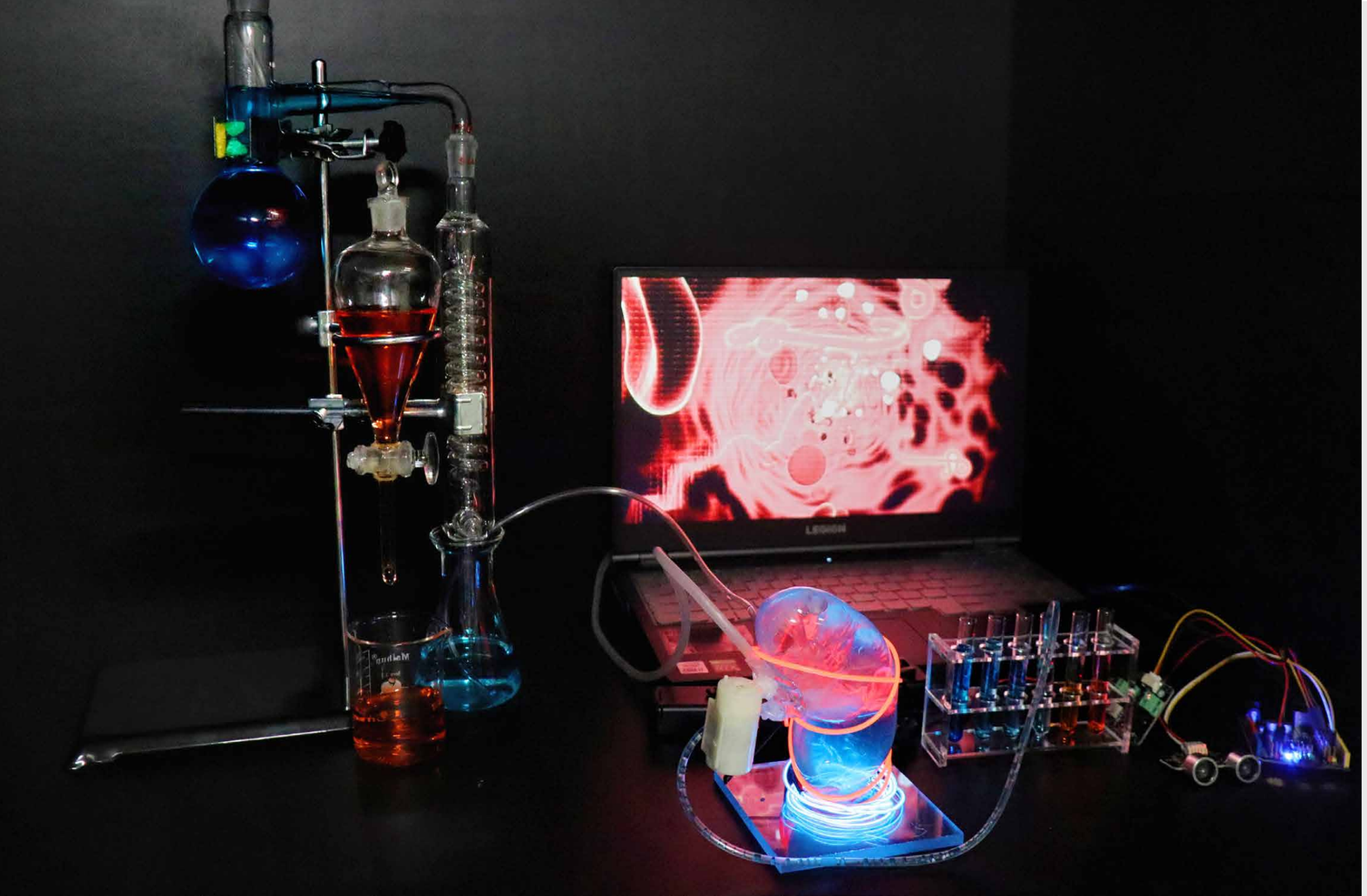


HydroPurify Interact

In the future, sewage purification requires the interaction between machines and the human body, with the kidneys as the main filtering link, and new rules will emerge in the future society.

