

**P o r t f o l i o**

**Z o u X u e d a n**

# 1. PIXEL

INTERACTIVE LIGHT SYSTEM DESIGN  
BASED ON SIMPLE GESTURE RECOGNITION

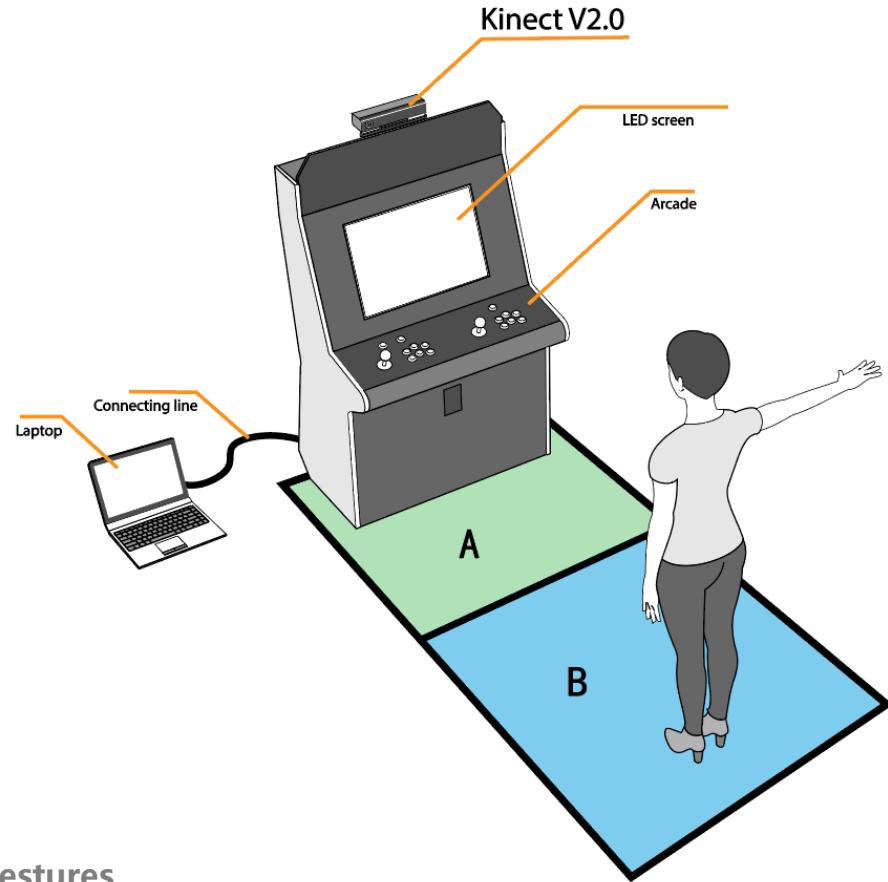


This is a project I made based on openFrameworks, an amazing creative coding frameworks. The project is an interactive light system with an arcade outlook. With Kinect V2 it can recognize simple gesture and give output images with a style of pixel culture or a classic SNAKE game interactively.

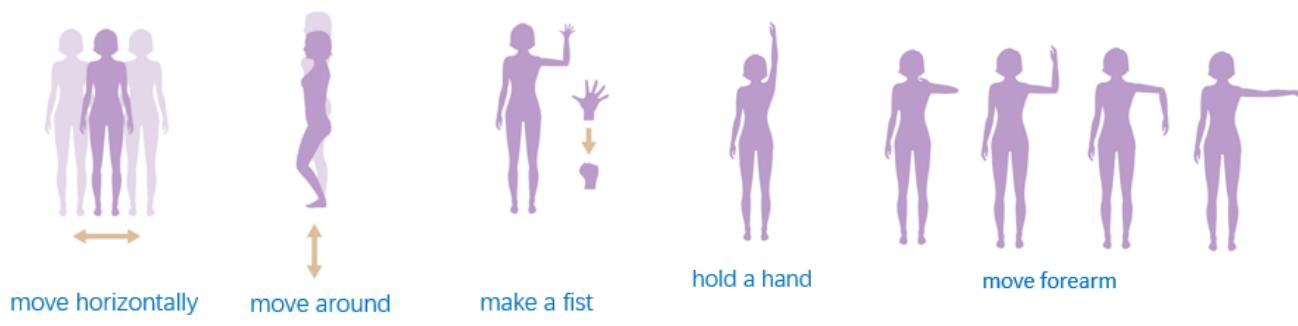
Project on github: <https://actbee.github.io/Interactive-Light-System-Design-Based-On-Simple-Gesture-Recognition/>

## System Map

# System



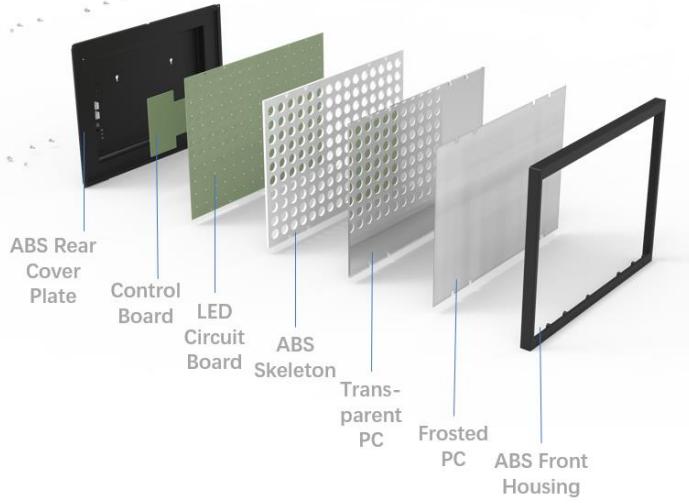
## Recognized Gestures



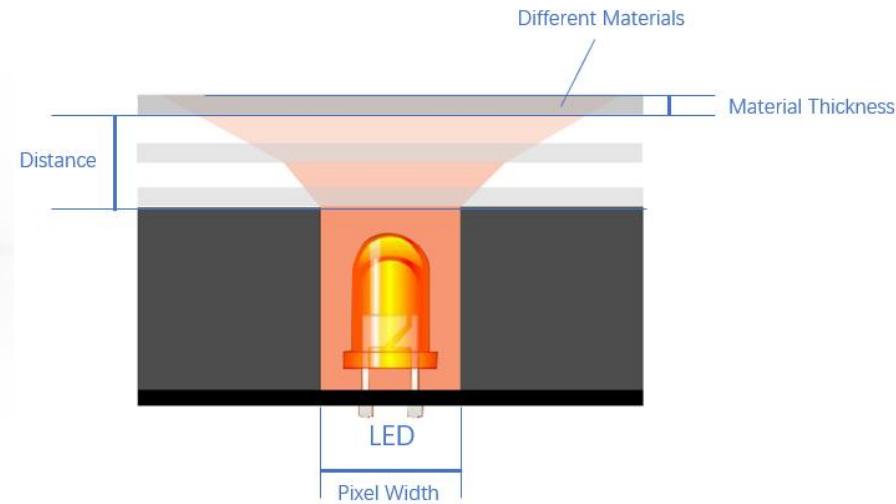
In this system, there is a Kinect placed on the Arcade. So it can collect the person's real-time skeleton data (with its depth information) and tell the laptop. The laptop computes the image output result through the codes and give the feedback to the microprocessor, which controls on and off of every single LED. Finally the person notice the interactive result and do the next step, the process iterates again.

