2020 WINTER DESIGN WORKSHOP

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CHIBA,JAPAN

cape

Campus
Asia
Plant
Environment innovation

01 - About CAPE

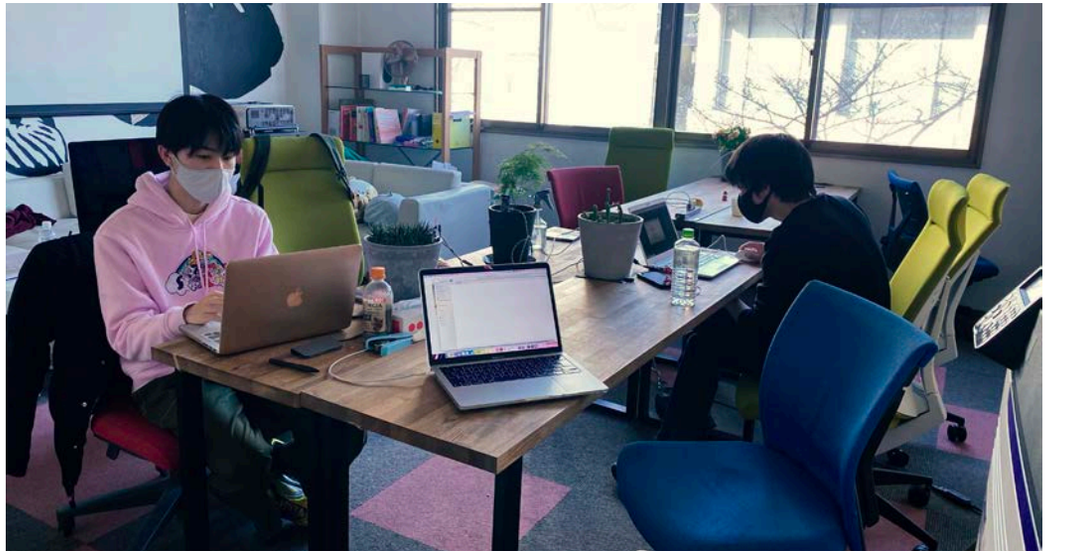
Cape program is an educational program for students from different backgrounds and nationalities, including those coming from companies and local governments,and through education, it intends to promote the "contribution of plants to the environment" in a range of urban environments. The projects have two main categories: Urban Plant Factories Projects and City Green Projects. In addition,we are also working on a reconstruction aid project in earthquake stricken areas.

02 - Objectives of Design Workshop

During this workshop, designers and plants worked with machine learning models to create generative visual elements capable to communicate emotions.

Modern AI and machine learning generative models represent an exiting opportunity for designers to conceptualize and explore the generation of new communication tools and applications.Through this methods, interaction withing humans and other living beings as plants can be enhanced.

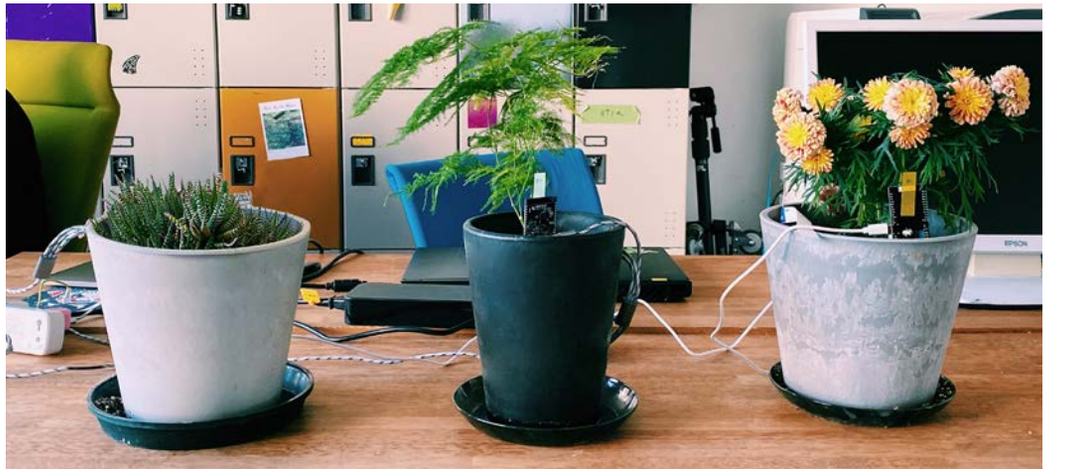
Participants from Chiba University working remotely with students from Yonsei University & Zhejiang University.



