LEGEND OF HANZI
UNITING THE PAST AND PRESENT

Start

Game design
Group work
Background Design：Han Hsun Shih
Game Assets and PR：Xiao Liang
Programming：Yining Jiang
Project management and hardware：Zhou Fang

This is a somatosensory interactive game. Designed to introduce native speakers of the Latin alphabet to the evolution of pictographs and Chinese characters. When playing the game, the user needs the cooperation of hands, eyes and brain to complete the two-level breakthrough game. The game is designed to show users the origin and evolution of pictographs. We want to reflect the commonality and difference of cultures by breaking down the barriers between languages.

Video link：https://youtu.be/5GPBzBXBggk

Documentation, Typography and Editing: Xiao Liang

BACKGROUND AND ITERATION

According to the Old Testament Book of Genesis, humans banded together to build a tower that they hoped would lead to heaven. In order to stop man's plan, God made man speak different languages so that man could not communicate with each other. So human beings grow apart, no longer unite, and separate.
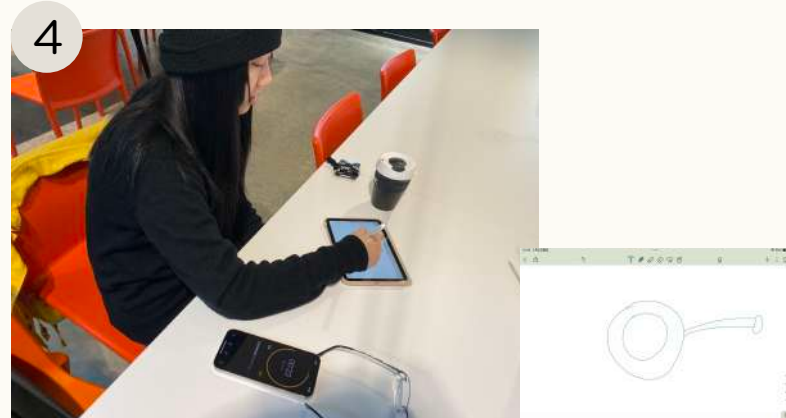
PROTOTYPE DESIGN
February 3, 2023

So last semester we designed our first physical game. Break the language barrier and convey the message with body and image.

Black Box Challenge - The first player to touch the object with eyes closed/blindfolded, guess and describe in words (but cannot directly name the item)

The second player draws from the description and then shows it to the third player.


The third person guesses based on the content of the picture and describes it to the fourth person in body language.

The fourth player guesses the name of the object based on the dynamics.

SECOND GENERATION DESIGN
March 17, 2023

This game is an interactive game combining physical sensors and virtual space. The game requires four players to participate in a team, including a conductor and three controllers.
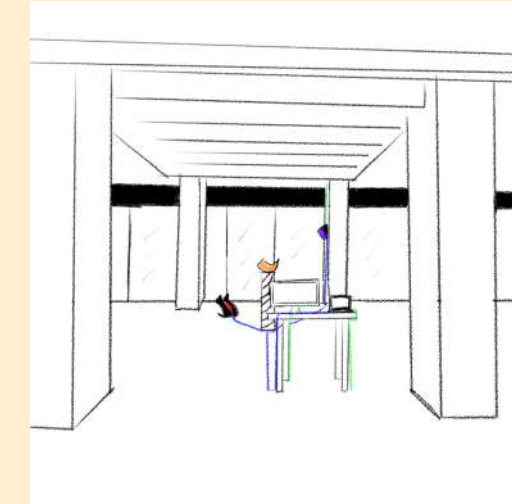
According to the instructions of the conductor, the controllers respectively control the ultrasonic sensor, the pressure sensor and the blowing sensor to build the Tower of Babel in the virtual space.

We chose three of the six sensors, connected using Arduino and unity. And using laser cutting, 3D printing and manual techniques to design packaging that fits the theme.
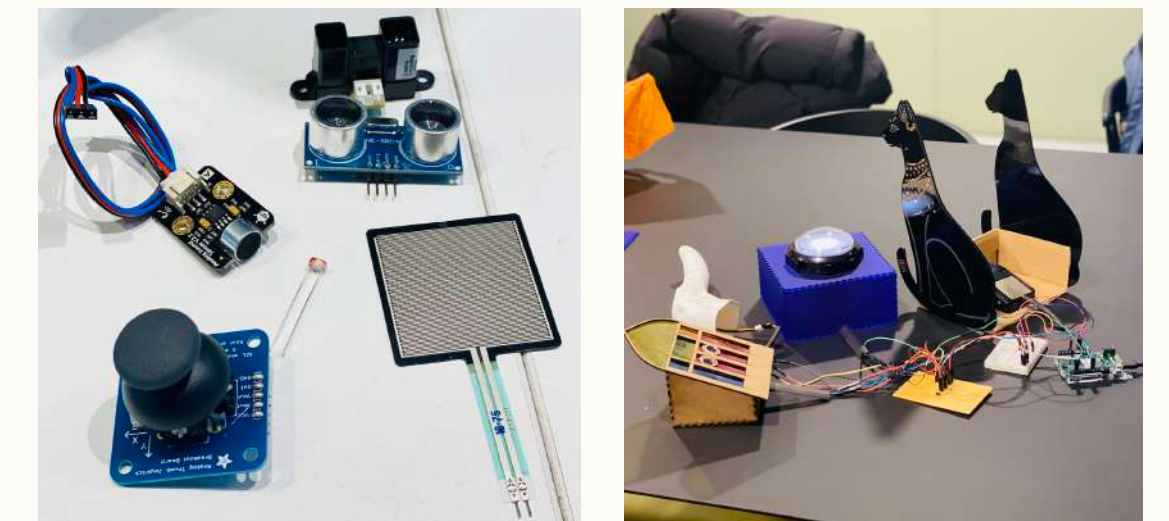
In the game, four players need to communicate and cooperate with each other to complete the brick building. The next group of four players needs to build on what was built before.

DISCUSSION

In this design, we still follow the idea of the Tower of Babel, and during the discussion we decided to focus on breaking down the textual barrier. In the story of the Tower of Babel, people are divided because of their language, which leads to conflict. Therefore, we want to use ancient Chinese hieroglyphics to break the writing barrier, hoping that people who have not learned Chinese can also understand the origin and development of Chinese.

INTERVIEW

Lieven van Velthoven

Netherlander

Lieven's brother has lived in China for a long time, but he finds it difficult to remember and write Chinese characters. He believes that understanding the evolution of Chinese characters through hieroglyphics is a very effective way to memorize them.

Olivia Evagora

British

Olivia likes Chinese food very much, so she is interested in Chinese culture. But she has not studied Chinese characters scientifically, and she thinks Chinese characters are very difficult to relate to English. But she thinks it's more interesting to learn about Chinese characters through hieroglyphics.

Kim Suan

South Korean

Kim has made a lot of Chinese friends recently, so she really wants to learn Chinese by herself. But she finds Chinese characters confusing because they are so complex. She thinks hieroglyphics help to memorize Chinese characters.

RESEARCH

HIEROGLYPHICS

Oracle bone inscriptions are the earliest mature Chinese characters we can see, and they are named for their engraving and writing on tortoise shells and animal bones.
'Know what it is, know why.' The origin of Chinese characters reveals the original intention of modern Chinese characters, which is quite beneficial to learn.

