作品名稱
Project Name

微生物溝通系統

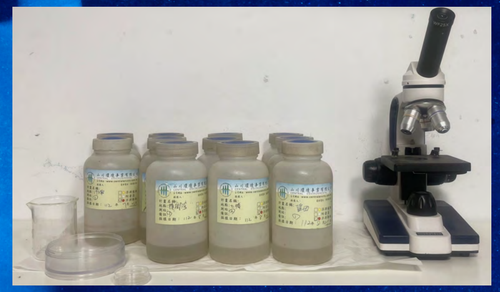
Microbial Communication System

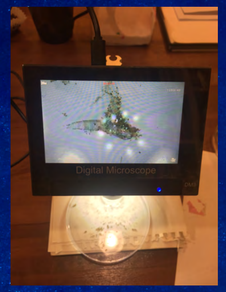
作品編號
Project Number 000222

共創單位
Co-creation 和碩聯合科技 PEGATRON

作者
Designer 王懷遠 Mark

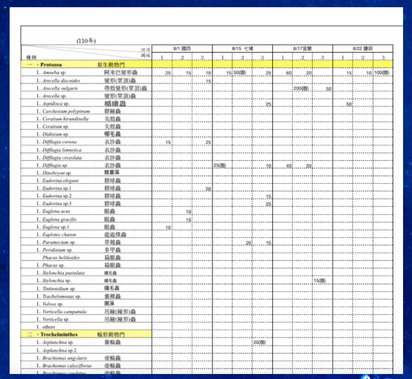
微生物鑑種研究
Microbial Identification Research





鹽田 1 __劍水蚤
Cyclops (Nauplius)

原生動物
Protist

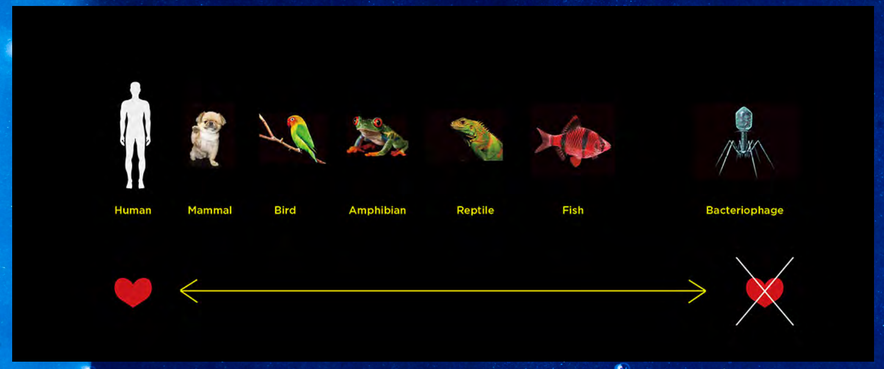


2030_ 八月微生物
Microorganisms Report, August. 2023

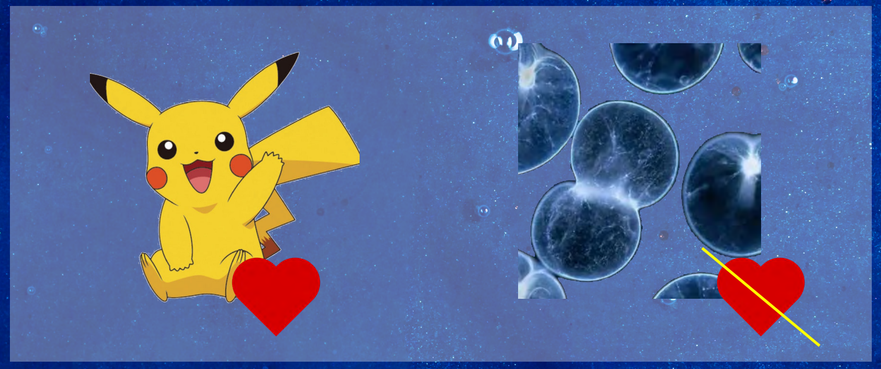
微生物與環境
Microorganisms and Environment

- 人體只有 43% 的細胞屬於人類，而其他的部分則是由非人類的微生物細胞群組成。
- 浮游生物是地球上氧氣供應最大來源，地球百分之五十以上的氧氣，是經由浮游生物進行光合作用所提供。
- 某些微生物的過量增值會造成的有害藻華 (Harmful algal bloom)，在水質中產生毒素，使飲用水源受到威脅，甚至影響沿海經濟。
- 微生物與環境的參數變化高度相關，例如溫度、水中酸鹼值、產氧量量、空氣污染指數等等，如果能對微生物進行更仔細的觀測，可以提前預知環境可能的趨勢走向。

