

Physical Computing Project Blog

–Symbiotic corals

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Introduction

Concept

In the last 30 years, we have lost 50% of the world's coral because of human behaviour. Global coral bleaching events occur frequently and duration become longer(1998; 2010; 2015). Human activities release carbon dioxide into the atmosphere. Increasing CO₂ not only affects the climate; it also has direct, chemical effects on ocean waters, which called ocean acidification. It will reduce pH level of ocean, then decrease the coral growth.

Coral and algae depend on each other to survive. Corals have a symbiotic relationship with microscopic algae called zooxanthellae that live in their tissues. These algae are the coral's primary food source and give them their colour. When the symbiotic relationship becomes stressed due to increased ocean temperature or pollution, the algae leave the coral's tissue.

Coral is left bleached and vulnerable. Without the algae, the coral loses its major source of food, turns white or very pale, and is more susceptible to disease. The fact that coral bleaching is already a serious problem.

However, because people do not have direct contact with it in their daily lives, there is no strong awareness of the need to improve the situation and to maintain a healthy coral ecosystem.

So....How do we make humans aware of this? This was my initial insight.

Housing

I initially envisaged a number of options. At first I wanted to use 3D-printing; however, there are not many materials available for 3D and the light does not penetrate very well. Then thought about say using silicone and plaster powder to pour the mould, followed by dripping glue to create the coral body. However, due to the delay in the arrival of the purchased materials, I ended up having to use wire to create the skeleton of the coral, and unexpectedly the final result was beyond my expectations.

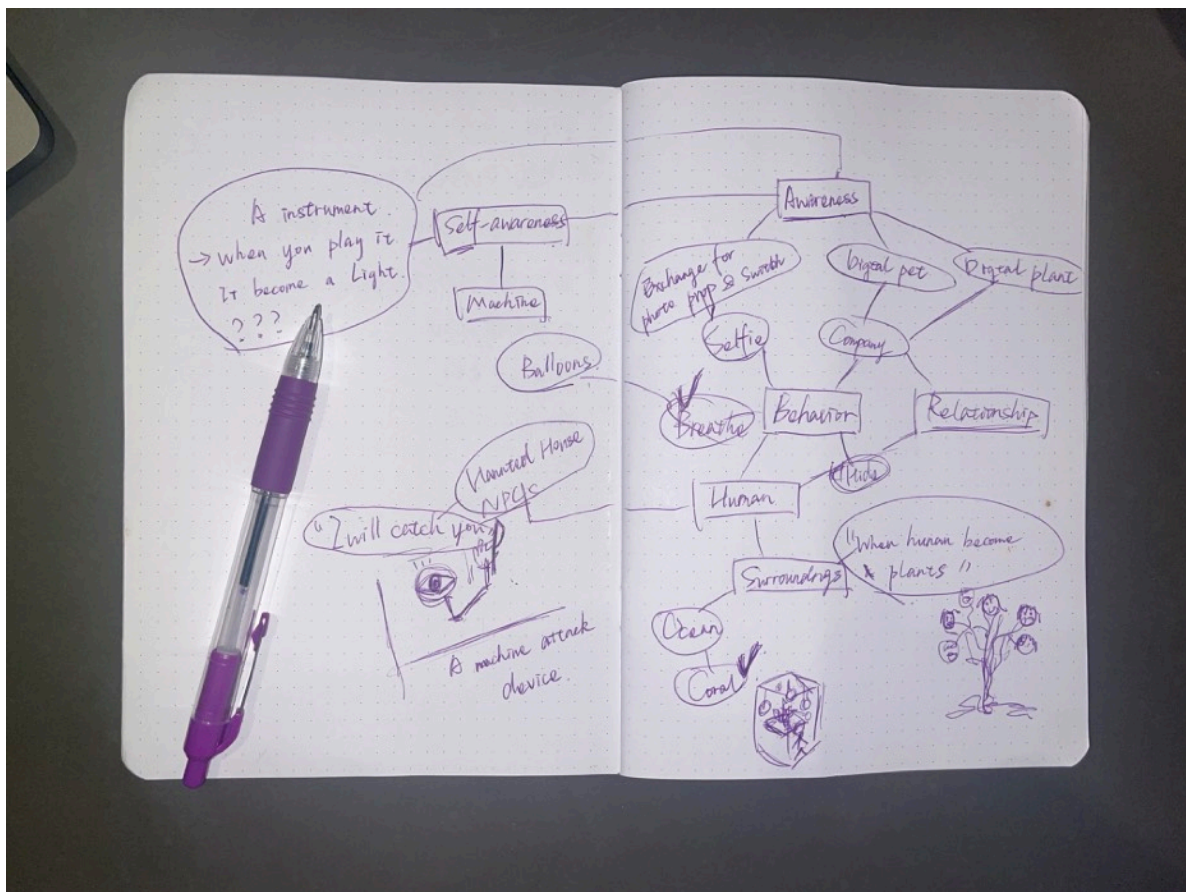
Interaction process

I envisioned using light to show the death process of the coral. And the lights are controlled by the participant's breathing. A sound module was added to express the sadness of the coral's disappearance.