Definition source: http://www.360doc.com/content/12/0121/07/15820106_1080831969.shtml

Chinese oracle bone script is the best preserved Chinese character font. The Chinese characters we use today originated from this hieroglyphic system.
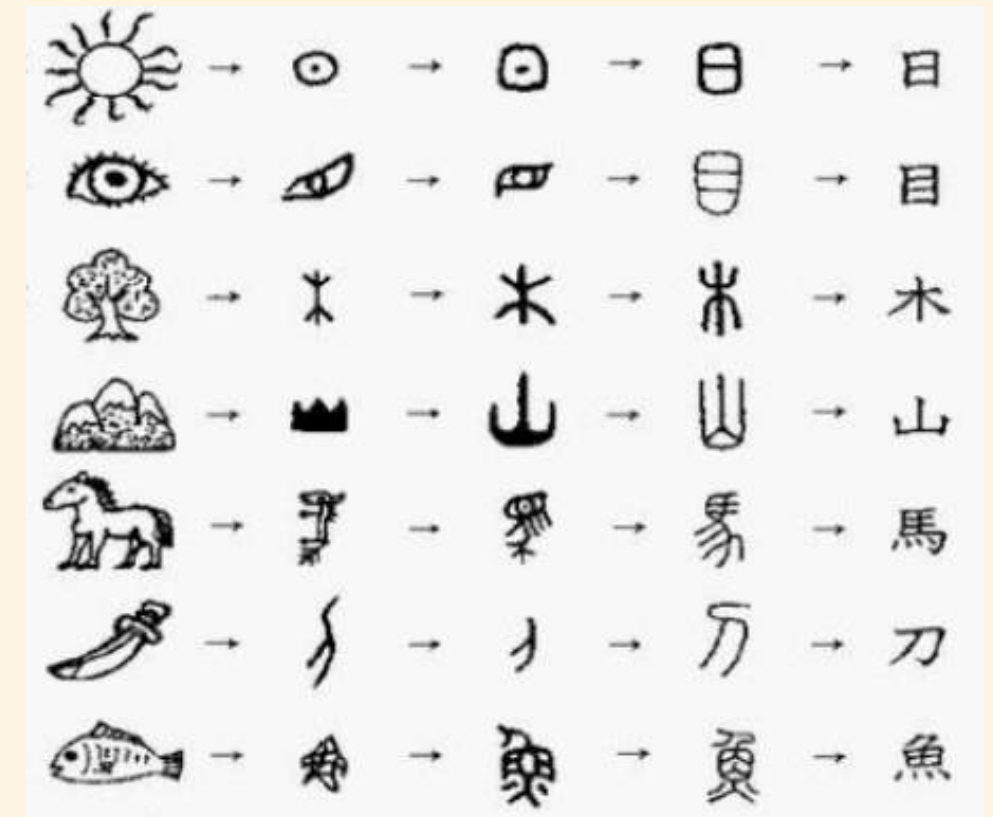
INTERACTIVE MODE

Darts are small, easy to operate, have a long range, are highly concealed, and have extremely sharp spikes. And very deadly, because the user would coat the darts with poison.

The bow and arrow is a rare remote weapon in ancient cold weapons, according to legend, the bow and arrow was invented by the ancestor of Zhang, so it was given the surname Zhang. Ancient bows and arrows are very dangerous long-range cold weapons.

The spear was a favorite weapon of the ancient infantry, usually holding a shield in one hand and a spear in the other. The length of the spear is generally about five meters, and the red fringes on the spear can disturb the enemy's view.

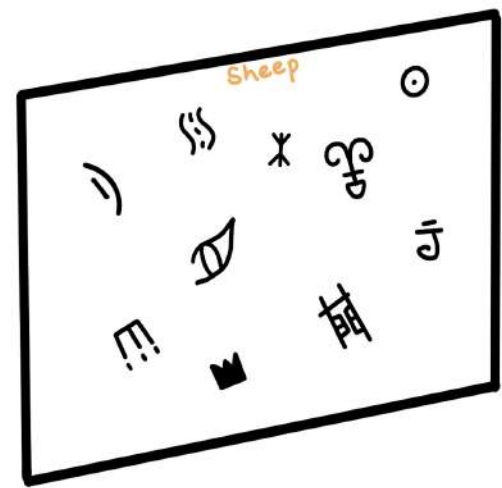Definition source: https://history.sohu.com/a/679839761_121166559   https://baijiahao.baidu.com/s?id=1740309703812868082&wfr=spider&for=pc

SKETCH

Our game aims to break down the barriers between languages, not completely, but to make people aware of the commonality of languages.
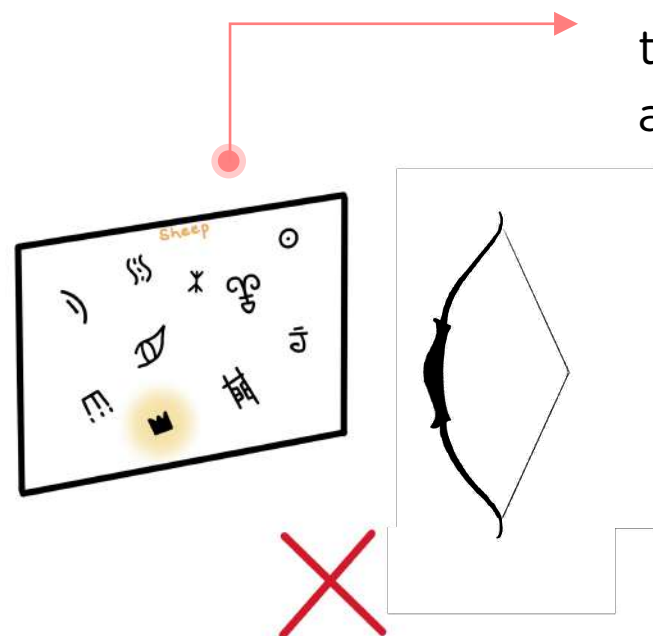
Start the game

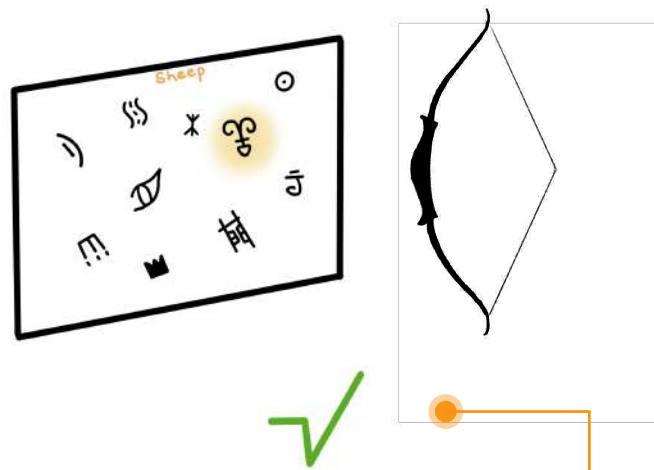Select successfully to proceed to the next level.

Level 1:

The user needs to choose the right hieroglyphics according to the given English using the bow and arrow.

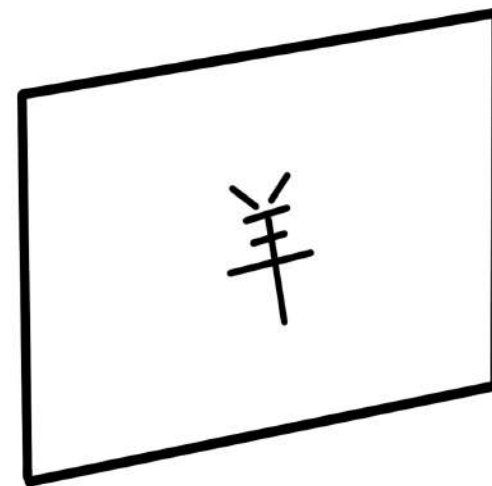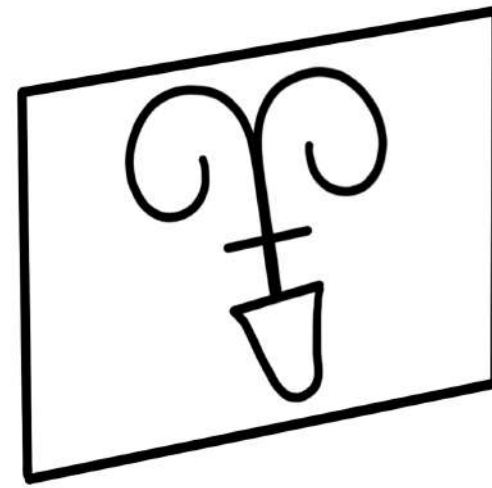If the selection fails, continue trying.