人類的物種偏好
Species Preferences

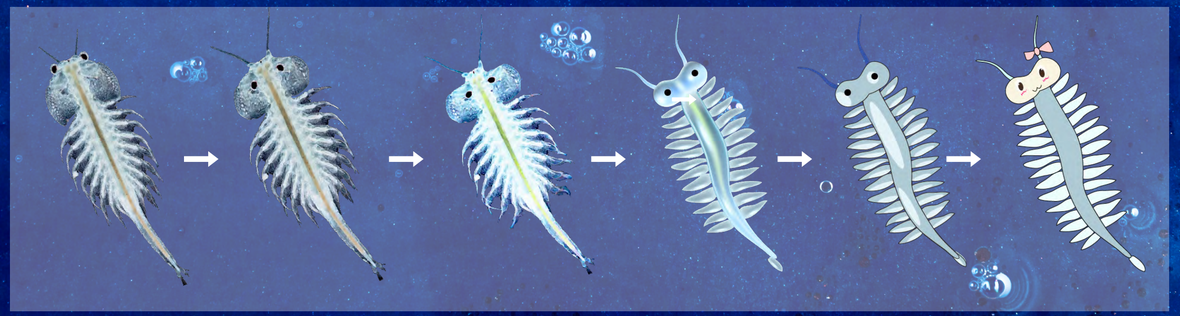


人類對物種喜好光譜
Spectrum of Species Preferences



皮卡丘與無毒鞭毛藻洗喜愛程度比較
Comparison of love between Pikachu and dinoflagellates

微生物可愛圖像化
Microorganisms cute transformation



鹵蟲屬(豐年蝦)逐漸可愛卡通化
Artemia gradually become cute and cartoony

微生物對我們的環境非常重要，不過因為規模與物種相似程度的緣故，我們的同理心卻難以對他們產生作用，因此該計畫試圖透過未來的科技技術，完成對微生物型態的觀測，並轉化成可愛的樣子，藉此提升人類對重要微生物的關注與喜愛。補足我們存在物種的

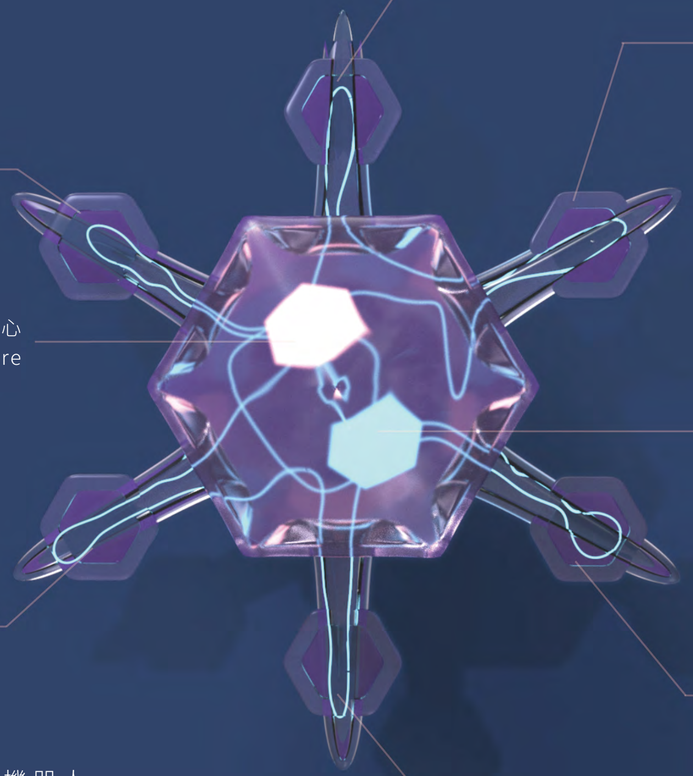
作品概述
Project description

該計畫試圖透過奈米機器人技術，組建一個與環境微生物的即時溝通系統，透過對環境微生物的週期、種類、數量等觀測，得知未來河川、湖泊等環境變化的趨勢與走向，並對於可能產生的污染與災害進行即時的預警。奈米機器人對環境物種進行探測之後，也能通過手機ＡＰＰ即時顯示物種、讓民眾到大自然中休憩時，也能得到搜集微生物的趣味，縮短我們與微生物相互理解上的限制，以此提升群眾對環境、微觀物種的關注與意識，在遊戲中一起觀察環境的變化，並期望在雙向的對話中拉近人類與非人物種的距離。