Week 5 – Ideation

Goal for this week: come up with an idea for the physical computing final project.

There was a time when it was difficult for me to design to 'express a concept'. For a long time, most of what I did was problem-solving design. I thought about it for a long time, but my mind was still blank. I ended up doing brainstorming to choose a direction.

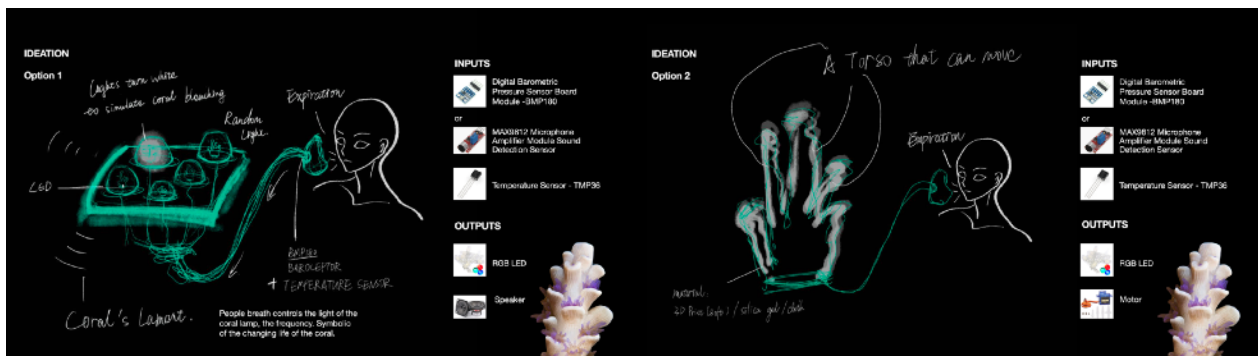


Due to my change of major studies, I was not yet aware of the kind of projects Arduino could do. After reading a few examples on Moodle, I went back to the internet to read more examples. Then I started thinking about the two themes of human behaviour patterns and self-awareness. In the end, I chose breathe, which I liked more in behaviour, and felt it was a relatively interesting sensor application.

Week 6 – Design and Planning

Goal this week: get a sense of which parts I would need, how I would use them, and get a general sense of how I could bring this project to life.

At the very beginning I had two concepts, one was to use breath to control the lights (colours) and music of the coral to simulate the process of coral bleaching to death. The second was to use breath to control the swaying of the coral's branches and lights (colours), using the swaying of the branches to express the coral's pain.



However, the second concept was abandoned by me because after research I found that the branches of hard corals do not move, while the soft corals actually move mainly because of the fluctuations of the sea.

About the housing part, I initially envisaged a number of options. At first I wanted to use 3D-printing; however, there are not many materials available for 3D and the light does not penetrate very well. And I've heard from students that the camberwell 3d printers don't work very well and some people have gone there and spent a day and come back empty handed.

Then thought about say using silicone and plaster powder to pour the mould, followed by dripping glue to create the coral body. I made a list of materials, some I chose to buy online and some I asked my friend in China to send for me.

And I've made a list of inputs and outputs that might be available to test which sensor is more suitable for use next week.

Possible inputs

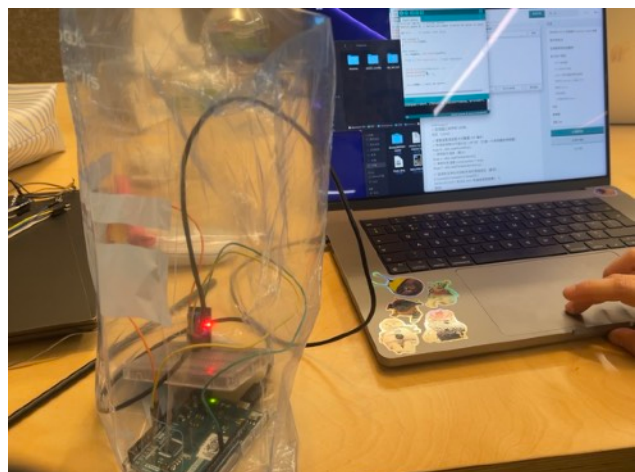
Grove – Barometer Sensor (BMP180)