We show how hieroglyphics evolved into modern writing. It is hoped that users can also understand Chinese character culture in the process of playing.

Level 2:

The user watches the text evolve and hits the bull's eye with a dart.

You can try several times until you succeed


The end
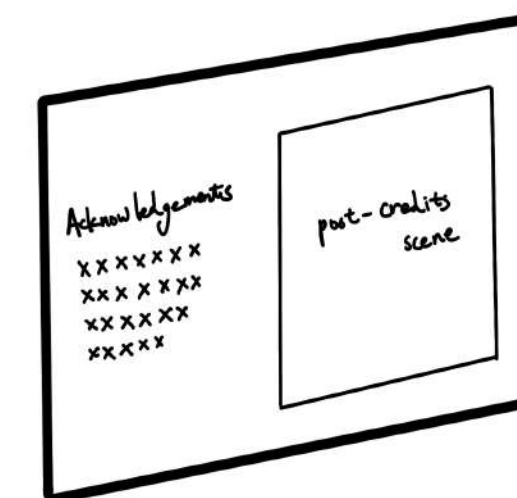
With bow and dart as a way to interact with the game, we want to change the way people think about weapons. When we think of weapons, we only think of war, so we want to break that impression, because if there is no conflict between people, then these are just our ways of playing.

DESIGN

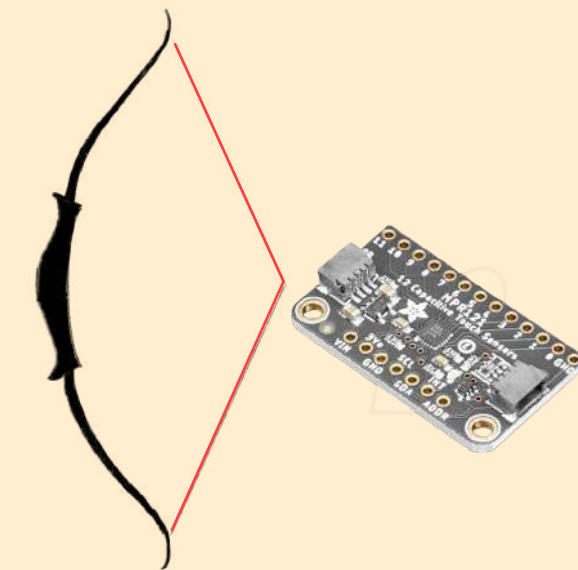Create interactive games using unity and Arduino sensors.

Orientation sensor

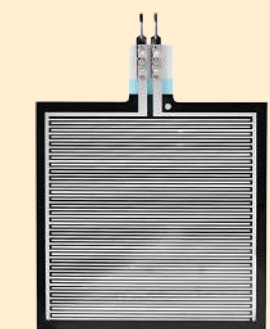Use the Orientation sensor to control the cursor and select the text.
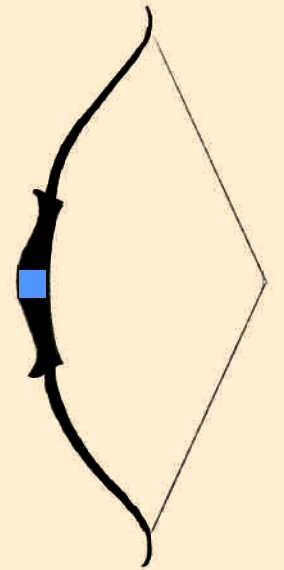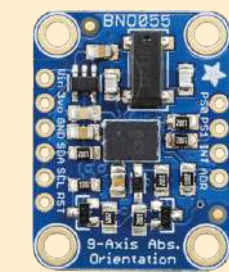
Capacitive touch sensor

