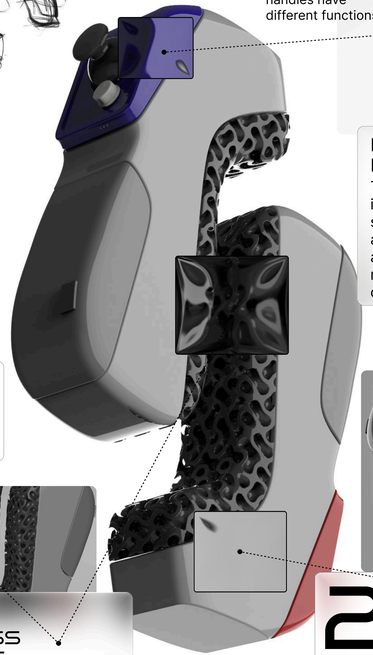
Software: rhino 8

CIRCUITS AND PHYSICAL OBJECTS



Early product concept sketches





The left and right handles have different functions.

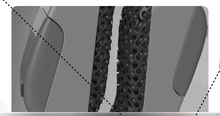
REMOTE SENSING HANDLE

The right-hand handle integrates remote sensing, a gyroscope and a button, which are used to control the movement of the game character.

1

3D HOLLOW STRUCTURE

Special flexible 3D printing materials and mesh structures



3 COMPRESSION POINT

After grasping, it can be pressed at any time. The bottom is equipped with a pressure sensor, enabling the compression data to be collected.

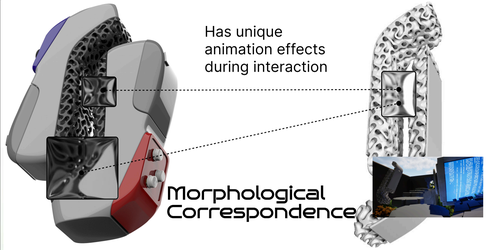
2 PUSH-BUTTON HANDLE

The left-hand handle is equipped with a large number of interactive buttons, which are used for controlling menus and other functions.

GAME DESIGN

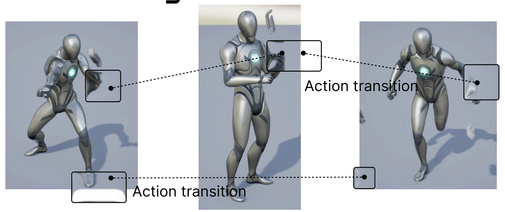
Software: UE 5

PRODUCT CORRESPONDENCE



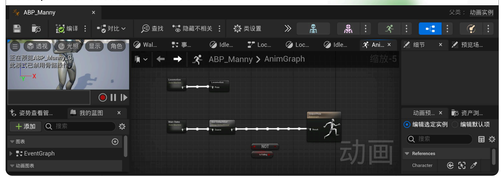
Created smooth menu animations and corresponding character interaction weapon designs that corresponded with the functions and hardware.

Action Design



Add special actions to adapt to different interaction behaviors, and use the dynamic blueprint of characters for control.

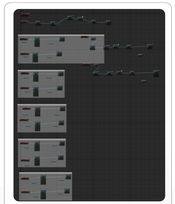
Action Transition



GAME INTERFACE

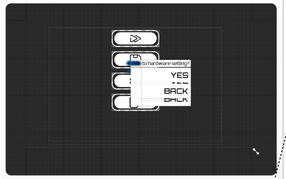
MENU UI DESIGN

The menu interface has five buttons, all of which have a simple hover effect.



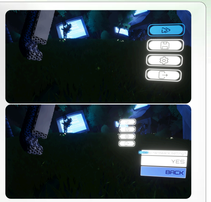
The menu hover animation is controlled by the blueprint and points to the destination waypoint.

INTERFACIAL DESIGN



The interface that floats around the character was adopted, and some VR effects were referenced.

Created smooth menu animations and corresponding functions

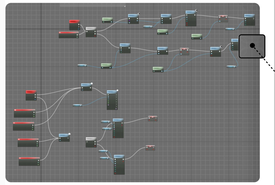


CORE GAME INTERACTION

This section covers the core interaction design process and interaction effects of the game.