Interactive devices | *Speculative design* | 2023.8.15-2023.10.15

BACKGROUND

As one of the three major ecosystems in the world, wetland refers to natural or artificial, perennial or seasonal water areas and water with significant ecological functions, including sea areas with a depth of more than six metres at low tide. Wetlands are natural or artificial, perennial or seasonal water areas and water with significant ecological functions, including sea areas with a depth of up to six metres at low tide.

Globally, 6% of the world's wetlands provide habitat for 40% of the world's wildlife. Wetlands provide a home for 40% of all wildlife, and more than 1 billion people around the world depend on them for their livelihoods. Wetlands are known as the **"kidneys of the earth"** and have important ecological functions such as water conservation, water purification, maintenance of biodiversity, flood and drought control, climate regulation and carbon sequestration. In addition, they also play a important role in environmental, economical and social service functions.

The current situation of the conservation of wetlands globally is bleak.Wetlands are disappearing three times faster than forests, and nearly 90% of the world's wetlands, including rivers, lakes, marshes and peatlands, have been lost.

https://youtu.be/TapD6u9oZLs?si=c1kRjfqFSXTdzchM

PESTLE ANALYSIS

Politics

World Wetlands Day in 2023 had the theme of 'Wetland Restoration', in order to raise the awareness and importance of wetlands.

Economic

The proportion between ecological wetlands and arable land is not reasonable, which weakened wetlands functions and disrupted the goal of maximizing ecosystem value.

Social

The knowledge popularity and awareness of wetland protection needs to be raised, as well as coordination among departments needs to be enhanced.

Techlogical

Technology for wetland rehabilitation, including estuarine man-made constructed wetland restoration technology, in-situ as well as ex-situ artificial wetland restoration technology for river channels.

Environmental

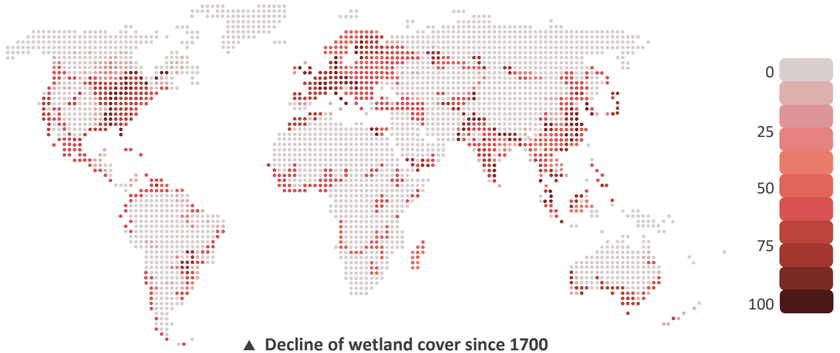
Water conservation & purification, flood & soil erosion control, groundwater recharge, landscaping, climate regulation, carbon cycle maintenance and coastal protection.

Legal

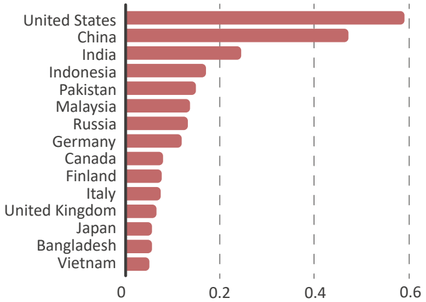
Wetland Protection Law, made in 2021 has provided stable and powerful guarantee for wetland protection and restoration.