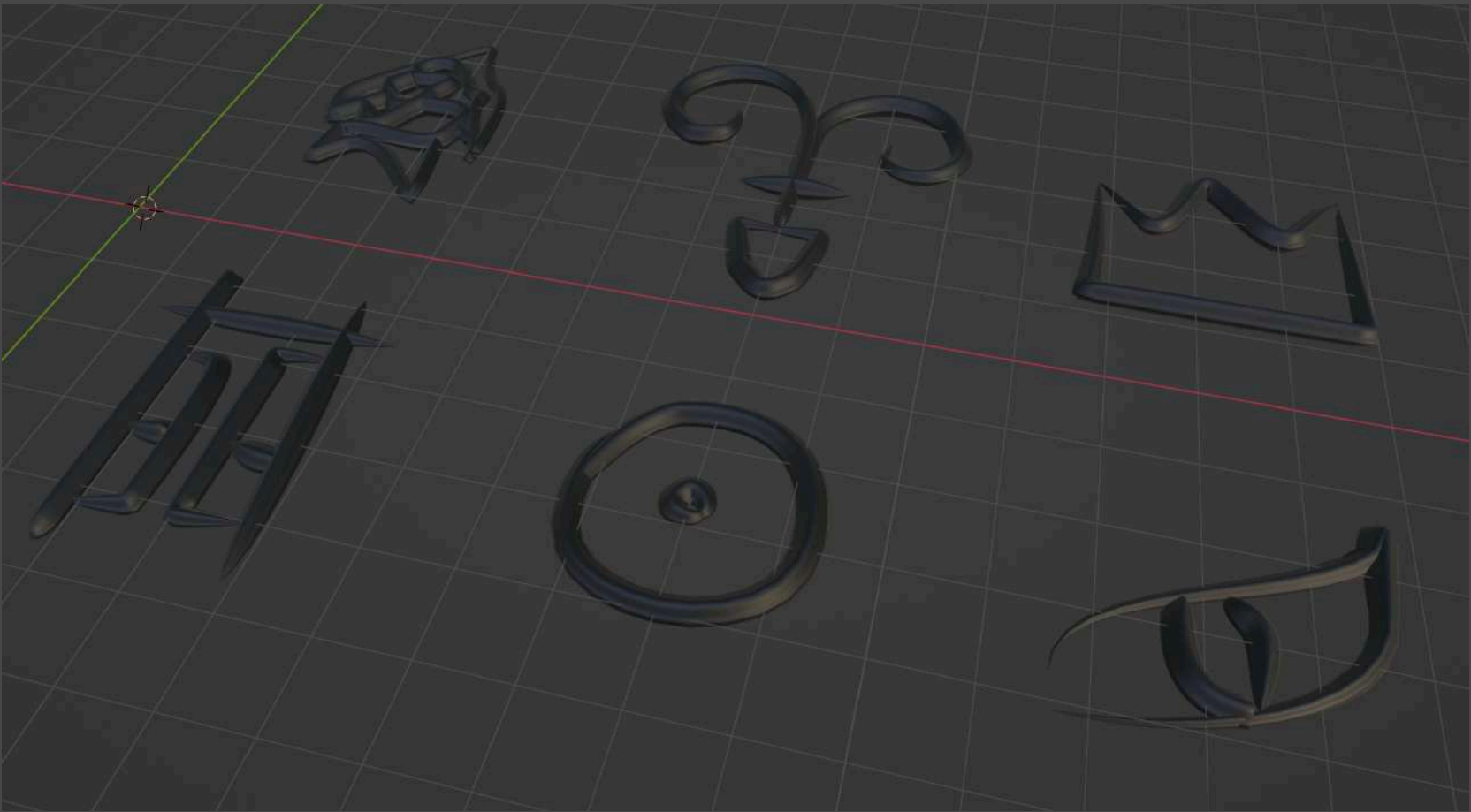Select confirmation action using Capacitive touch sensors.
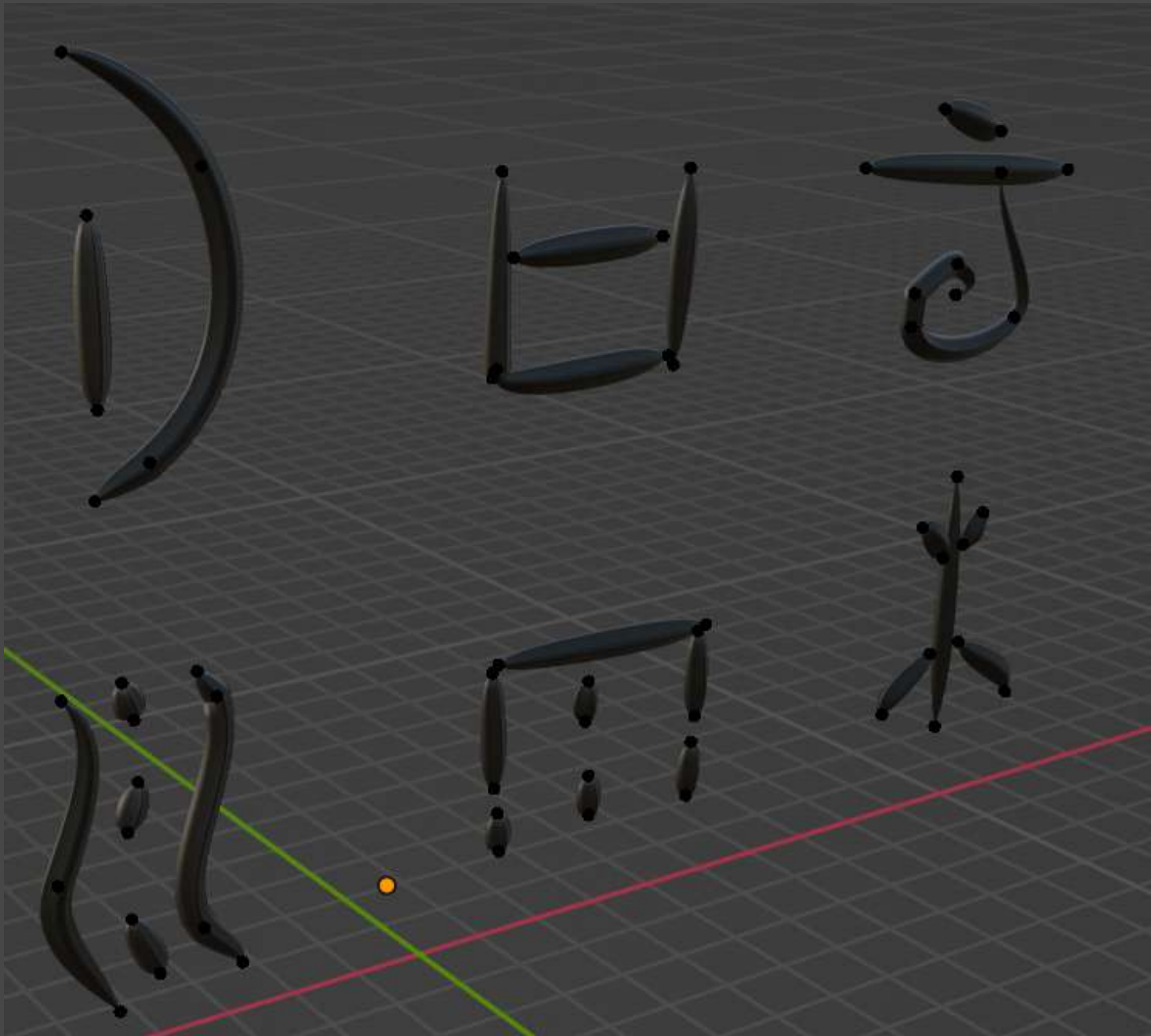

Force sensor

Use the Force sensor to feel if the dart hits the bull's eye.