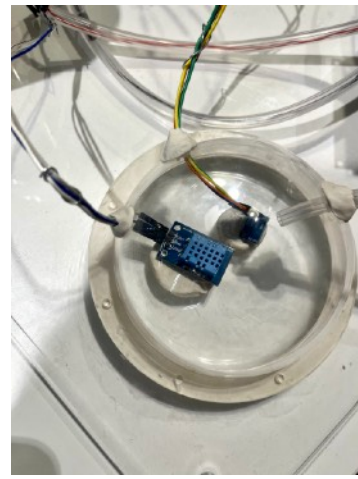
Grove – Barometer Sensor (BMP280)

Grove – Temperature&Humidity Sensor (DHT11)

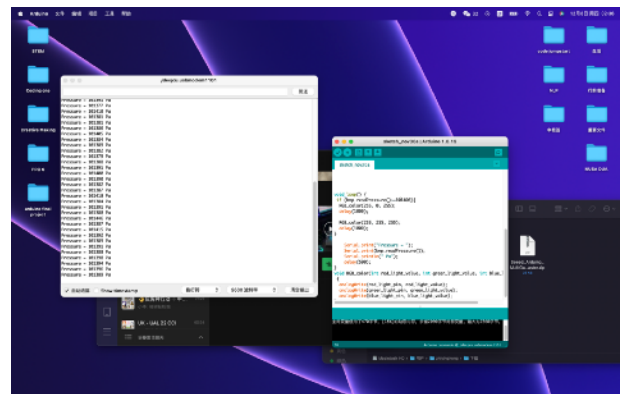
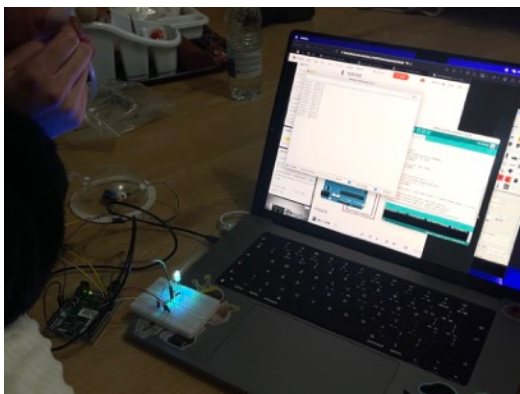
DHT20 SIP Packaged Temperature And Humidity Sensor







Second test—I created an enclosed environment with acrylic and clay that allowing them to better test the temperature and air pressure that changes due to the participant's breathing.

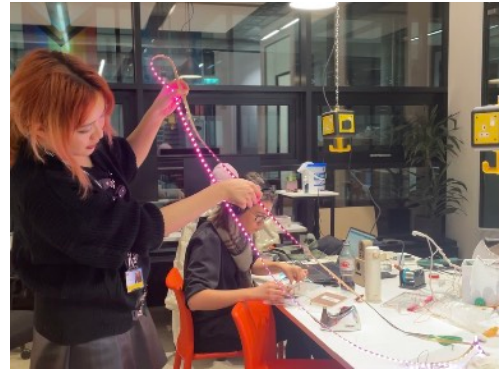
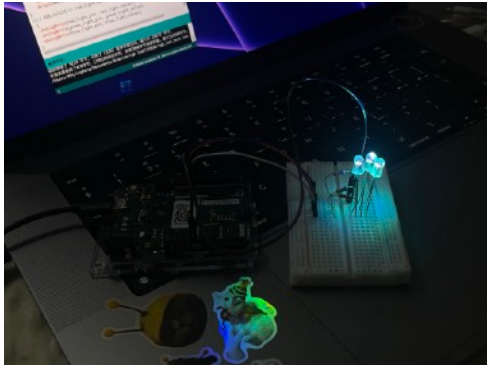


I was supposed to start working on the housing this week. However, due to the delay in the arrival of the purchased materials, I was very anxious for a while. But then on my way to buy materials, I saw a discarded lampshade that someone had thrown away by the rubbish, which happened to be perfect for the housing of my coral, so I took it home with me. I ended up having to use wire to create the skeleton of the coral, and unexpectedly the final result was beyond my expectations.