RESEARCH

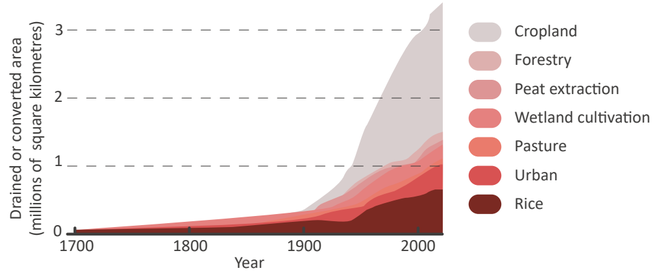
The following is a comprehensive assessment of the trajectory of wetland area loss and the major driving factors of its land use.(1700-2023)



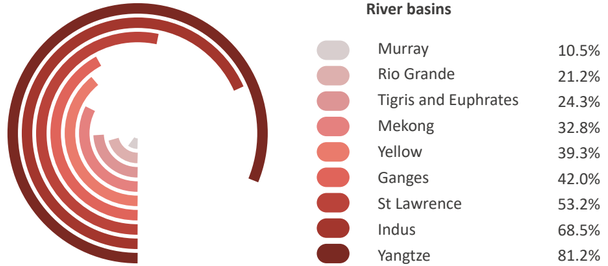
▲ **Decline of wetland cover since 1700**
(%of cell)



▲ **Major areas and countries where wetlands have disappeared (million of square kilometres)**



▲ **Land uses that have contributed most to wetland loss over time**



▲ **Percentage of freshwater loss affected by wetland degradation**

▲ The study found that the net loss of wetland area globally since 1700 was 21 %(3.4 million square kilometres), which is lower than previously extrapolated. The land use contributing to wetland loss is predominantly cropland, which contributes nearly two-thirds (62 %) of wetland loss. Wetland loss is concentrated in Europe, the United States of America, China, India, Russia and Indonesia, and expanded rapidly in the mid-20th century.

FUTURE TRIANGLE

WEIGHT OF HISTORY

Destroying water purification resources for short-lived gains.
Ecological pollution
Wetland decline

PULL OF FUTURE

Future needs clean drinking and domestic water
The technology and equipment for water purification is in the hands of a few wealthy people.
Ordinary people pay a price for access to clean water.

possible futures

PUSH OF PRESENT

Huge water consumption contradicts scarce water resources.
Limited water purification equipment, technology resources and the number of population contradiction.

SIGNAL

All wetlands will disappear and the imbalance in the regulation of water resources will turn fresh water into "poisoned water". A "water" currency will be created and access to freshwater resources will become a survival task.

future signs

TREND

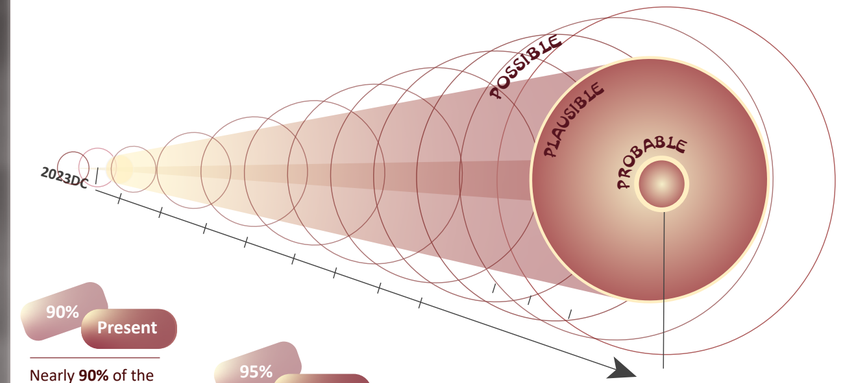
Rich mastery of purification technologies and devices
Government provides policy and financial support
Ordinary people do what they need to do to survive.

PROBLEMS

Studies have found that important substances for water purification can only be synthesized by the human body.
Human kidneys and machines combine to form a water purification device.