According to the distance between the person and the Arcade, there are two areas, A and B. In area A people can play games and in area B there are some random animes which can be interacted with people. The depth data of the real-time skeleton data can tell the system whether the person is in area A or area B. Some simple but natural human gestures are chosen to interact

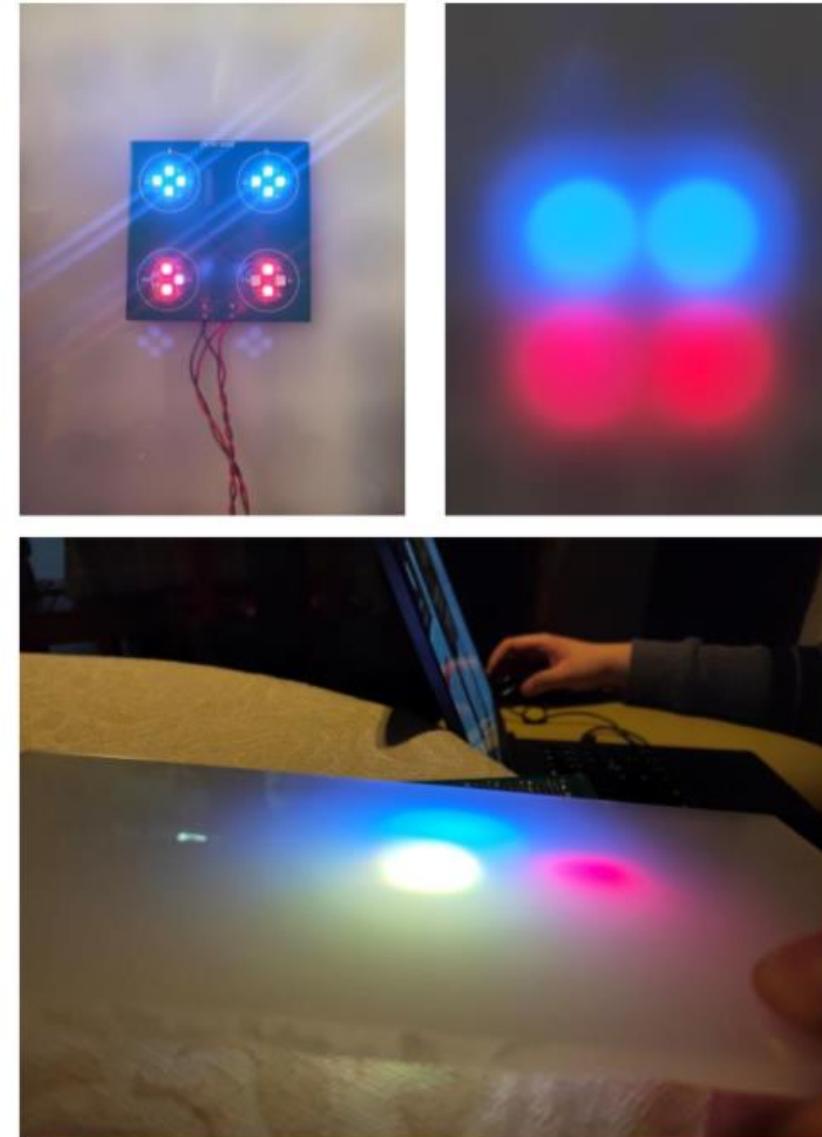
## Screen Structure



## Theory To Generate A Light Pixel



Here in order to low down the complexity of the circuit design, red and blue LED lights are chosen, both in single color. When the blue and red LED light turn on together we can see the purple color, which is an obvious result through the principle of Color Mixing(also this is how the main idea of LOGO comes from). So by this 4 status of each LED light in total can be used(red, blue, purple and off) to get some meaningful images.

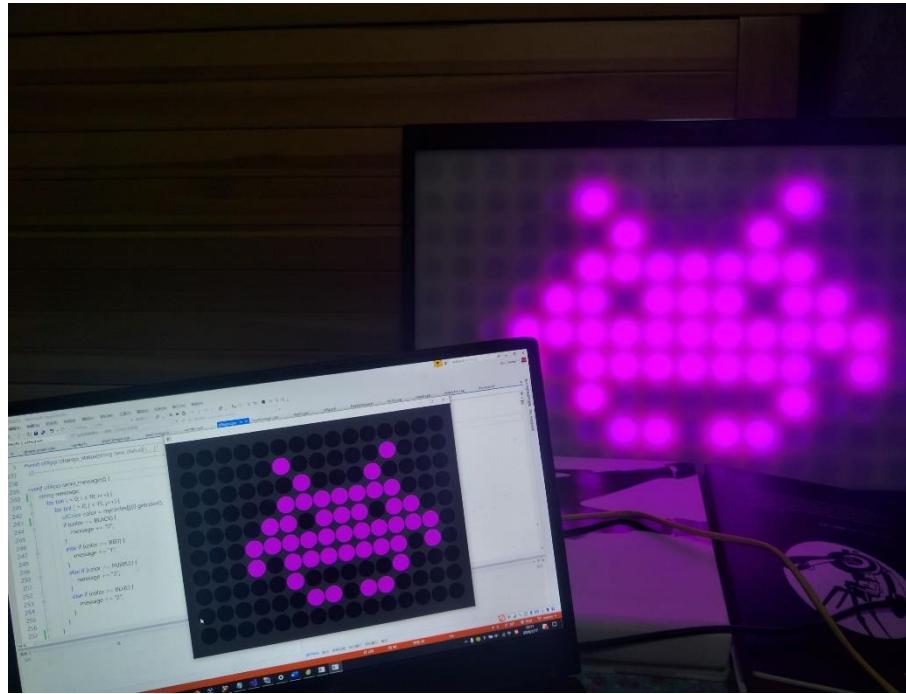




The Arcade

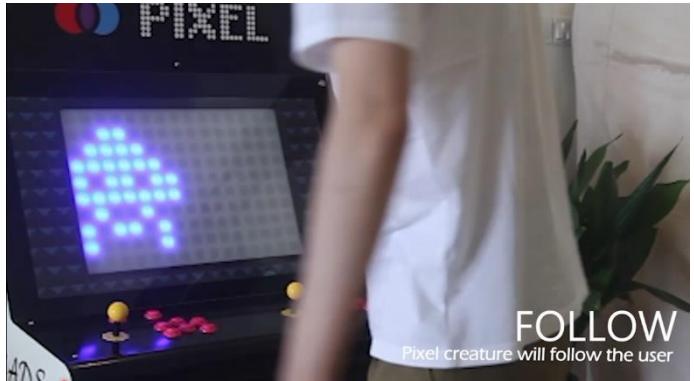


LOGO Design

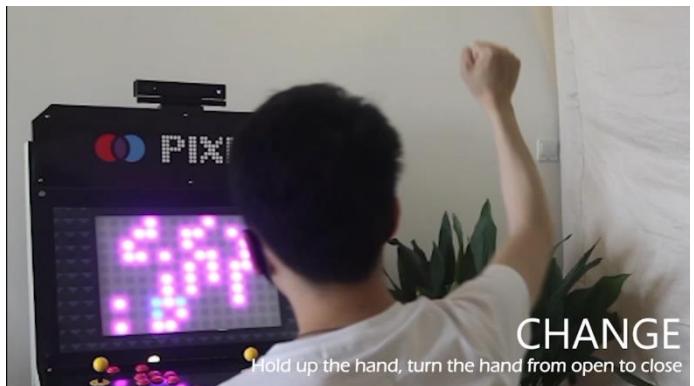


Program To Control The Image On LED Screen

The final screen is set on a bought Arcade and the patterns are redesigned. The image printed can then be controlled through the program developed by C++ based on openFrameworks.