Week 8 – Experimentation & Prototyping

Goal for this week: settle on the final shape of my project with considerable progress in terms of construction, soldering, enclosure and code

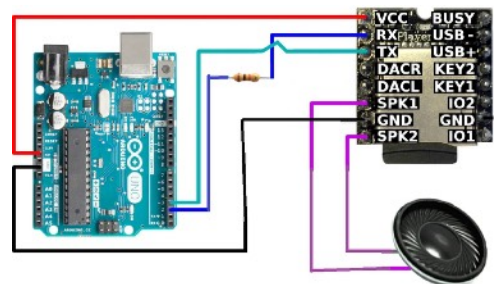


At first I just wanted to use multiple RGB LEDs simply connected in series to create a device with multiple mini coral lights. However, due to some voltage problems, the RGB LEDs did not always display a clear white light very well. I tested many times and could not solve this problem well. In addition, the materials I ordered had some accidents on the delivery: (

So I changed my plan and made a larger light using some off-the-shelf waste materials.

I also replaced the RGB LEDs with Neo pixel. And a more stable 5V external power supply was used.

Then the mp3 playback module, I followed a simple online tutorial to connect it, and it worked.



And I've finally started making the housing!



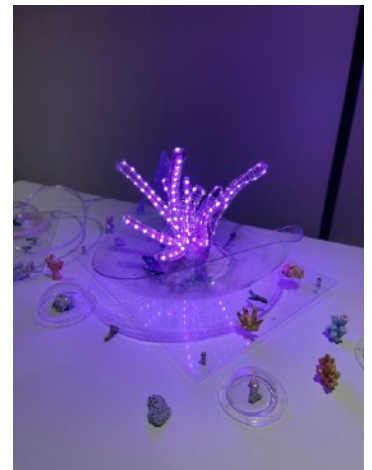
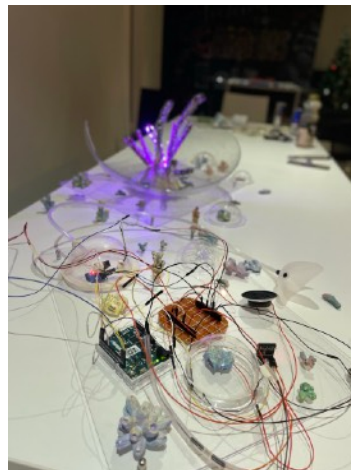
Week 9 & Week 10 – Prototyping

Goal for this 2 weeks: put the pieces together and build something that “works”



The last two weeks was mostly about working on some housing and putting together the code from each of the previous sections, inputs and outputs.

During the process we have been encountering many hardware failures and connection errors, testing one cause after another to find the error. I have to say that this has made me a lot more patient.

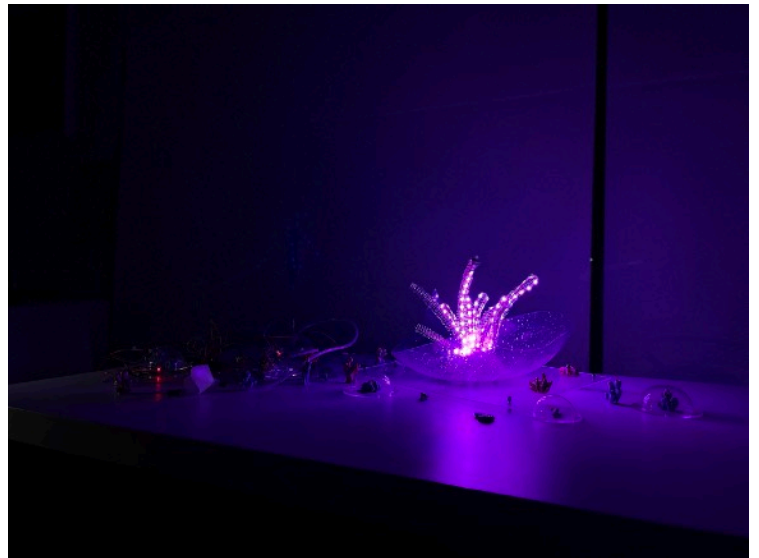


Future Possibility

When I was talking to friends around me about this project found that many people did not understand the concept of coral bleaching and death. Perhaps it is too far away from our lives.

The filming team for the documentary 'chasing coral' spent three years recording and collecting audio and video footage of coral bleaching and death from around the world.





The final documentary was produced and several talks were held around the world. I can still remember the sadness I felt when I first saw the documentary.

I hope to have the opportunity to make a more visual, larger scale installation and be part of spreading the word.

Be part of spreading the concept.