FUTURE WHEEL

FUTURE CONE



90% **Present**

Nearly **90%** of the world's wetlands have **disappeared** and the ecosystem has been **damaged.**

95% **Metaphase**

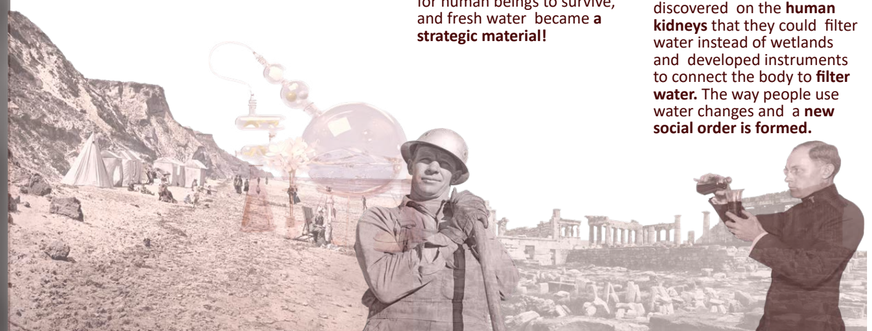
By **2073, 95%** of wetlands will be **gone**, plants and animals will be extinct, and heavy metals will be difficult to degrade.

99% **Last phase**

In **2123**, the huge demand drained all the wetlands, and fresh water became **"toxic"**, making it difficult for human beings to survive, and fresh water became **a strategic material!**

100% **New world**

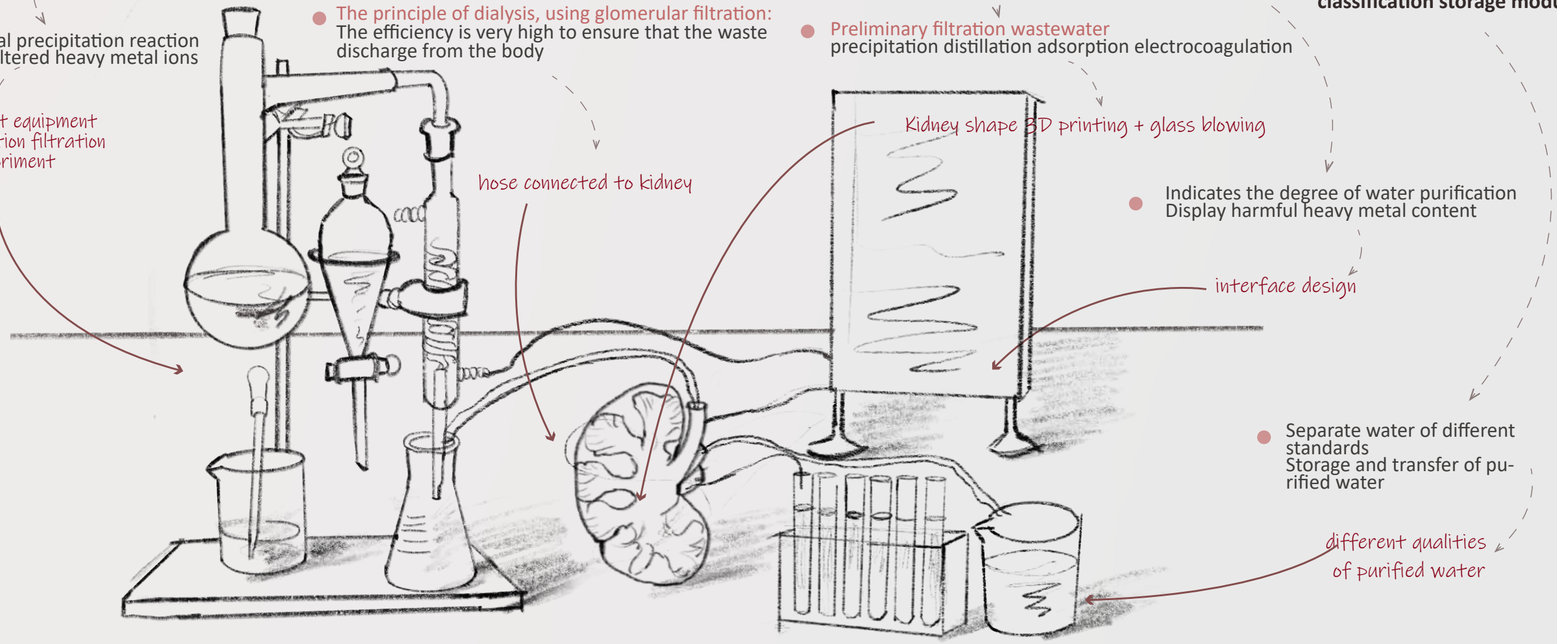
In the year **2223**, scientists discovered on the **human kidneys** that they could filter water instead of wetlands and developed instruments to connect the body to **filter water.** The way people use water changes and a **new social order is formed.**