Chiba University students Trainning the GAN during the Machine Learning session.

02 - Tracking the Plants

During this Workshop, students worked online with a Plant as a TeamMate. The plant is connected to a sensor in order to capure information about it's condition like humidity and temperature. Using the plant real-time information, the design team proposed a way to interpret this data in order to communicate emotions.



Chiba University plants connected through a sensor in order to track their values remotely.

03 - Design Approach

By introducing students into Generative Machine Learning from a designers perspective, the proposed workshop aims to promote the generation of new emotion based icons and interfaces for human - plant communication and interaction. This approach can result in new proposals for emoticons, stamps and icons, user interfaces, apps, services and products.

04 - Co-Design

During this workshop, the plant, the designers and the machine learning models will take important decisions during the design process in order to create a system capable of express emotions. Technology and artificial intelligence are opening the possibility to explore the interaction with different agents and models.

05 - Main Activities during the Workshop

1. TRACKING

During the Workshop it was required to take care of the plants and the tracking their values in order to keep then safe.
Chiba University students were in charge of providing water, and moving the plant to face the sun.
Students from Yonsei & Zhejiang University were able to track the plant and its changes online.

2. TRAIN THE MODEL

After the lectures and understanding the basic concepts of Generative Adversarial Networks, students put their the hands on the code. Training and running their first GAN.

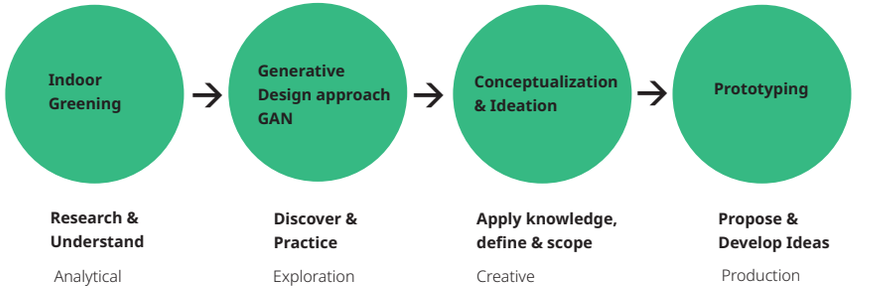
3. INTERPRET VALUES

During the workshop, students tracked plant values such as water, light and temperature in order to obtain data and understand how to keep the plant in good condition. During this activity the students had to interpret the numerical values generated by the report and associate them with the state of the plant.

4. PROPOSE NEW IDEAS

After learning the basics of generative design using GAN and making the relationship with the real data generated plants, students were able to propose new ideas for human-plant communication through the use of generative design.

06 - Worshop Process



During this workshop, a series of activities and lectures were conducted to facilitate the creative process. Starting with a lecture to understand the background and benefits of indoor greening, as well as introductory lectures on machine learning to provide basic knowledge of generative design using GAN. During these sessions they had the opportunity to explore with artificial intelligence models to create their own designs. Finally, the students then moved on to a creative process where using the knowledge acquired they were able to propose new solutions for human-plant communication. For this process the participants were divided into 3 teams. Each team was assigned a different plant with which they collaborated throughout the event.

TEAMS & MEMBERS

	**Team 1 Asparagus setaceus**	Haruka TASHIRO, Zhang Changwen, Jiwon KIM, Goeun CHOI, Runze HAN, Dong DING
	**Team 2 Haworthia fasciata**	Yue MA, Yasuhiro Kanda, Minhyuk KIM, Jeongjin PARK, Tiancheng JI, Jianfeng LI
	**Team 3 Argyranthemum frutescens**	Nanhwi Kim, Ryoko MIAKI. Jongseon PARK, Sangyun PARK, Hongbo ZHANG, Tuotuo ZHENG

07 - Interior Greening Lecture

During the first session, Chiba University Professor Ayako Nagase presented a brief Introduction about the Plants that interacted with the participants during the workshop. As well as the importance of indoor plants. This session was very important in order to understand the natural needs of the plants involved in the project and the importance of indoor greening in our current environment.