The pixel creature on the screen will follow the user. And if the user holds up his hand, turns the hand from open to close then the stuffs on the screen will be changed. The screen shows a random pixel creature or a GAME OF LIFE anime (inspired by John Horton Conway)



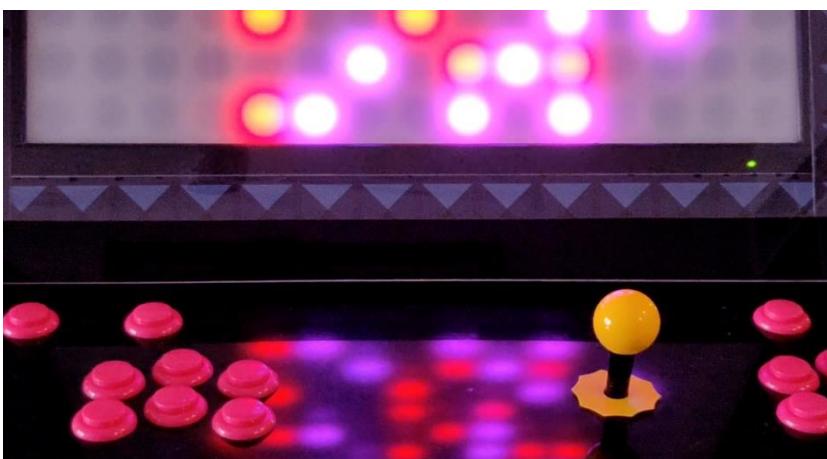
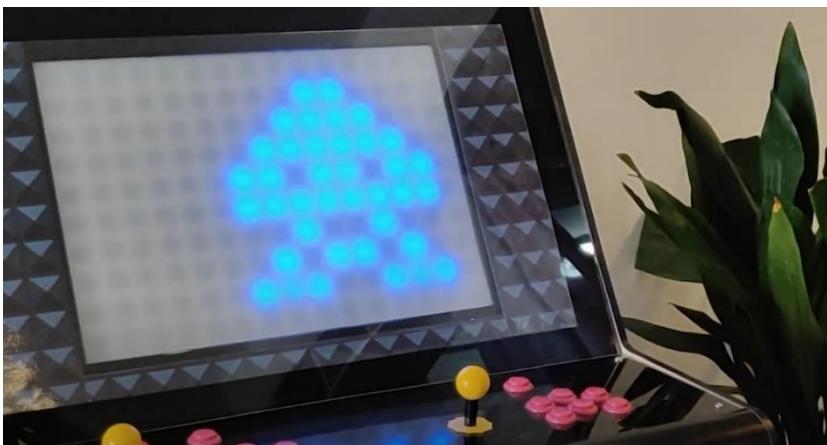
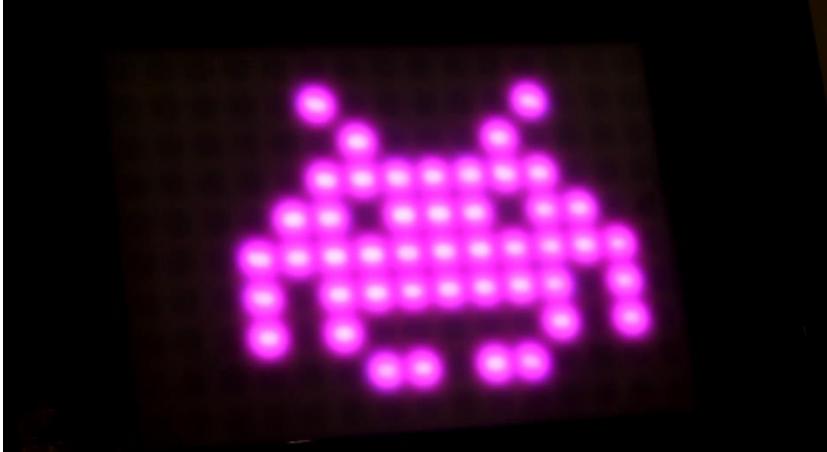
Come close enough and the system will jump into the SNAKE Game mode. First the user hold up on side of hand (left or right) then the direction of forearm will lead the snake to move.



Interact

## Meaning

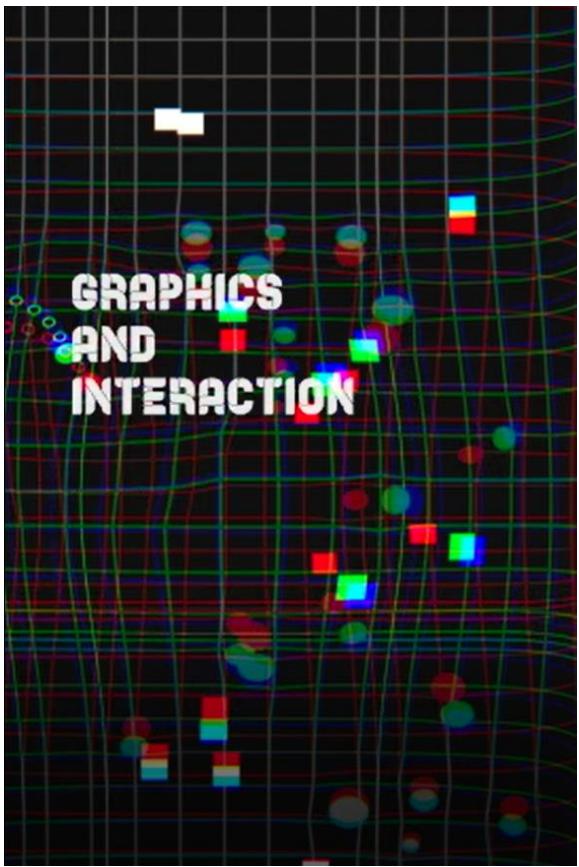
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Since the total size of pixels is quite small(only 15x10), it is a great challenge to give a meaningful output. Inspired by the Pixel Culture, I decide to present something in the past. So I choose a classic SNAKE game, some pixel characters in some games, and a modified GAME OF LIFE to present.

Using a whole new way to interactive with the past things, please try to consider the relationship between the past and the future. If it is possible to bring the old things reborn by the new technologies? And feel the consistent humanism thoughts under the fast growing technologies.

This project has been exhibited on the New Asian Generation Design Exhibition(2020) online.

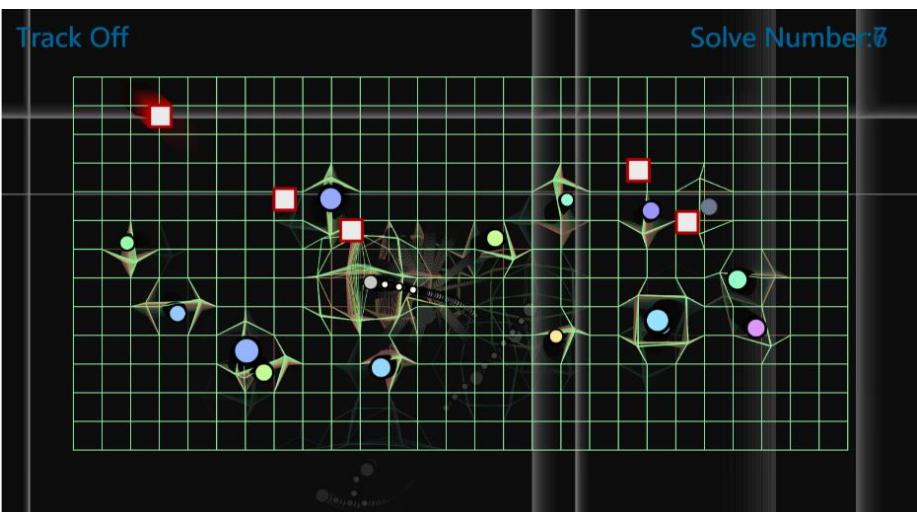


## 2. Worm — A Game

A P5.JS BASED INTERACTIVE GAME

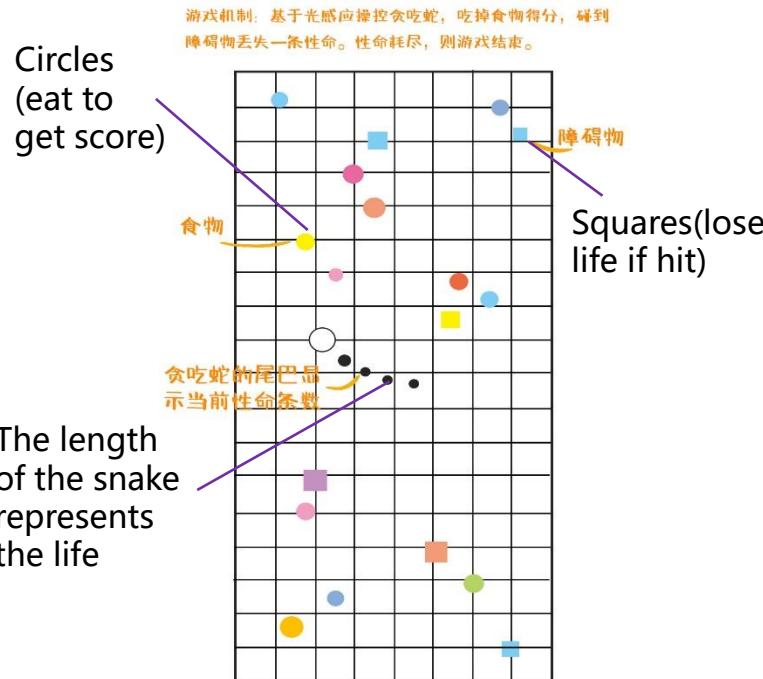
Worm game is considered as a lovely online game using the most basic ray tracing algorithm under the structure of P5.js. Players in the game are supposed to catch some color through camera, controlling the worm to eat as more bubbles as possible at the same time getting rid of obstacles.