CONCEPT DEVELOPMENT & SKETCH

Water purifying plant

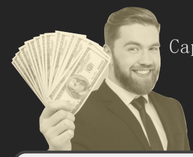
- **Impurities processing module**
  - Chemical precipitation reaction
    Purify filtered heavy metal ions
  - experiment equipment
    Sedimentation filtration
    experiment
- **External filtration and purification module**
  - The principle of dialysis, using glomerular filtration:
    The efficiency is very high to ensure that the waste discharge from the body
  - hose connected to kidney
- **Human body filtration and purification module**
  - Preliminary filtration wastewater
    precipitation distillation adsorption electrocoagulation
  - Kidney shape 3D printing + glass blowing
- **Display connecting module**
  - Indicates the degree of water purification
    Display harmful heavy metal content
  - interface design
- **Water quality classification storage module**
  - Separate water of different standards
    Storage and transfer of purified water
  - different qualities of purified water



Product value point: 1.Treat heavy metals to protect other creatures.2.Reduce kidney pressure.3.Convenient classification management. 4.Use water more efficiently.5.Monitor the degree of purification in real time.

SYSTEM STRUCTURE

In the future, under conditions of scarcity of water resources, people will be forced to extract and purify polluted water due to survival pressure, resulting in a new water purification model.



Provide water purification systems and platforms

Water purification labor

Points and equipments

Pay taxes

Water purification technology

Policy Support
Financial subsidy

Policy Support

technology research and development

Points can be exchanged for different levels of water resources (such as domestic water, drinking water, etc.)

Task

Complete water purification tasks and exchange points for redeeming different levels of water resources.

TESTING

Experiment


1.Weigh the required medicines


2.Add the desired solvent

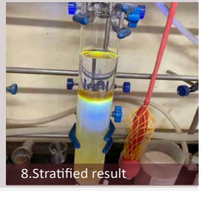

3.Synthesis reaction


4.Sample sampling


5.Centrifugal analysis


6.Data logging


7.Precipitation result


8.Stratified result

Purpose of the experiment: To explore the principle and method of existing technology to purify sewage, and the degree of purification. Choose the appropriate method as the external purification part of the device.
Experimental conclusion: At present, the experimental process of water purification is very complicated, and it is difficult to carry out water intake in a large area.

3D printing

Burnt glass

The main body of the kidney is mainly made of 3D printing, and the blood vessels and other details are made of fired glass, which is connected to other filtration experimental equipment.

PROCESSING

This Arduino code uses the HC-SR04 Ultrasonic Range Sensor to detect if there is an object within 8 cm and, if so, turns on the water pump connected to pin number 6.

Coding and hardware test

sketch_oct10d | Arduino IDE 2.1.1
文件(F) 编辑 项目 工具 帮助
Arduino Uno
sketch_oct10d.ino

```
#define TRIG_PIN 4
#define ECHO_PIN 5
#define PUMP_PIN 6

void setup() {
  pinMode(TRIG_PIN, OUTPUT);
  pinMode(ECHO_PIN, INPUT);
  pinMode(PUMP_PIN, OUTPUT);

  digitalWrite(PUMP_PIN, LOW);

  Serial.begin(9600);
}

void loop() {
  long duration, distance;

  digitalWrite(TRIG_PIN, LOW);
  delayMicroseconds(2);

  digitalWrite(TRIG_PIN, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIG_PIN, LOW);

  duration = pulseIn(ECHO_PIN, HIGH);
  distance = (duration/2) / 29.1;
```