Temperature, Soil moisture, Light

Temperature	Current room temperature is appropriate.
Humidity	Current room humidity is appropriate but avoid wind from air conditioner
Soil moisture	It is better to water after soil get dry at least for a few days.
Light	Current Lux is too low for the plants. Asparagus and Haworthia is better to be window side. Margaret needs plenty of sunshine. Less than 100 lux: Most plants are not able to survive. 150 lux – 200 lux : It is possible for shade tolerant plants but not a long time 300 lux – 500 lux : It is possible for most indoor plants with healthy.

Origins of Indoor Greening Orangery

- Greenhouse designed to keep trees such as oranges during the cold season: large windows and placed fruit trees planted in wooden boxes.
- They used as a 17th-century aristocratic social venue

Haworthia fasciata 十二の巻

- Succulents
- Native to South Africa
- Light – Indoor is appropriate, half day sunshine
- Water – once a month in winter, once in two weeks in spring and autumn
- Humidity- escape too humid condition
- Temperature- Escape extreme, less than 5 degree

Argyranthemum frutescens "Smash double apricot" マーガレット Margaret

- Flowering plants
- Native to Canary Island
- Suitable for outside but inside is better in winter
- Light – Plenty of sunshine
- Water - once a week (winter), twice a week (summer)
- Humidity- escape too humid condition
- Temperature- Escape extreme temperature (over 30 degree, less than 5 degree).

Indoors Plants Lecutre by Professor Ayako Nagase from Chiba University

08
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GAN
Generative
Adversarial
Networks

During the workshop, students attended to GAN Lectures, as an introduction about Machine Learning and the use of Generative Adversarial Networks. These sessions were planned for Designers and students with no background on Machine Learning to get a basic understanding of current possibilities of using machine learning for generative design.