TEXT MODELING

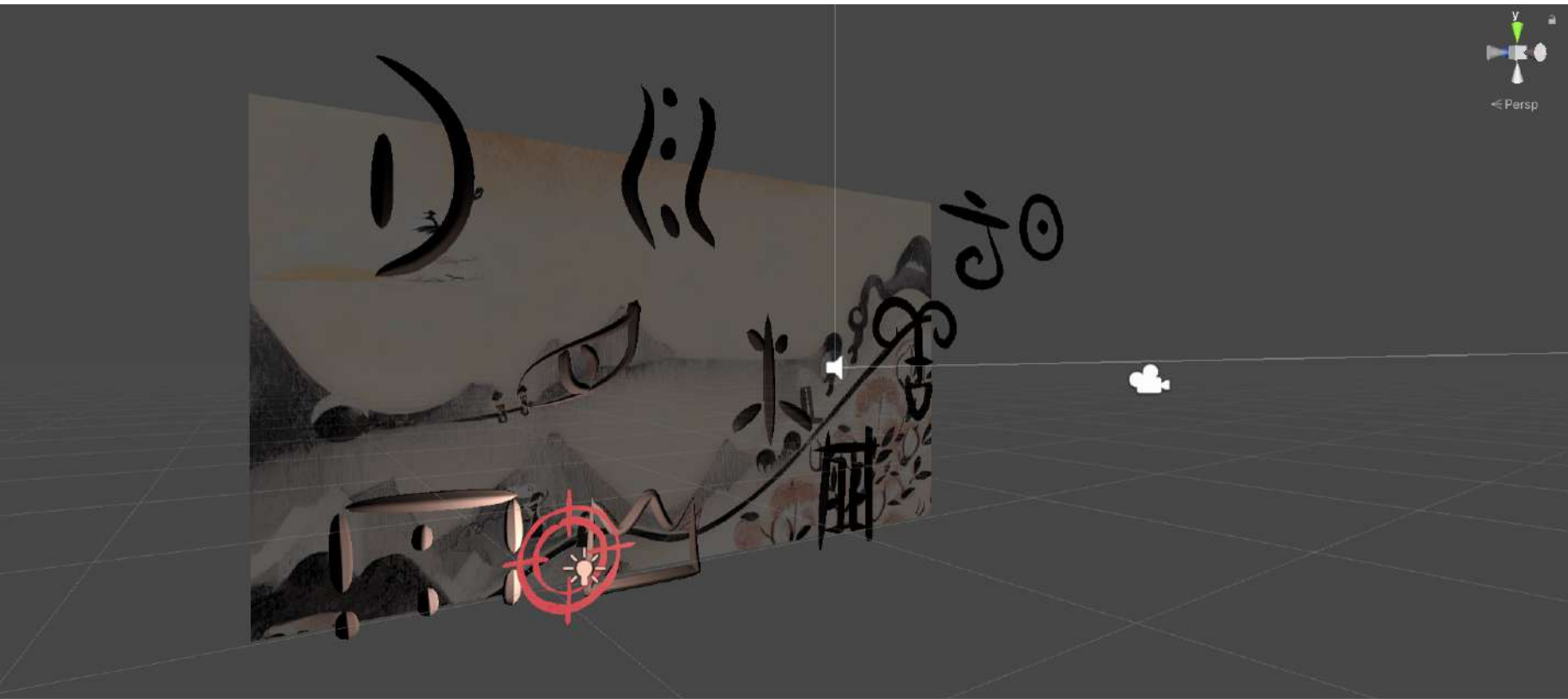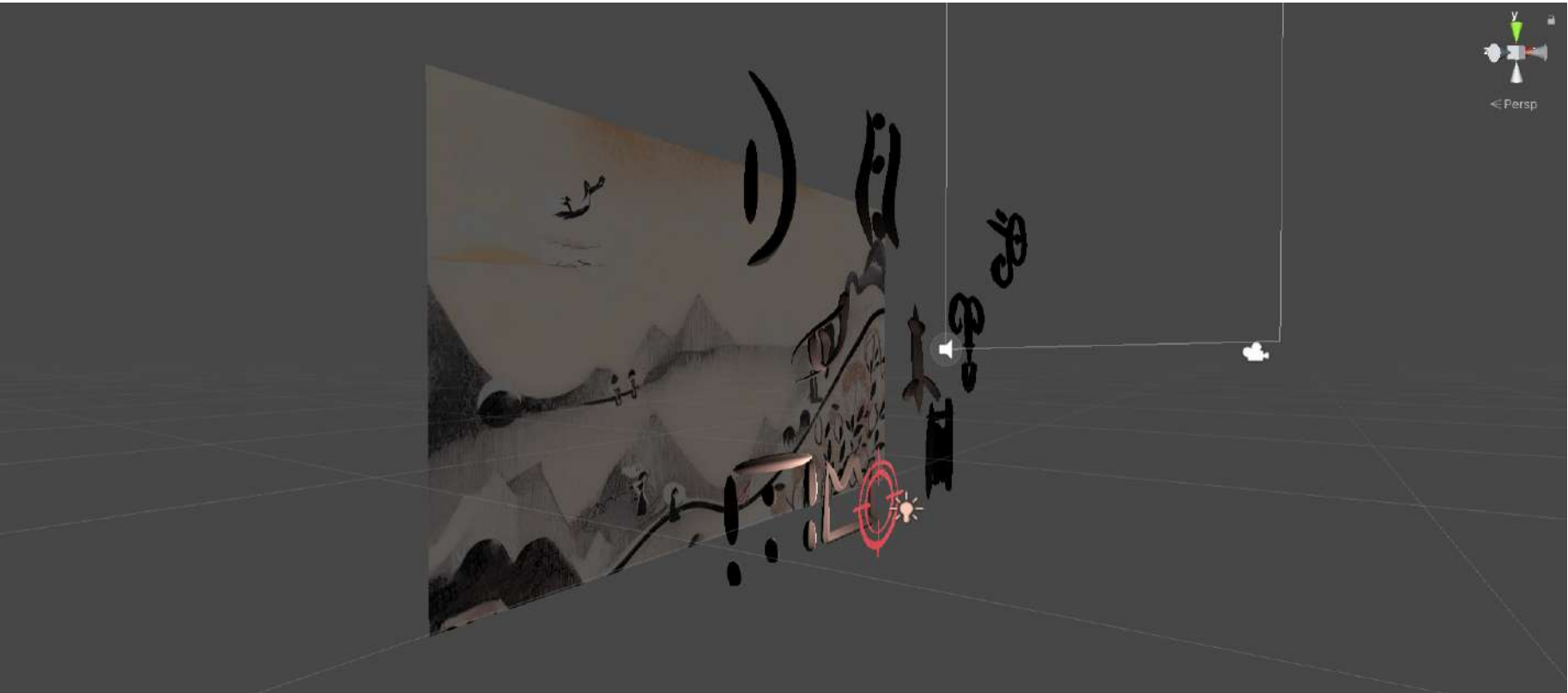We used blender to model the oracle. And build the scene for the first level in unity.

月、口、云
川、雨、木
Moon, mouth, cloud
Rivers, rain, wood

鱼、羊、山
门、日、眼
Fish, sheep, mountains
Door, sun, eye

Principal person in charge:
Xiao Liang、Zhou Fang

2D CAMERA RENDERS 3D MODEL

Principal person in charge
Yining Jiang

VISUAL

ANIMATION

In our game, we chose to use animation to show the evolution from hieroglyphics to modern Chinese characters.
We obtained four progression images illustrating the evolution of the characters and utilized frame interpolation techniques to create smooth transitional animations.

UI
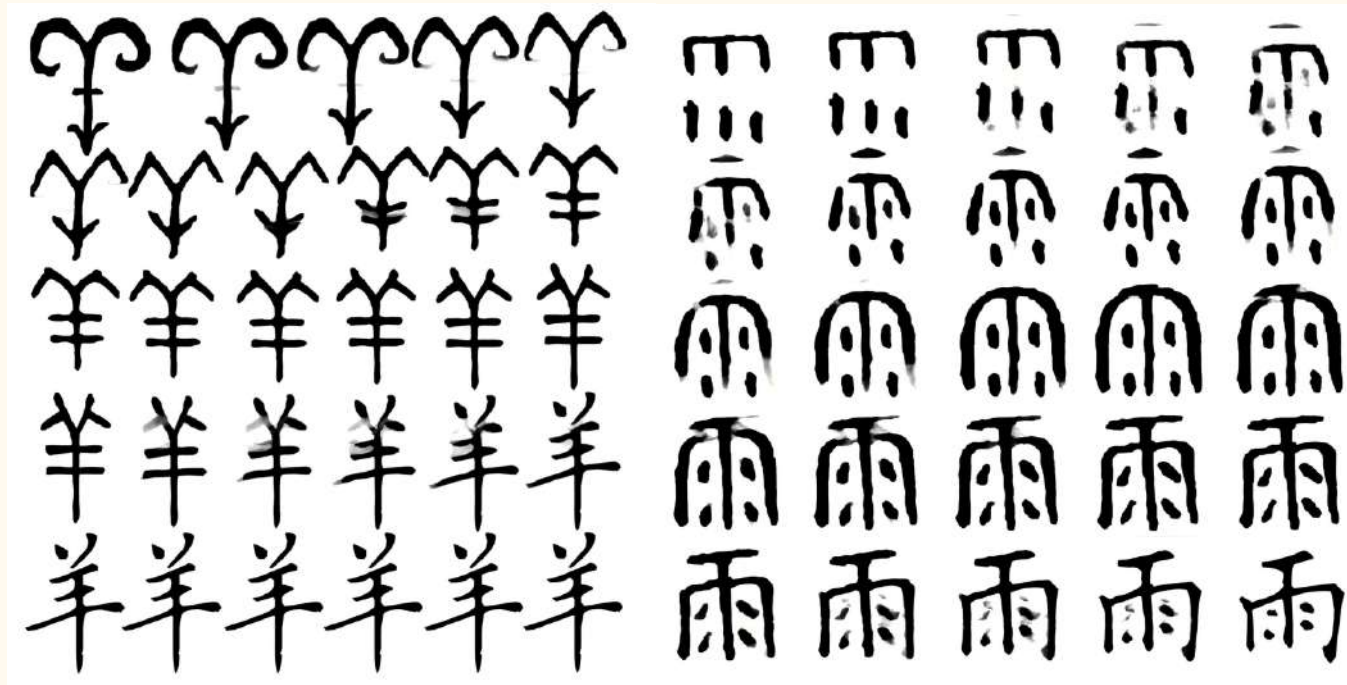
We consulted Chinese calligraphy, extracted the radicals in Chinese characters, and hand-designed the prompt styles and buttons that were unique to our game.