It is available playing online: <https://editor.p5js.org/actbee/sketches/b82q31jhl>

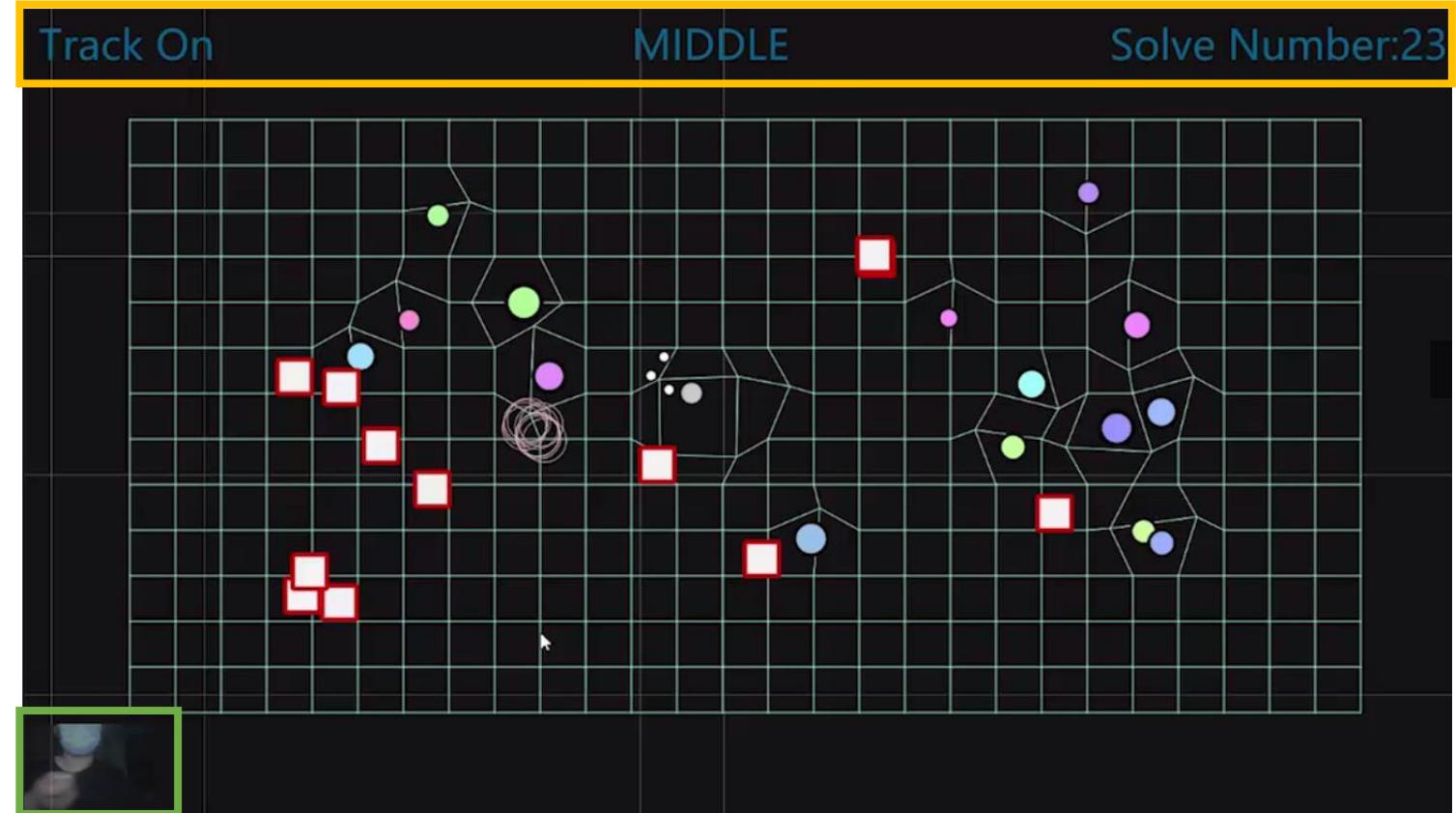


Project on github: <https://github.com/actbee/Worm---a-game>

Track On/Off shows whether the worm is led by the user  
EASY/MIDDLE/HARD implies the difficulty(way) to lead the worm to move  
Solve Number shows the total scores so far



Idea Sketch



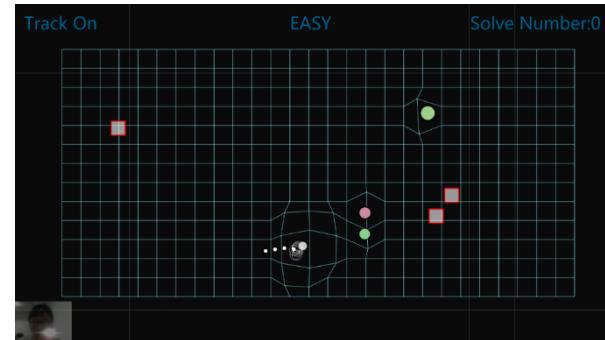
User Interface

## Rule

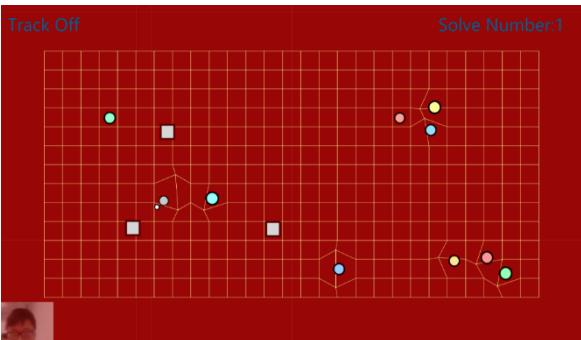
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Color Selecting



Control Worm With The Color  
(through webcam)



Loosing Life



Game Over

Using light to control the worm to eat food (circles in the game) and get points.

If the worm dashes on the obstacles (square in the game) then it will loose life. Game will over when there is no more life. Obstacles will increase when more food are eaten. The Game will be harder.

In the game, the location of the worm, its velocity and acceleration can be selected to control, which matches different game experience.

## Process of the game



Track Off

Solve Number

p5js • 已关注

p5js WORM- A GAME

Is a p5js web game project created by Daniel Zou. WORM uses light to lead the worm to eat as many circles as possible, while avoiding the squares and finally getting the highest score! Let's Drug! Watch the video to learn how to play it!

Game link:  
<https://editor.p5js.org/actbee/sketches/b82q31jh1>

2 周

bbnito02 Fun!!

2 周 回复

liu.designs 和 其他用户 赞了

9月4日

添加评论...

发布

It has also been shared officially by P5.js team on the Instagram.

This project has been showed on the exhibition of Hunan University and is highly recommended. They wore luminous rings controlling the worm.