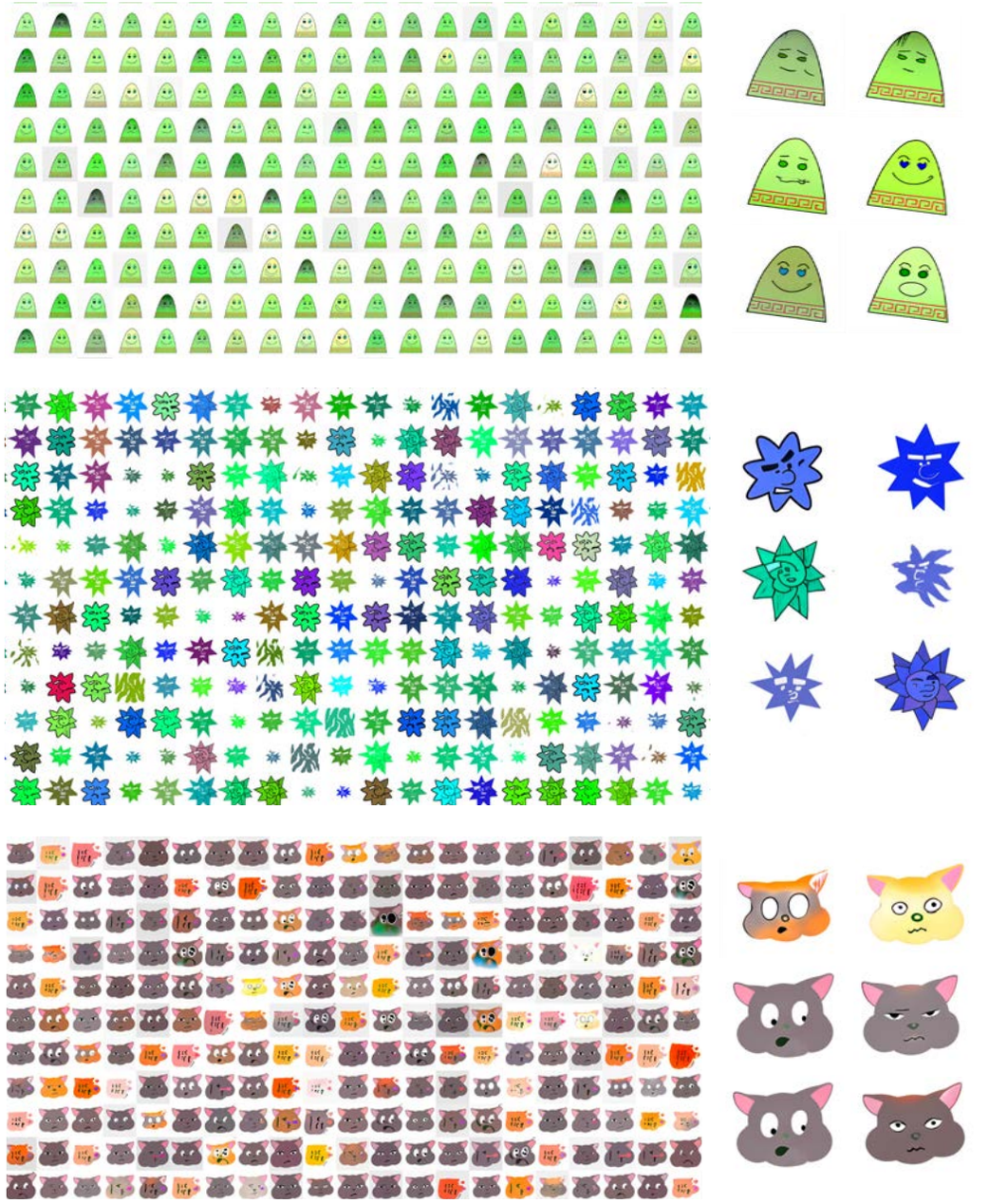
Generative Adversarial Networks, or GANs, are a deep-learning-based generative model.More generally, GANs are a model architecture for training a generative model, and it is most common to use deep learning models in this architecture.

After the lecture and understanding the basic concepts students put their the hands on the code. Training and running their first GAN. This exercise was completely planned to run on the cloud without any additional software or hardware requirements. Students created their own dataset representing 7 emotions and using the StyleGAN 2 were abble to create their own generative set of characters.

DATASETS

Original Datasets created by students representing 7 different Emotions in three different levels

GENERATIVE OUTPUTS & RESULTS



Results of trainning GAN model. This outputs are totally generated by the model mixing characteristics of the dataset.