Resume   Pause

Restart   sheep

Start   Try again

Success   Great
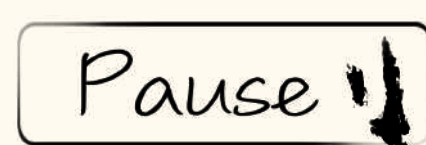
AUDIO

At the same time, in order to improve the immersion of the game, we also looked for sound effects for the action of drawing the bow, shooting, and focusing the bull 's-eye.

BACKGROUND

For this project, we needed four background images with a strong Chinese cultural style. Use AI drawing to combine various elements such as color palettes, textures, and compositions.
The first image is characterized by grayscale tones and shows a thick brush texture. The second picture contains elements such as butterflies, Bridges, cranes and clouds, all depicted in traditional Chinese painting styles.
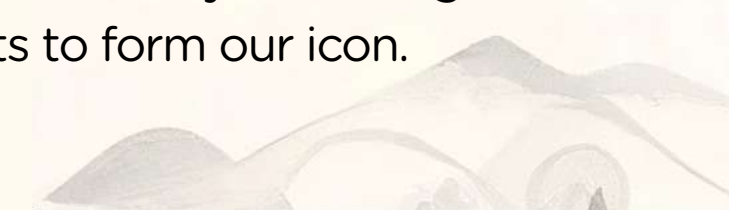

ICON DESIGN

汉字

Hanzi
(Chinese characters)

We wrote "汉字" by hand using elements of Chinese calligraphy. At the same time overlay the background elements to form our icon.


Principal person in charge：Han Hsun Shih、Xiao Liang

CIRCUITS AND CODE

INPUT

Three sensors transmit data to unity via Arduino

Arduino code display

```cpp
// touch sensor
currtouched = cap.touched();
for (uint8_t i=0; i<12; i++) {
  // it if *is* touched and *wasnt* touched before, alert!
  if ((currtouched & _BV(i)) && !(lasttouched & _BV(i)) ) {
    //Serial.print(i);
    Serial.println("Wire:1");//touched
  }
  // if it *was* touched and now *isnt*, alert!
  if (!(currtouched & _BV(i)) && (lasttouched & _BV(i)) ) {
    //Serial.print(i);
    Serial.println("Wire:0");//released
  }
}
// reset our state
lasttouched = currtouched;
return; // important!! It works
for (uint8_t i=0; i<12; i++) {
  Serial.print(cap.filteredData(i)); Serial.print("\t");
}
for (uint8_t i=0; i<12; i++) {
  Serial.print(cap.baselineData(i)); Serial.print("\t");
}
delay(50);
// orientation sensor
  sensors_event_t event;
  bno.getEvent(&event);
  Serial.print("Vector3,");
  Serial.print(event.orientation.x, 4);
  Serial.print(",");
  Serial.print(event.orientation.y, 4);
  Serial.print(",");
  Serial.println(event.orientation.z, 4);
  Serial.print("Pressure:");
  Serial.println(analogReading);
  delay(50);
// force
  int analogReading = analogRead(FORCE_SENSOR_PIN);
```
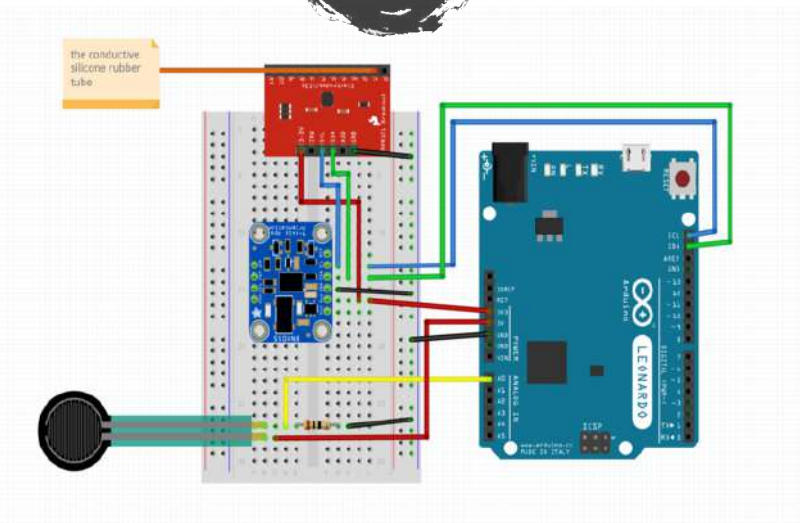
Unity receives Arduino value code presentations

```csharp
public void CheckArduino()
{
  {
    string data = sp.ReadLine();// ReadByte();

    if (data.StartsWith("Vector3,"))
    {
      string[] splitData1 = data.Split(',');
      float xValue = float.Parse(splitData1[1]);
      float yValue = float.Parse(splitData1[2]);
      float zValue = float.Parse(splitData1[3]);
      lightPos = new Vector3(-1 * ((xValue / 360) * 100 - 50), (yValue + 45) / 2 + 10, -2.5f);
      //print("lightPos"+lightPos);
    }

    else if (data.StartsWith("Wire:"))
    {
      string[] splitData1 = data.Split(':');
      int wireStatus = int.Parse(splitData1[1]);
      print("wireStatus:" + wireStatus);

      if (wireStatus == 0) // release
      {
        currentTouch = false;
        lastTouch = true;
        //print("currentTouch:"+ currentTouch+ ",lastTouch:"+ lastTouch);
      }
      else if (wireStatus == 1) // touched
      {
        currentTouch = true;
        lastTouch = false;
      }
    }
  }
}
```

```csharp
1 reference
void CheckArduino()
{
  string data = sp.ReadLine();
  // darts
  if (data.StartsWith("Pressure:"))
  {
    string[] splitData1 = data.Split(':');
    int pressureStatus = int.Parse(splitData1[1]);
    //print(pressureStatus);
    if (pressureStatus > 50)
    {
      boolPressureStatus = true;
    }
    else boolPressureStatus = false;
  }
}
```

OUTPUT

Unity part output code display

Fetch the output from the Arduino orientation sensor, and control the position of point light in Unity.

Fetch the output from the Arduino touch sensor, and trigger animation and sound effects in Unity.