PRODUCT OPERATION

Level One Interaction Process



Level two Interaction Process

Collect real-time data generated during the gameplay through the hardware components, and send it to the UE via ports, and complete the reception using blueprints.

SCENE INTERACTION

Level One Interaction Process

In the game, it checks whether the values received from the sensors meet the conditions. If the conditions are met, an interactive effect is triggered and the event is distributed to the scene.

SCENE INTERACTION

Level two Interaction Process

The huge guidance prompts players to interact with the scene.

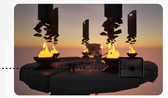
INTERACTION RESULTS

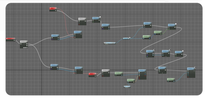
NIGHT SCENE WITH FOG

SANDSTORM SCENE

SUNNY DAY BEFORE REACHING THE END

After the interaction is completed, the blueprint of the level will be more adaptable to the current situation and progress, modifying the game's weather and scene composition.



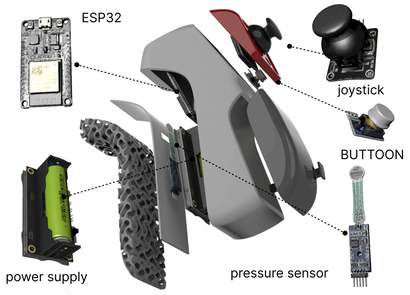


ANIMATION PLAYBACK

After the interaction is completed, the blueprint controls the sun to rise and plays the game's ending cutscene animation.

INTERACTION TECHNICAL

CIRCUIT SYSTEM DESIGN



The handle is integrated with a relatively complete set of handle functions. To accommodate the interaction of squeezing, it combines flexible materials and pressure sensors.

HARDWARE PROGRAM

JOYSTICK CODE (1)

DUAL HARDWARE COLLABORATION

Each hand is responsible for different functions and is controlled by different code blocks.

DATA TRANSMISSION

The data will be shared first to the right-hand controller, and then the right-hand controller will send it via the local network to...The data will be shared first to the right-hand controller, and then the right-hand controller will send it via the local network to the PC.

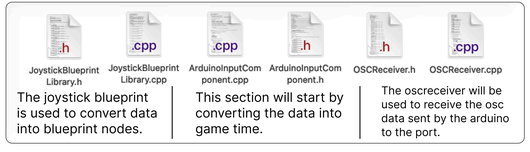
JOYSTICK CODE (2)

OPEN-SOURCE CODE

this project also includes a method of controlling the internal interaction of the ue game using osc signals through arduino and hardware. all the related codes have been converted into usable blueprints.i believe this will be very helpful for some designers who have requirements for interaction between software and hardware.

UE DATA RECEPTION SCRIPT

In order to process the sensor data sent to the port and make it more usable by the blueprint, I used AI assistance to complete the programming of a simple UE script.



The joystick blueprint is used to convert data into blueprint nodes.

This section will start by converting the data into game time.

The oscreceiver will be used to receive the osc data sent by the arduino to the port.

EXPANDING EXPERIMENTAL/RESEARCH

EXPERIMENTAL OBJECTIVE

In Order To Further Quantify The Impact Of Changes In The Interaction Method On The Performance And Psychological And Physiological Responses Of Actual Users During The Usage Process, And To Verify The Feasibility Of The System, The Following Experiments Were Conducted.

LAB PROC

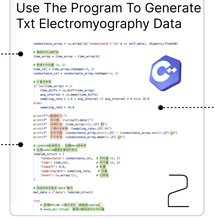
During The Experiment, The Subjects Wore GSR Sensors And Completed Two Tasks: Standard Interaction And Squeezing Interaction. The System Recorded The Skin Electrical Signals In Real Time.

1

Control Group 1: Using The Joystick

Control Group 2: Using Keyboard

Use The Program To Generate Txt Electromyography Data



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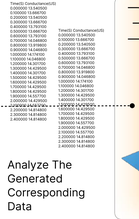


Analyze The Generated Corresponding Data

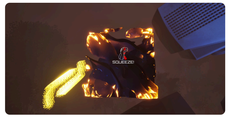
3

MAT LAB

EXPERIMENTAL PRINCIPLE

Skin Electrical Response, Also Known As Skin Electrical Activity, Is A Common Physiological Indicator That Reflects An Individual's Emotional Arousal, Attention Level And Cognitive Load.