This project aims to establish a real-time communication system with environmental microorganisms through nanorobot technology. By observing the cycles, types, and quantities of environmental microorganisms, it aims to predict trends and developments in future changes in environments such as rivers and lakes. Additionally, it provides real-time warnings for potential pollution and disasters. After detecting environmental species, nanorobots can also display species information instantly through a mobile app. This allows the public to engage in the fascinating task of collecting microorganisms while enjoying nature, thereby reducing the limitations in our mutual understanding with microorganisms. The goal is to enhance public awareness and interest in the environment and microscopic species, collectively observing environmental changes in a game-like context, and fostering closer interaction between humans and non-human species through two-way dialogue.

微生物觀測系統
Microbial observation system

捕捉微生物影像、掃描其外觀 / 將物種數量與種類資料傳給控制系統 / 將語音訊號傳送給微生物 / 引導微生物到適合生長的範圍
Capture microbial images, scan their appearances, transmit species count and type data to the control system, send voice signals to microbes, and guide microbes to suitable growth areas.



微生物溝通機器人
Microbial communication robot

微生物機器人運輸系統
Microbial robotic transport system

微生物機器人運輸系統
Microbial robotic transport system

系統藉由太陽能提供電力，可依設定自動到達想要觀測的位置。
The system is powered by solar energy power, can be set automatically arrive at the location you want to observe.

系統到達目的地後便會開始放出機器人。
Once the system reaches its destination, it will begin releasing the robots.

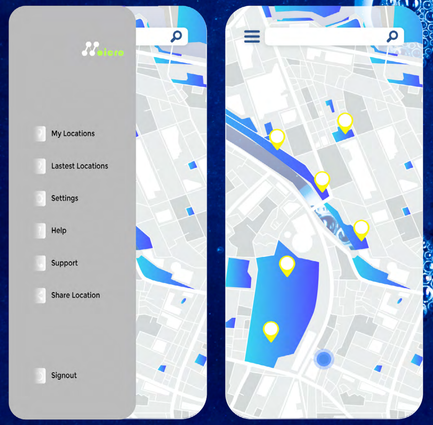
微生物機器人運輸系統
Microbial robotic transport system

系統到達目的地後藉由水面下的閘門門發射微型機器人進行觀測。

After the system reaches its destination, it releases the micro-robots for observation.

微生物溝通APP
Microbial Communication APP

透過 APP 搜集不同的微生物
Collect different microorganisms through APP



透過 APP 找到微生物的位置
Find the location of microorganisms through APP

透過 APP 顯示未來環境走向
Show future environmental trends through APP

1. 找尋想交流的微生物地點，前往該處。Locate a place with microbes you want to communicate with and head to that location.

2. 搜集該處的微生物圖鑑、觀察、把想說的話輸入APP、與其進行交流。Collect the microbial catalog from that location, observe, input your desired messages into the app, and engage in communication with them.

3. 透過APP的微生物分析得知環境未來走向，一起關注環境的變化。Use the app's microbial analysis to understand the future direction of the environment and collectively pay attention to environmental changes.

微生物溝通APP
Microbial Communication APP

想說的話
what we want to say

他們的情況
their situations

聲音訊號
sound signal

活動影像
life images

人類
Human

微生物溝通機器人
Microbial communication robot

微生物
Microorganism

唐娜·哈洛威《 伴侶物種宣言 》

我們與動物的關係總先於牠們的存在，亦即牠們之所以是什麼，在於我們和牠們維持的關係，哈洛維將「關係」(relation) 作爲一個分析的最小單位，尋求重新磨塑 (remolding ／ remodeling) 的機會，重新看待我們身邊的物種，也使我們必須隨時調整自己，尋求與他者的適當的關係與距離。

Our relationship with animals precedes their existence, meaning what they are is determined by the relationships we maintain with them. Harloweve considers "relation" as the smallest unit of analysis and seeks opportunities for remolding and remodeling the species around us. This also requires us to constantly adjust ourselves, seeking appropriate relationships and distances with others.

微生物觀測系統（空氣 / 地表）
Microbial observation system（Air/Ground）