Fetch the output from Arduino force sensor, and trigger animation and sound effects in Unity.

```csharp
public void LightPosition()
{
  // rain
  if (lightController.lightPos.x > -14.1f &&
      lightController.lightPos.x < -8.96f &&
      lightController.lightPos.y < -1.67f &&
      lightController.lightPos.y > -8.06f)
  {
    rainPos = true;
    print("rainPos: " + rainPos);
  }
  else
  {
    rainPos = false;
    print("rainPos: " + rainPos);
  }

  // sheep
  if (lightController.lightPos.x > 2.18f &&
      lightController.lightPos.x < 6.58f &&
      lightController.lightPos.y < 2.33f &&
      lightController.lightPos.y > -1.93f)
  {
    sheepPos = true;
    print("sheepPos: " + sheepPos);
  }
  else {
    sheepPos = false;
    print("sheepPos: " + sheepPos);
  }
}
//rain
if (/* Input.GetMouseButtonDown(0) || */
    wordIndex == 0 &&
    lightController.currentTouch == false &&
    lightController.lastTouch == true)
{
  // bow release
  bowRelease.SetActive(true);
  Invoke("CloseSoundEffect", 2f);
  // trigger animation and switch scenes
  if (rainPos == true)
  {
    print("you are right");
    successDialog.SetActive(true);
    Invoke("CloseDialog", 3f);//wait for 3s and call CloseSuccessDialog
    Invoke("NextLevel", 3f);
  }
  else if(rainPos == false)
  {
    tryAgainDialog.SetActive(true);
    Invoke("CloseDialog", 2f);
  }
}
1 reference
public void SelectTarget()
{
  if (boolPressureStatus == true)
  {
    print("you are right");
    successDialog.SetActive(true);
    Invoke("NextLevel", 6f);
  }
}
```
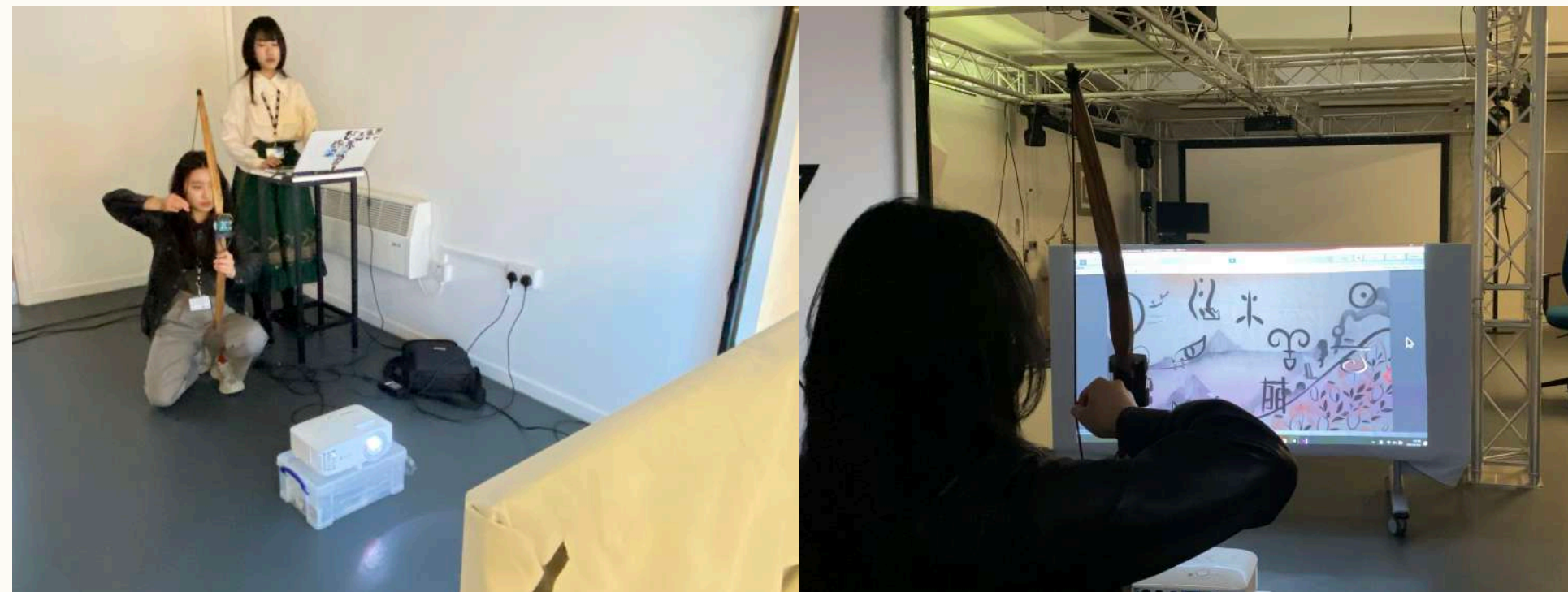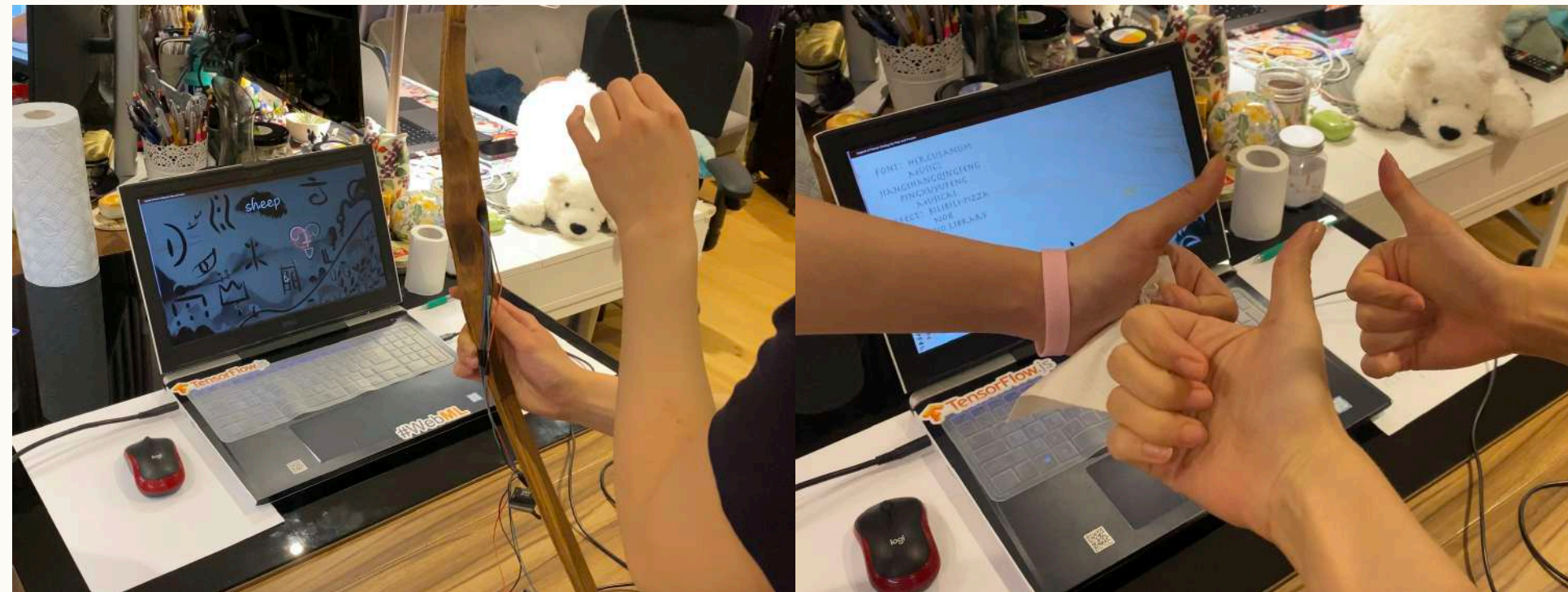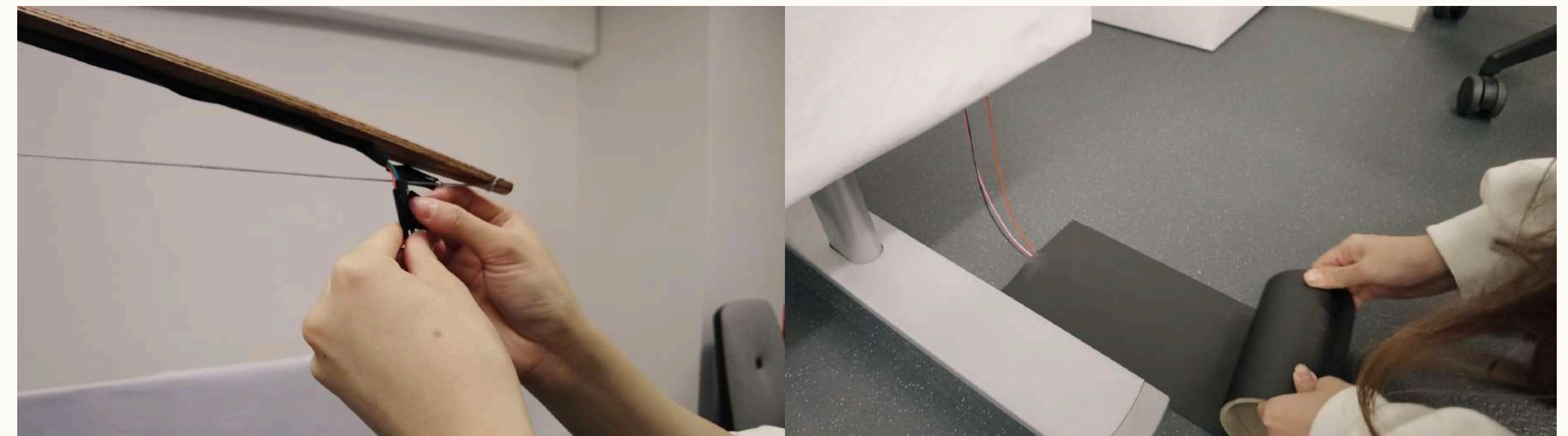
Principal person in charge: Zhou Fang、Yining Jiang