# 3. Hearing The Fume

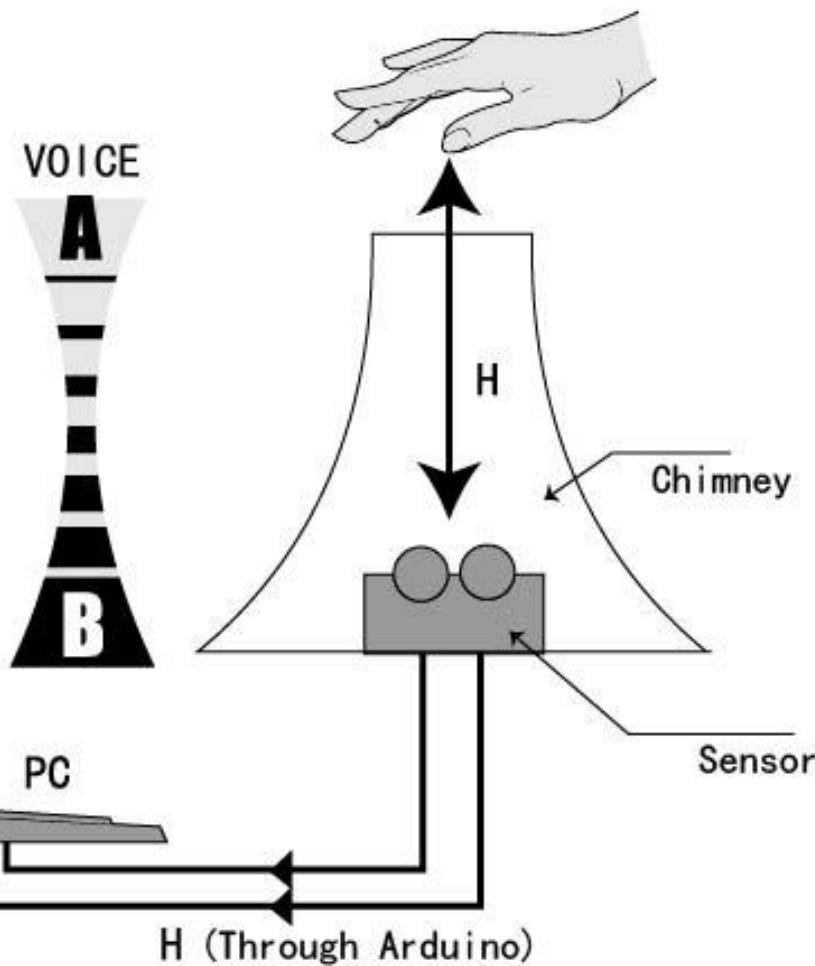
An Arduino Project  
Promoting Environmental Friendly Awareness

Noisy from people, busy road filled with vehicles, the chirps of the garden birds sounds distant.

Fume from the chimney rises into the gray sky. Tell us how to breath in such a chaotic world?

The hand of god is falling down to stop all of these. Silence, back to the nature, road to the future!

The project video is on Youtube : <https://www.youtube.com/watch?v=s0ofkeRuXCo>



System Map

There are four sensors hidden under the paper chimneys, so when hands put down towards those paper chimneys the actual distances can be detected and thus the computer will know the real-time data and play the exact sound we provided before. To be more specific, it will change the sound from noisy city sound to holy nature sound. One sound is fading and another is appearing. In the same time, we add some chemicals to produce continues fume from the chimneys.





Sounds Changed From City To Nature

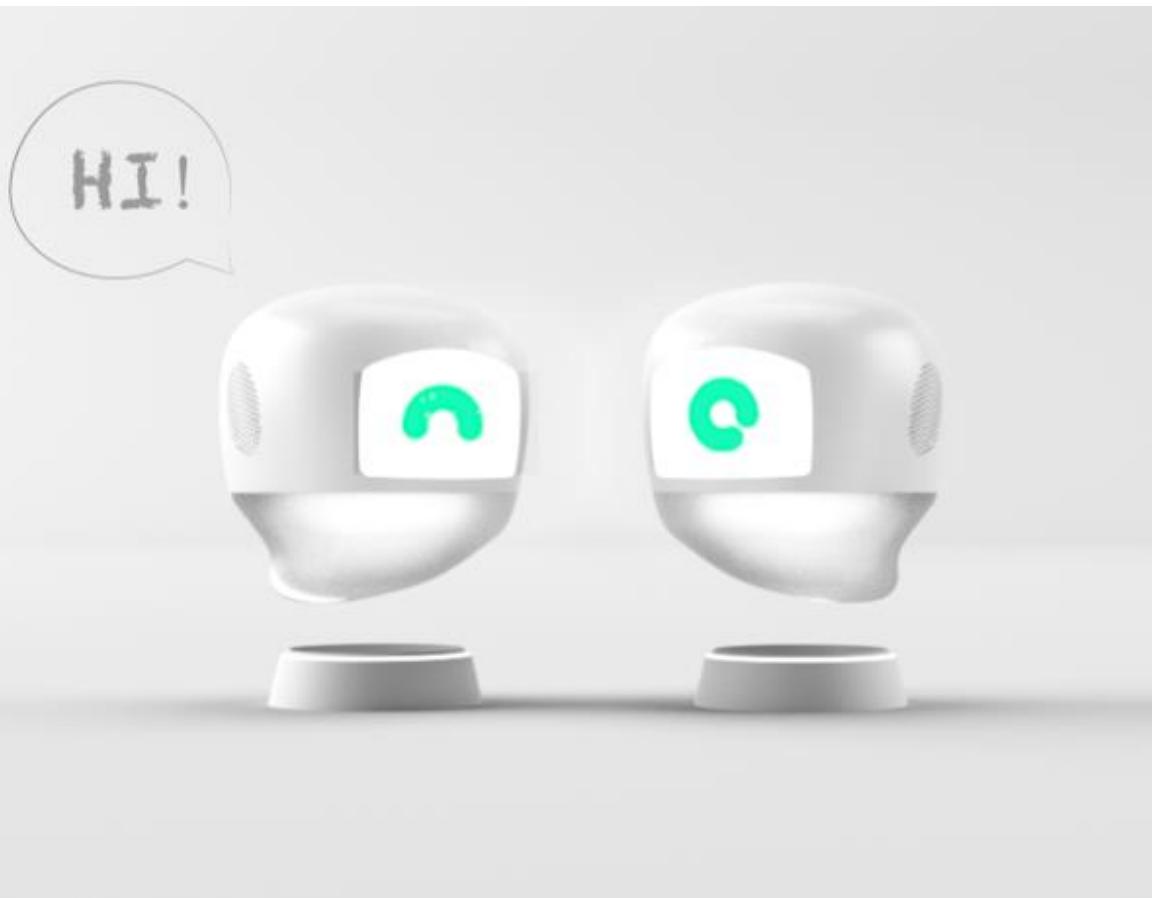
Idea

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Since the pollution of the earth is getting worse, we are here to tell the people that it is time to do something to make our environment better! Using the hand to block the chimneys and stop the fume is a symbol. It is our duty to do some environmental friendly behaviors from now on!

# 4. Robot Design

Design For Imperfect



Since artificial technology these days is still under developed, there are many mistakes an agent will make. How to design for those imperfect agent to make them more smart and sometimes more lovable is a great topic discussed in Human Robot Interaction.

Here some ideas are proposed and a simple prototype system is built to test using Arduino and Processing.