08
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GAN
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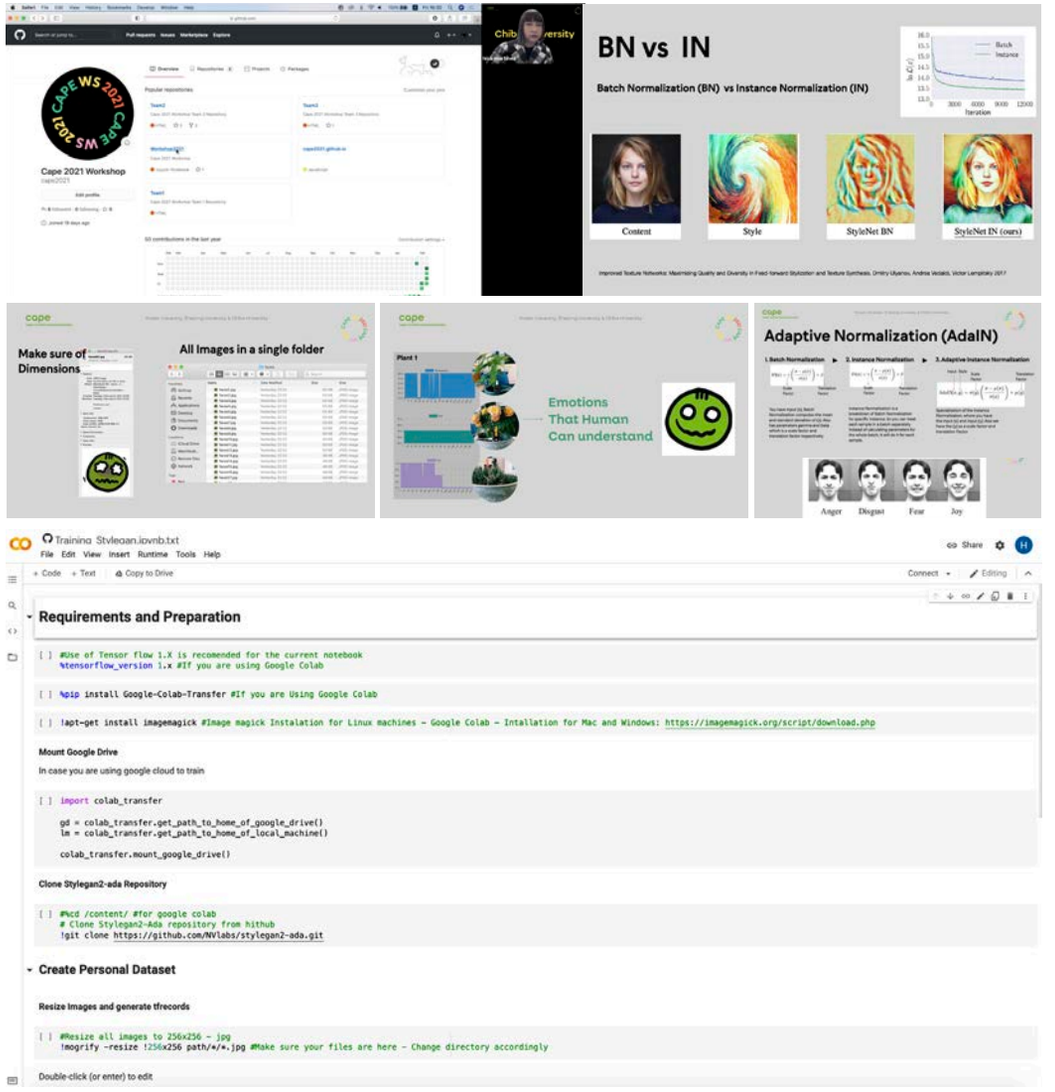
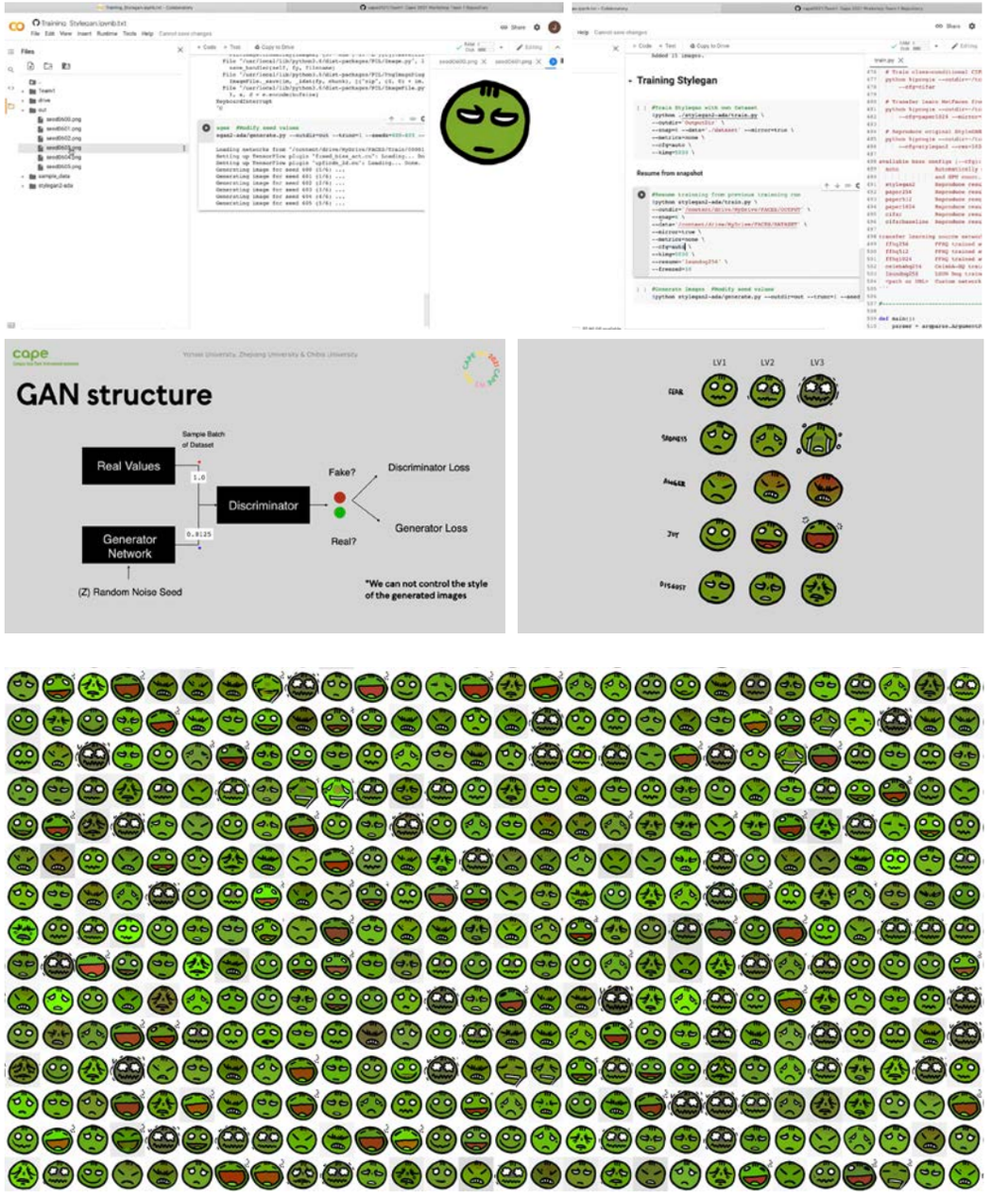
GENERATIVE ADVERSARIAL NETWORKS SESSION