TEST

CONSTRUCTION AND ARRANGEMENT

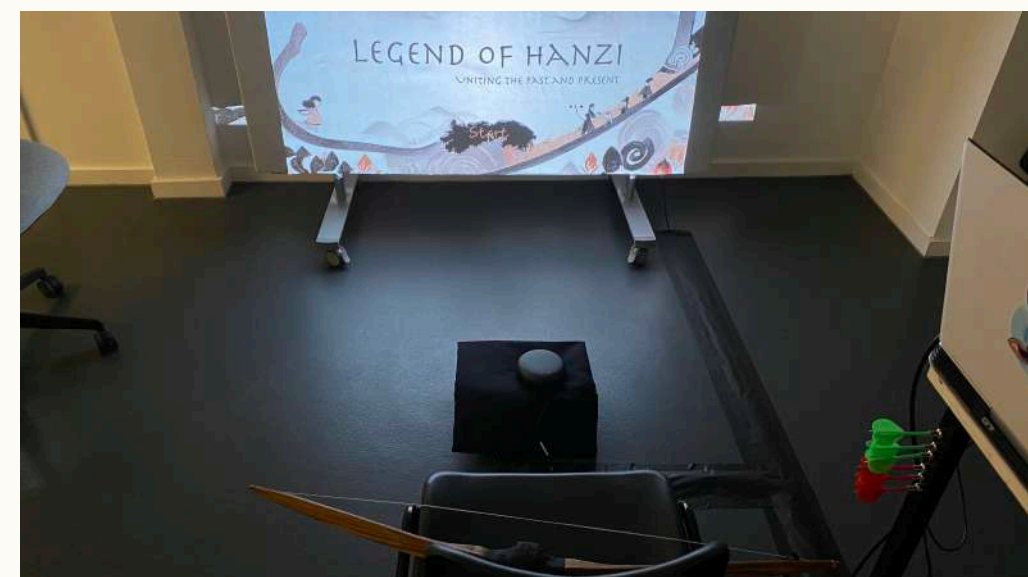We carried out many code tests and scene simulation experiments to confirm the feasibility of the design repeatedly.

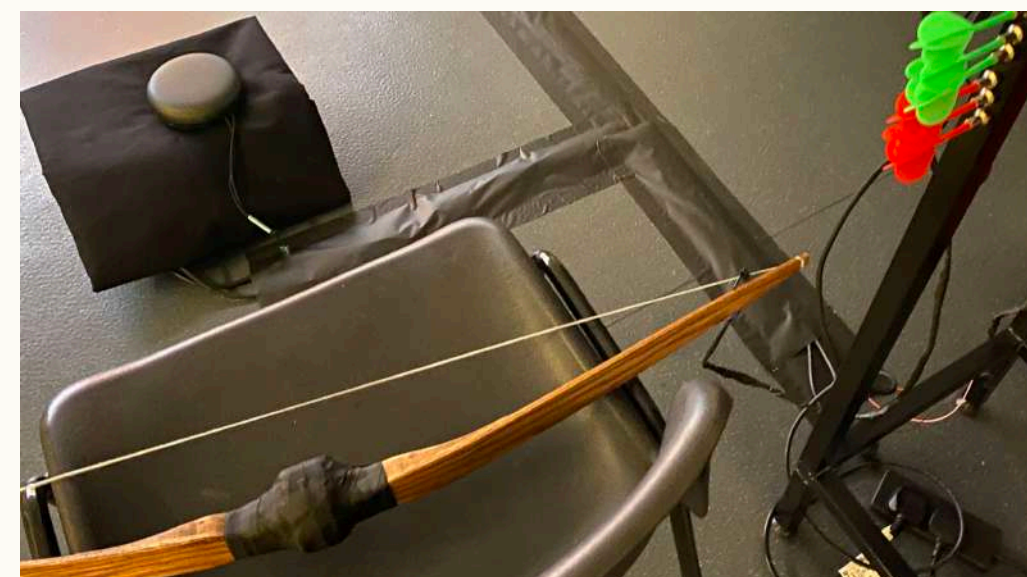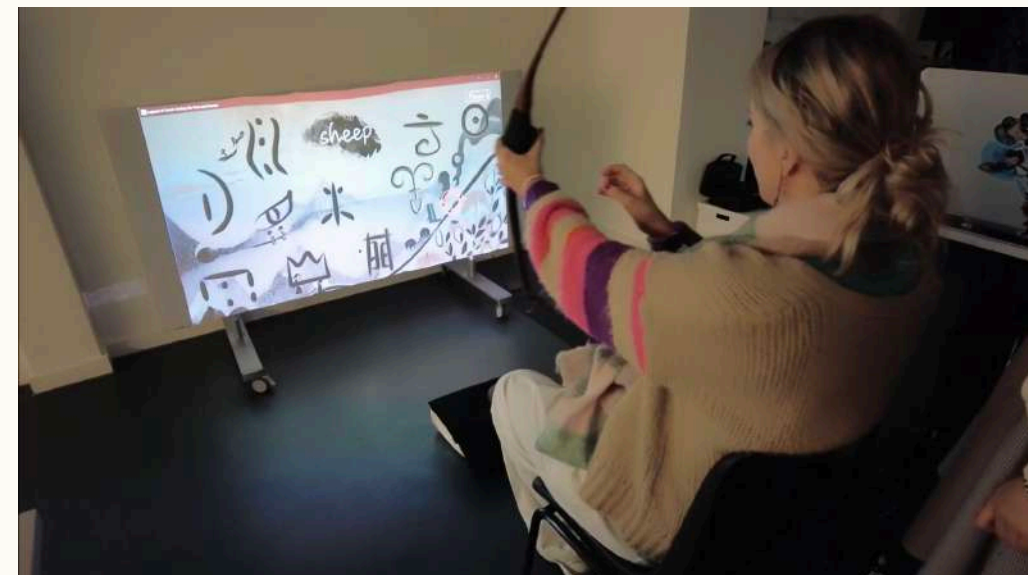Principal person in charge：Zhou Fang、Yining Jiang、Xiao Liang

EXHIBITION

Video link：https://youtu.be/5GPBzBXBggk

FUTURE

1. Add more levels: for example, recognize people's movements with dynamic video, and take the viewer to write words with strokes.

2. Adjust the force size: The current one is too small, so the game is too difficult for the audience.

3. Adjust the icon of the center tip: The size of the center needs to be the same as the size of the force. Help the audience better Orient themselves.

4. Replace the sensors that are currently wired with Bluetooth sensors.

CHALLENGE

We need to attach a sensor behind the curtain and shoot it with darts. There is a risk that the curtain will be damaged, so we can't use a normal projector.

Our solution was to replace the small projector and find a new hard background for support, then mount the sensor on the supported background wall and cover it with curtains.