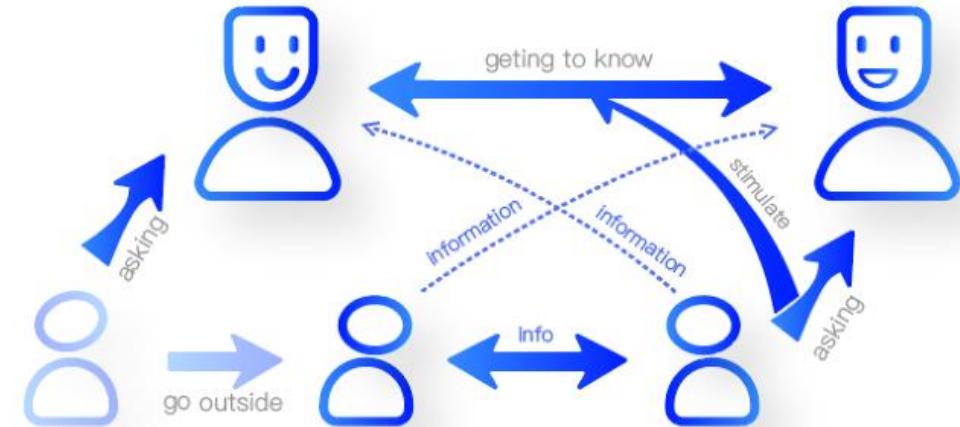
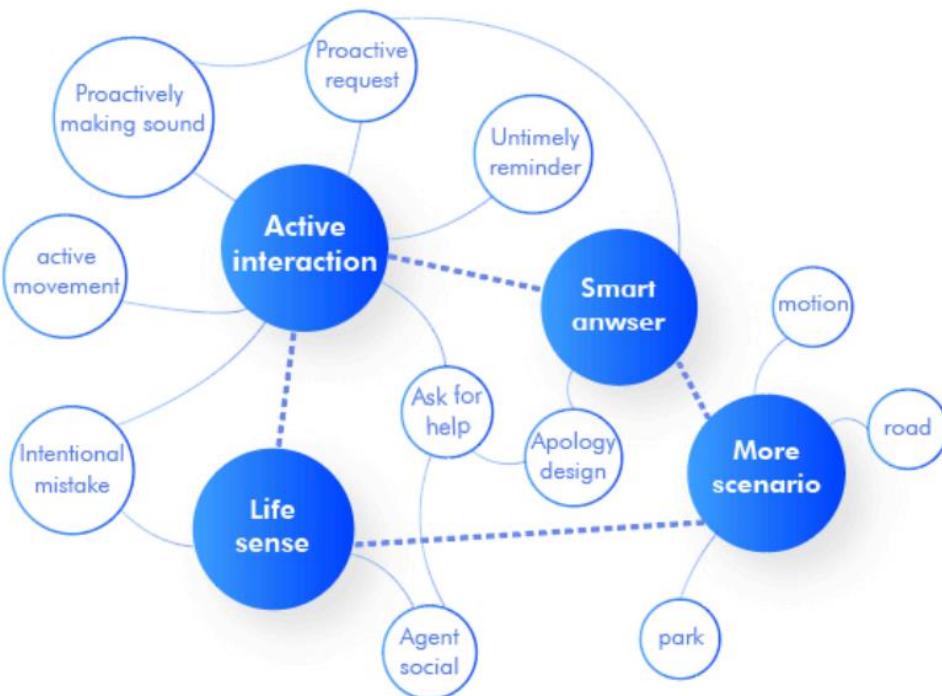
This project is based on a workshop with Georgia Institute of Technology.

Project on github: <https://github.com/actbee/Robot-project>

# Concept Design

First the imperfect points the currently robots have are found out.

1. The agent still lacks the ability to actively stimulate interaction.
2. Robots can hardly answer some questions.
3. Most robots are used in single scenario and can not socialize.
4. The robots are more of a tool than a real life with secrets.



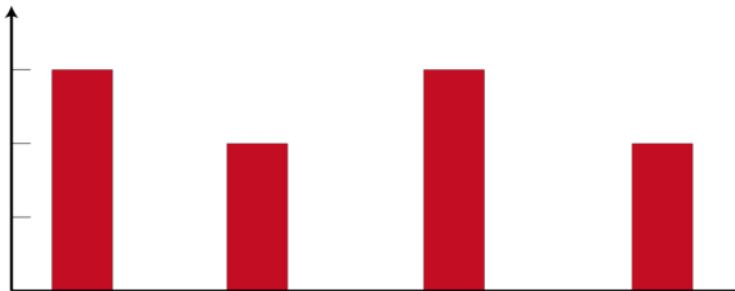
*Take your elf out!*

- Robot social activities promote human social.
- actively question and request.
- a individual rather than a tool.

Here we focus on four aspects to improve based on the imperfect points found before: active interaction, life sense, smart answer and more scenario. We propose a new kind of robot which can have social activities with each other to promote human social. Meanwhile it is individual rather than a tool and always ready to question and request the human.

# Design Process

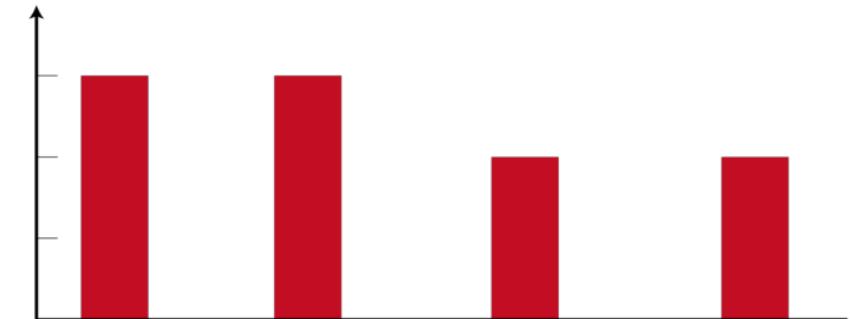
We first present an outlook design and then do a peer testing to improve the design. After few times of such process we finally get a satisfactory outlook. It combines the idea of active, convenience and unknown.