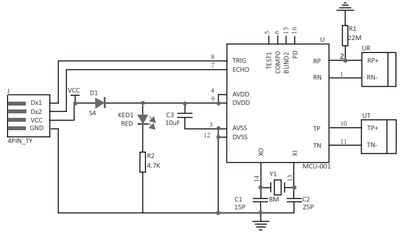
sketch_oct10d | Arduino IDE 2.1.1
文件(F) 编辑 项目 工具 帮助
Arduino Uno
sketch_oct10d.ino

```
void loop() {
  long duration, distance;

  digitalWrite(TRIG_PIN, LOW);
  delayMicroseconds(2);

  digitalWrite(TRIG_PIN, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIG_PIN, LOW);

  duration = pulseIn(ECHO_PIN, HIGH);
  distance = (duration/2) / 29.1;

  if (distance < 8) {
    digitalWrite(PUMP_PIN, HIGH);
    Serial.println("The pump is activated.");
  } else {
    digitalWrite(PUMP_PIN, LOW);
    Serial.println("The pump is off.");
  }

  Serial.print(distance);
  Serial.println(" cm");

  delay(500);
}
```

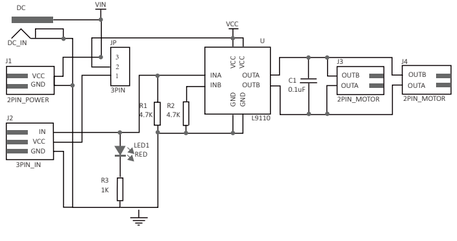
输出

Circuit diagram

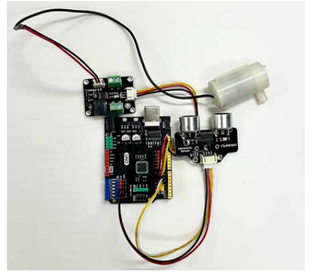
- Ultrasonic sensor

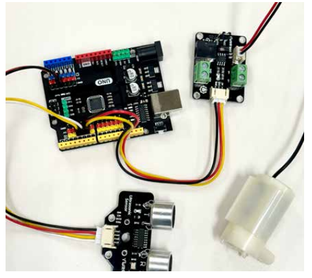


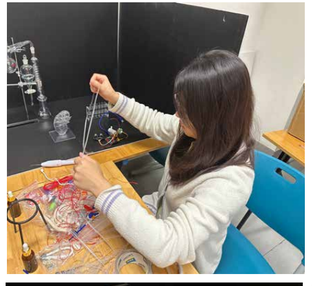
- Pump drive

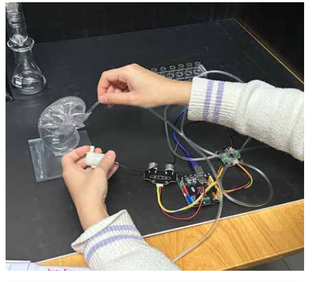


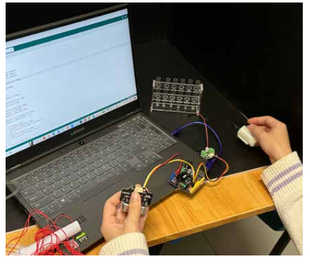
Prototype details

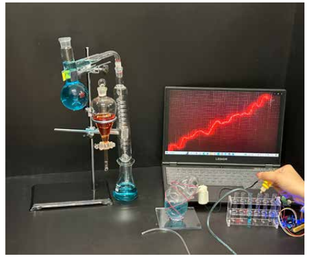






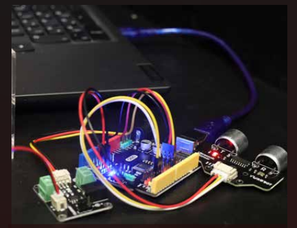






FINAL

Story Board



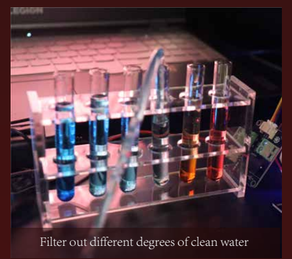
The distance sensor senses the past of the person and the device starts to operate

The display shows information such as the condition of the person's kidneys and the time of filtration