When A Person Is In A State Of Tension, Surprise, Immersion Or High Concentration



Activation Of The Sympathetic Nerve → Secretion Of Small Amounts Of Sweat By Sweat Glands → Increase In Skin Conductivity.

Measure The Resistance (R) Or Conductance (G = 1/R) Between Two Points On The Skin

$$GSR(t) = SCL(t) + \sum SCR_i(t)$$

GSR Is Mainly Controlled By The Sympathetic Nervous System (SNS) And Is Influenced By Emotional Arousal. The Related Responses Can Be Classified Into Two Categories:

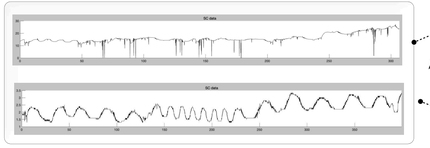
SCL (Skin Conductance Level)

SCR (Skin Conductance Response)

EXPERIMENTAL DATA

SC DATA

The Original Skin Conductance (SC) Data

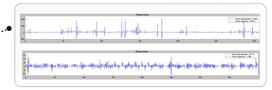


CDA Uses Deconvolution To Obtain The Hidden Neural Driving Signals, And Thereby Obtains The Amplitude, Time, Area, And Other Characteristics Of Each SCR.

$$SCL(t) + \sum_i SCR_i(t) = G(t)$$

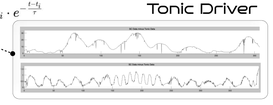
$$SCR_i(t) = a_i \cdot e^{-\frac{t-t_i}{\tau}}$$

Phasic Driver



The Line Represents The Overall Trend Of Changes In The Skin's Electrical Conductivity Level.

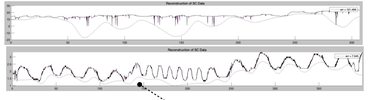
Tonic Driver



The Blue Line Shows The Intensity And Timing Of Each Skin Electrical Response Event.

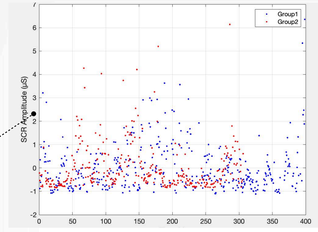
DATA PROCESSING

Reconstruction Of SC Data



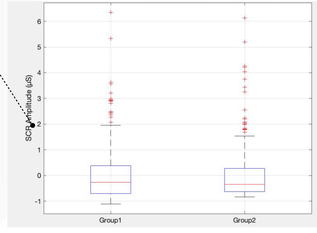
Read The TXT Data Exported By Two Sets Of Ledalab, And Extract The Reaction Time And Amplitude Of SCR.Then, Through Statistical Analysis And Significance Tests (T-Test, Mann-Whitney Test), Compare The Differences In Physiological Responses Between The Two Groups.

The Analysis Code In MATLAB



Time Series

Present The Trajectory Of SCR Amplitude Over Time, Which Is Used To Observe The Dynamic Characteristics Of The Two Groups Of Reactions.



Boxplot

Show The Overall Distribution Of The Amplitudes Of The Two Groups, Which Can Intuitively Reflect The Differences Between The Groups.

RESEARCH RESULT

FINAL CONCLUSION

SCR-Amplitude

Group1:
3.0E-07 ± 1.0

Group2:
2.2E-17 ± 1.0

SCR-Onset

Group1:
152.37 ± 87.5 S

Group2:
199.49 ± 115.8 S

The Line Represents The Overall Trend Of Changes In

Mann-Whitney

No Significant Difference
P ≈ 0.87~0.99

Significant Difference
P < 0.001

The Data Ultimately Revealed That The Group Using The Special Interactive Hardware Exhibited Significantly Earlier Skin Electrical Responses. This Indicates That Group 1 Responded To The Stimulus More Quickly Or Was More Sensitive, Possibly Reflecting Higher Levels Of Attention, Stronger Psychological Expectations, Or Greater Task Engagement.

SUMMARY

#1.PROUD ASPECTS

The aspect that makes me most proud of this project lies in its high technicality and practical research significance. Regarding the core innovation point of compression interaction, I utilized the most scientific psychological physics theories and research methods to prove its practical value. On the other hand, this is an open-source project; I collaborated with AI to develop a set of UE based on OSC signals and an Arduino signal interaction system. I believe that it is not only meaningful for this project but also can be helpful to some designers with related needs.