Results Of One Peer Testing



Denied Designs



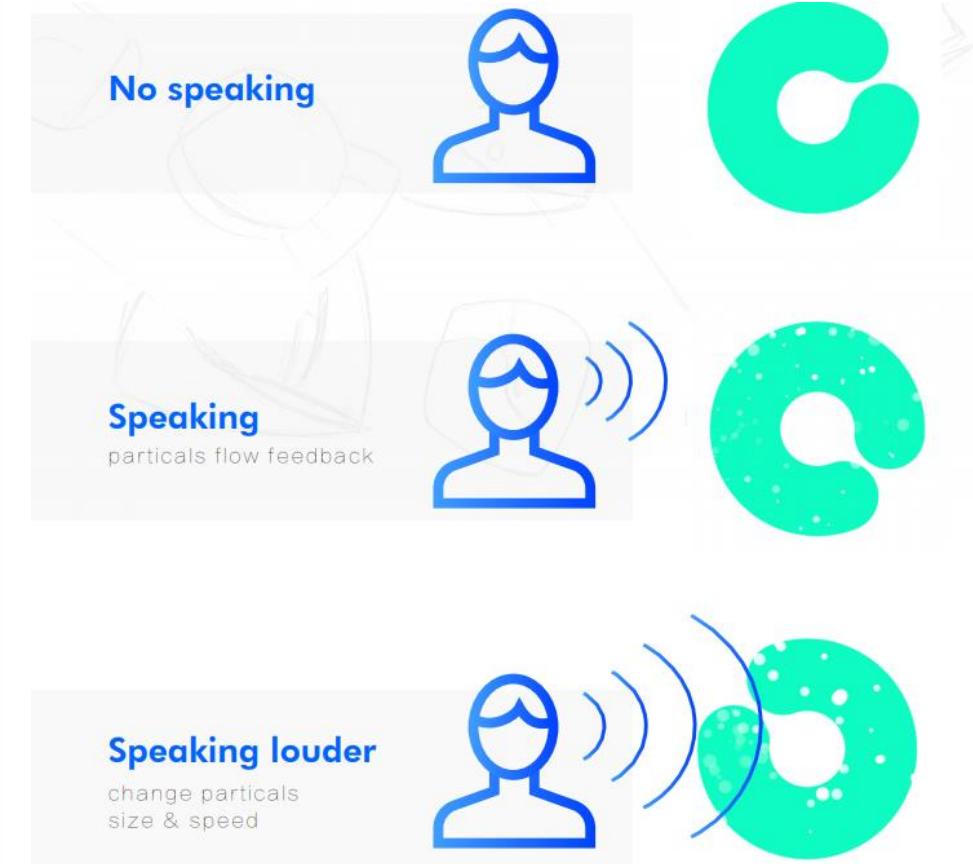
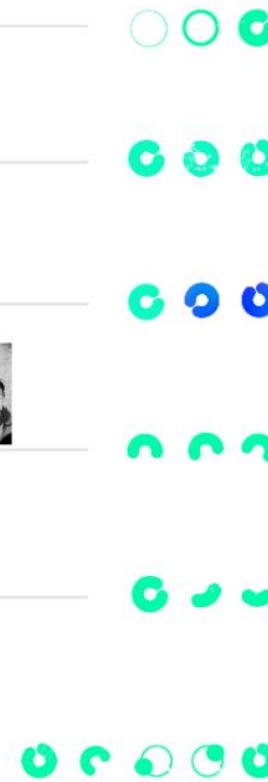
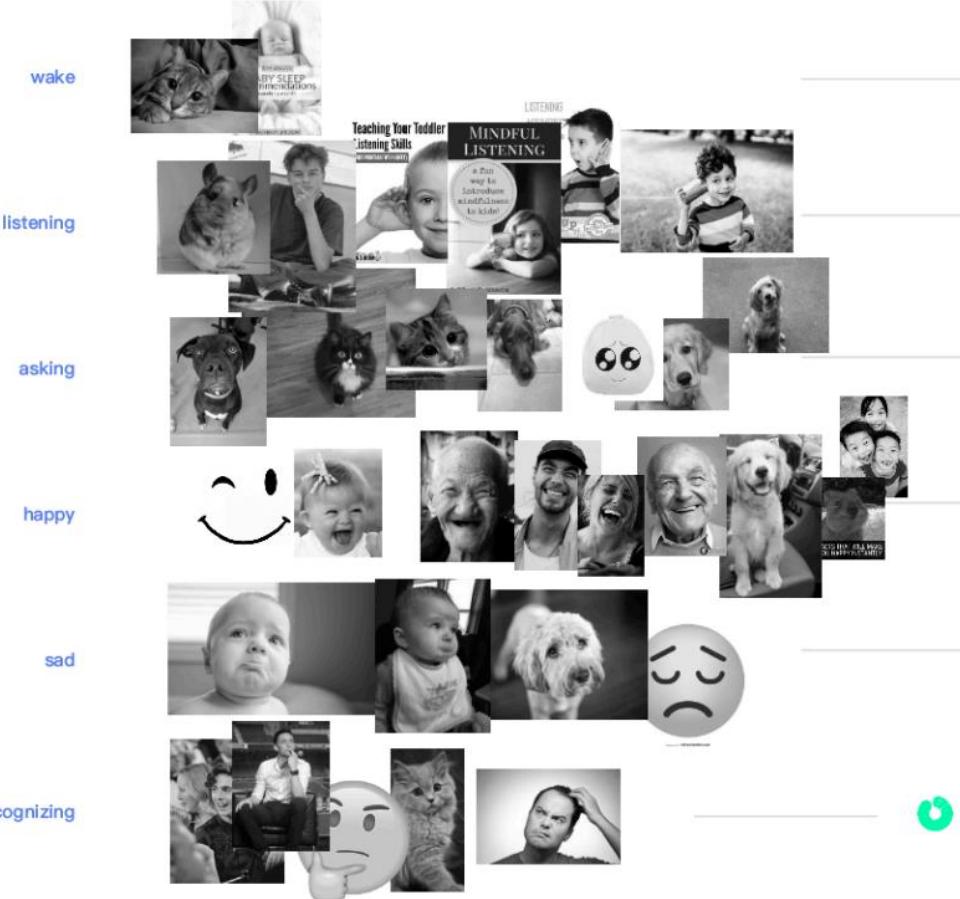
Final Result

sociability

actively

independ-  
dent

The agent' s interface symbolic expression are designed by analyzing the characteristics of human behavior and expression. We focus on three key factors summarized before: sociability, actively and independent.



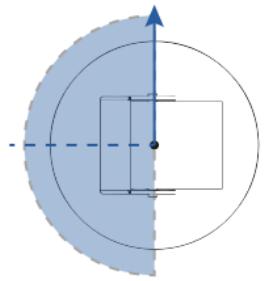
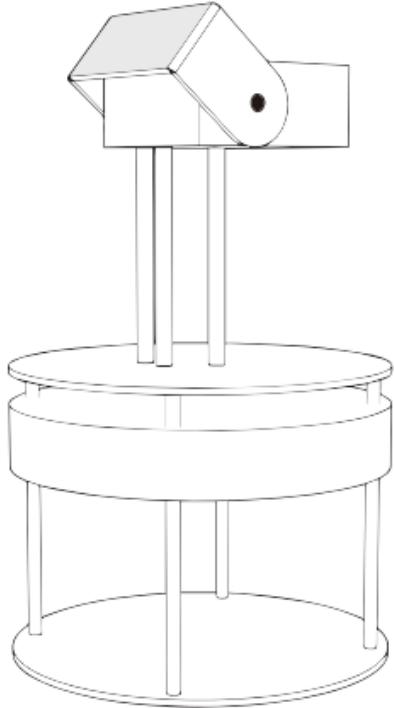
GUI Designs

# Interaction Designs

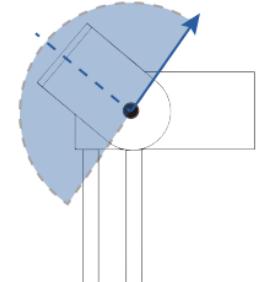
	distant < 0.5m	hey Elfo	decision needed	recieve positive reply	recieve negative reply	Perceived signal	recognition success
	wake	listening	asking	happy	sad	recognizing	communication
GUI							
	Expanding from the outside to the inside	Rotate	Rotate	swing	rotate swing	swing	Graphic change
	/	Breathing change	0efbc4 1d84f7 1a40ff	/	/	00fbac 85fcc4 00fbac	/
	0 1.2s	0 0.3s	0 0.3s 1.2s	0 0.3s 1.2s	0 0.3s 2s	0 2s	0 2s
AUI	remind	/	/	emotion	emotion	Status Display	/
	dingdong~	/	/	dingdingding!	wing...	ding—	/
VUI	/	/	Fang Yuan, can you take me out to play? Inquiring tone	great! exciting tone	maybe tomorrow... upset tone	Hi, I am Saya, whats your name? friendly tone	Robot language
	/	/					
MUI	horizontal direction	shake = 45°~135°	Headup to look at users	Headup to look at users	Headdown = 120°	Headup to look at another robot	Headup to look at another robot
	Vertical direction	Headup = 45°		Headup to look at users			

We finally decide the details of each behavior of our robot including GUI (graphics user interface) , AUI(audio user interface), VUI(voice user interface) and MUI(movement user interface) and the conditions (both the distance and the commands) to trigger them.

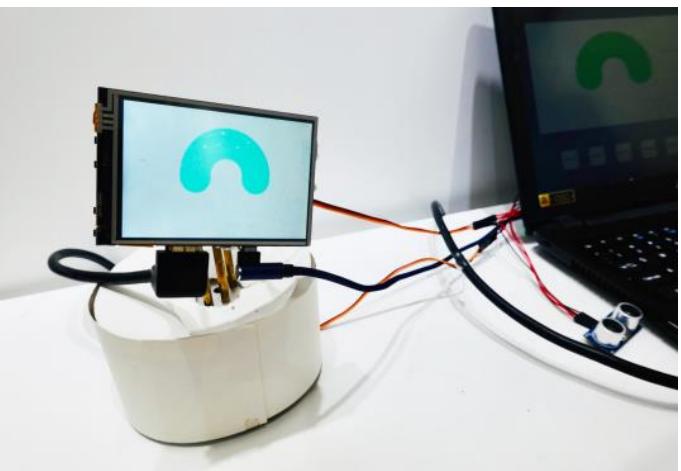
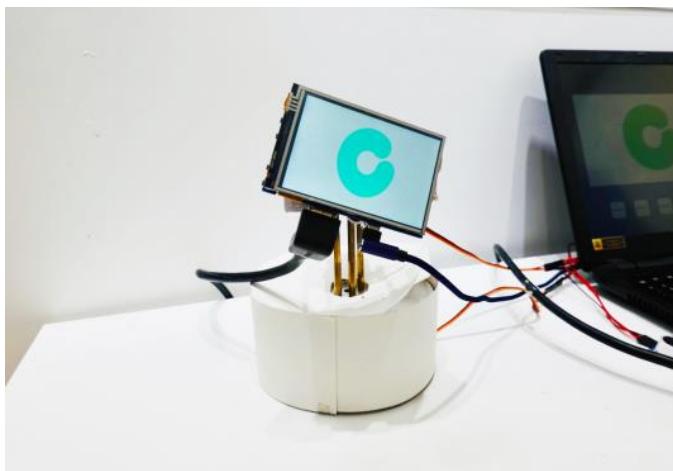
# Prototype