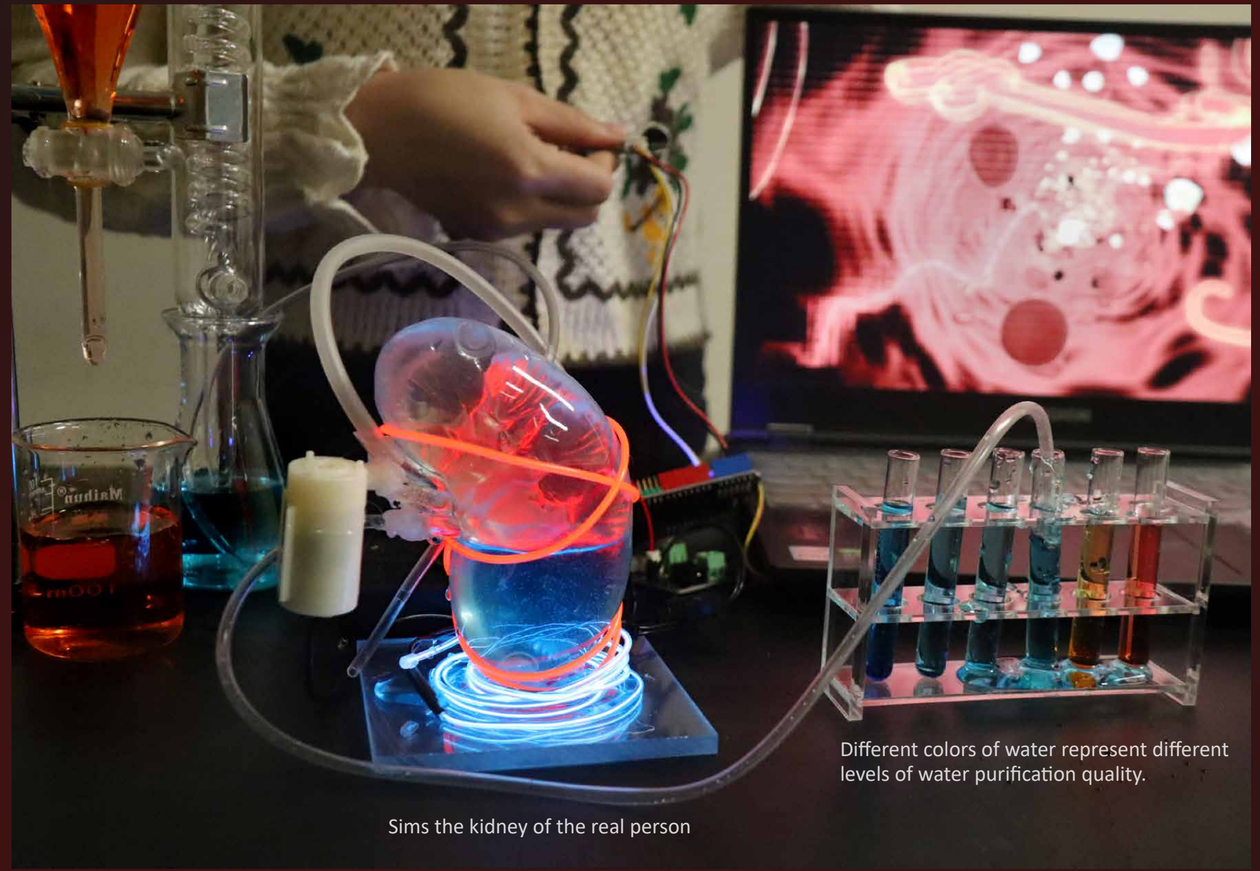
External filtration system for preliminary purification

The glomeruli in the kidneys begin to purify.

Dispose of filtered hazardous substances



Filter out different degrees of clean water



Sims the kidney of the real person

Different colors of water represent different levels of water purification quality.

Detail

The left side of the device represents the water purification part of the machine. When the human body is close to the distance sensor, it means that the switch is turned on, and the kidneys participated in the purification process, the water pump on the right starts to operate, completing the entire water purification process.