#2.GAINS

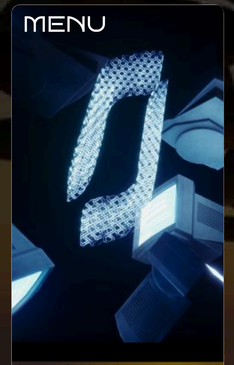
During this project, I significantly enhanced my research and scientific capabilities, and made progress in game design, related interactive technologies, and programming.

#3.IMPROVEMENT POSSIBILITIES

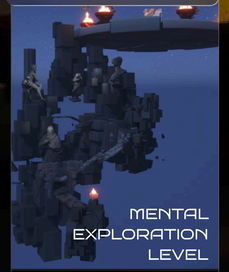
Since the product has only a single prototype, its usability and comfort level are poor, and further improvements are needed to enhance the user experience. Some details of the game console still require optimization. Subsequently, a paper will be written based on the research; efforts will be made to present it academically.

GAME/PRODUCT OUTPUT

GAME SCENE

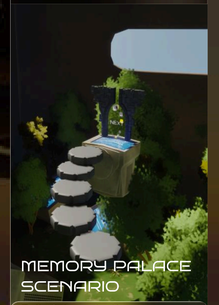


Integrating key scene elements, it serves as the starting point of the game and leads to various levels.

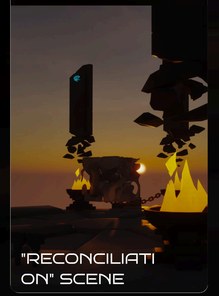


A large number of sculptures symbolizing experiences of workplace violence were set up, aiming to confront one's own inner self.

It features a large number of interactive levels and a hierarchical game flow.



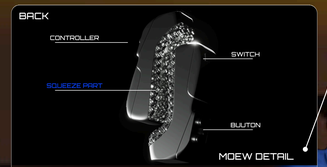
Fully integrate the scene with the sky environment, the over-the-shoulder animation symbolizes reconciliation with oneself, and this is the final chapter of the game.



GAMME PROCESS

Here is the complete game interaction process. For a more detailed real-time demonstration of the game process:

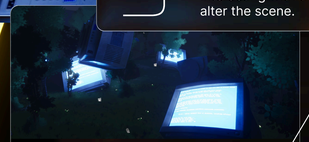
1 At the beginning of the game, the menu features the main core intention.



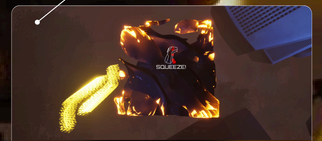
2 **HARDWARE INTRODUCTION INTERFACE**

At the beginning of the game, the menu features the main core intention.

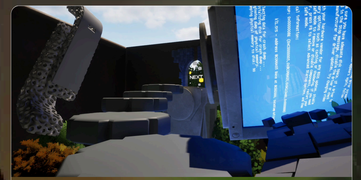
3 An opening animation, entering the scene from a black screen



4 Enter the first scene and search for the key interaction points within it.



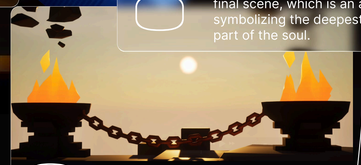
5 The map is filled with numerous square blocks of handle-like texture. Interacting with them can alter the scene.



6 Once all the buttons are activated, after a series of parkour maneuvers, you can proceed to the next level.

7 Enter the second scene. The gameplay is similar to mountain climbing. The player needs to keep ascending upwards.

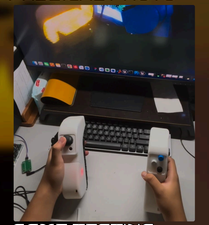
8 After passing through the teleportation portal of level two, the player arrives at the final scene, which is an altar, symbolizing the deepest part of the soul.



9 Arriving at the final scene, after a cutscene, the sun rises and the game ends.

PRODUCT TEST PHOTOS

PHYSICAL PHOTO



GAME TESTING

INTERNAL CIRCUITRY OF THE PRODUCT