range of rotate degrees horizontally

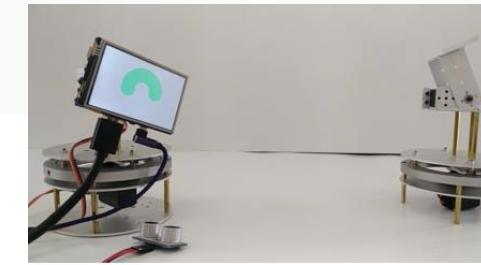
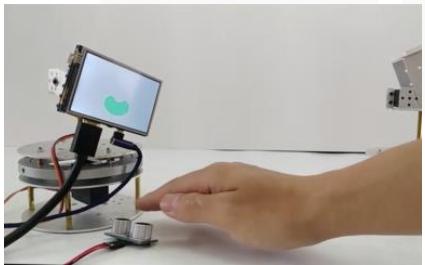


range of rotate degrees vertically



With the help of two steering engines controlled by Arduino, we can simulate the head behaviors of our robot. A little screen is bound on the top of the head which displayed the GUI. We then program in Processing together with Arduino to test the purposed reaction of our robot in different situations. A test platform is built based on Processing to help the test process more easily.

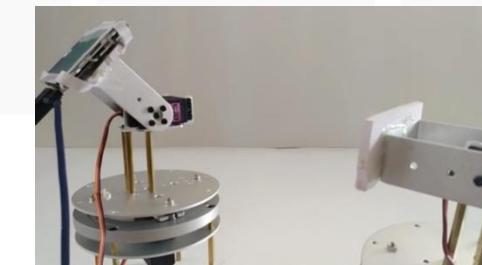
When I got up in the bright afternoon, ELFO was awakened when I approached ELFO. It asks: Bright, today's weather is good, can you take me out to play?



Liang Liang said: "Well, I just want to go out for a walk!" ELFO smiled happily and said: "Great!"

Bright and ELFO walking on the street, ELFO began to identify the "small robot friends" around

A girl came in the distance, and ELFO recognized its small robot "Xiao Di". It greeted Xiaodi.



Two small robots began to chat about the sky, bright and girls chatted as they walked, and they went to a cafe to sit and rest.

ELFO suddenly asked brightly: "Just Xiao Di asked if I like to eat crayfish or hairy crabs, I have never tasted it. ... which one do you like? "

Liang Liang said, "Hmm... crayfish!" said the girl: "I also like crayfish~ I know the nearby Yangfan Hotel crayfish is good!..."



After returning home, ELFO asked brightly: "The communication with Xiaodi is very interesting! Do you want to know~"

Bright: "Is it? I want to know."

"It says that its owner usually likes to make it coffee, the master's schedule is full, and often remind her..."

We wrote a story to test the interaction of the robot we designed then. Finally, we purposed a series of robot' s interactions with its GUI, AUI, VUI and MUI in a specific situation. This is a preliminary probe and more works should be done on other situations.



# 5. The Pineapple

The Third Eye Observing The Real

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Recently with the development of the deep learning technology, especially with the help of Generative Adversarial Network (GAN), the computer is able to generate some amazing artworks. But can AI really surpass us human beings in the field of art? Here we need to have a deeper understanding of how artists really draw things, even draw some common daily stuffs like the pineapple. With the help of an artist I try to use the third eye to observe the pineapple and get the final paintings from it. From complex to simple, the whole process is kind of inspired by the famous artwork The Bull created by Pablo Picasso.



Pineapples A      6x420mmx297mm



Pulling The Pineapple



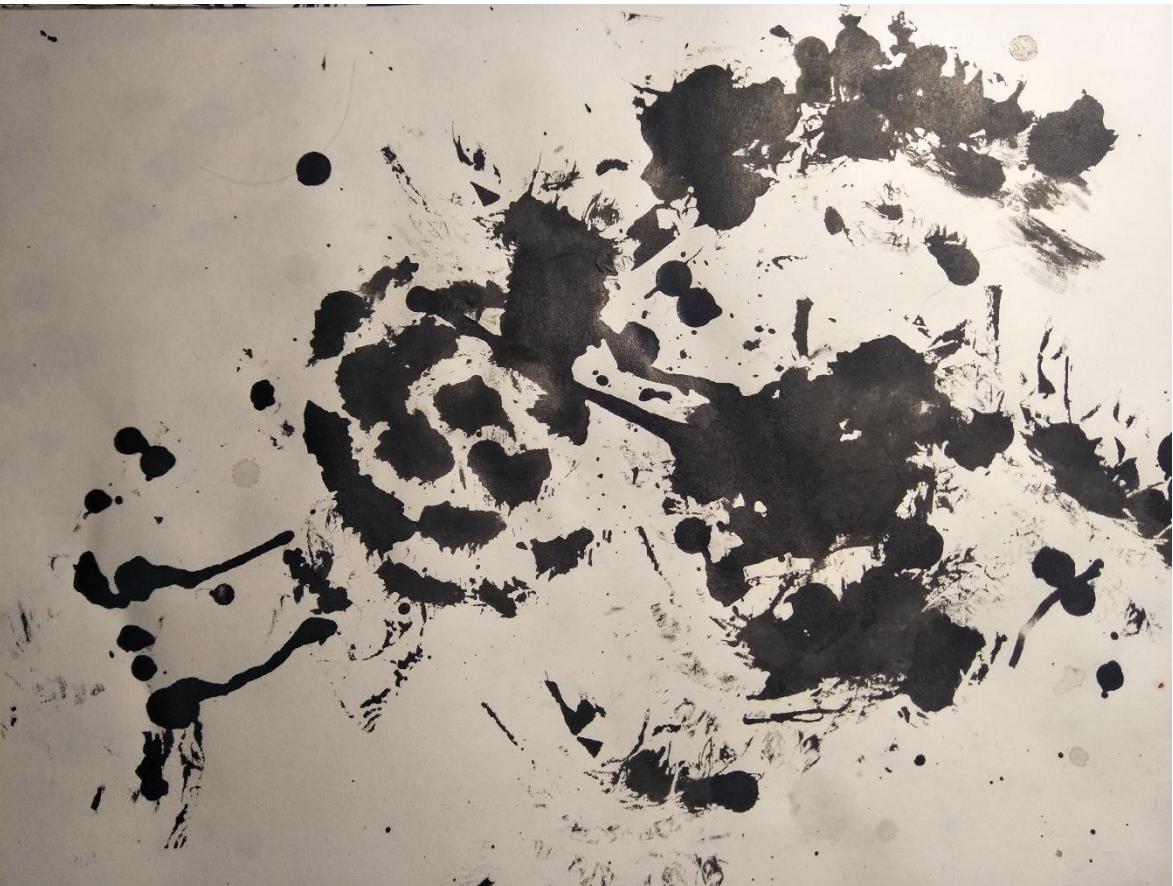
Pressing The Pineapple



Pineapples B

420mmx297mm

By pulling or pressing the pineapple with ink on the surface, more modern style paintings can be generated. This is kind of inspired by the artist Yves Klein.



Pineapples C

3x420mmx297mm



Pineapples D

3x297mmx420mm



THANK  
Y O U