During this session the students had the opportunity to train their own generative adversarial network remotely. In the following images we can see a compilation of the practical machine learning exercise that was performed as part of the workshop.



Generative Adversarial Networks lecture and practical session.

PRACTICAL TRAINING EXERCISE



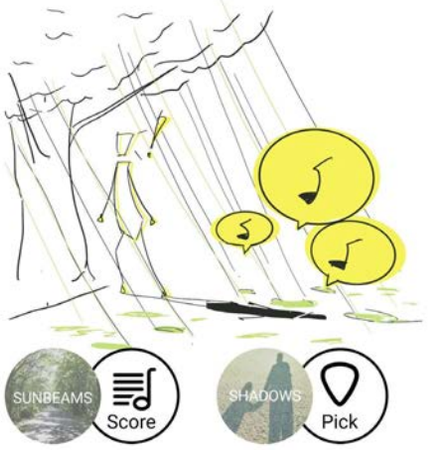
Results of trainning GAN as a Practical Exercise.

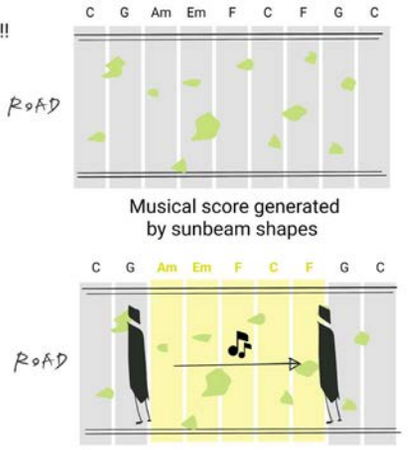
09 - First Ideas

Once the practical sessions with machine learning and generative design were over, the students continued with the first stage of ideation and generation of proposals for new ways of interaction between humans and plants using generative adversarial networks. With a series of ideas and proposals, the students received feedback from the invited professors. In this section we can see some of the first ideas and directions of the projects.

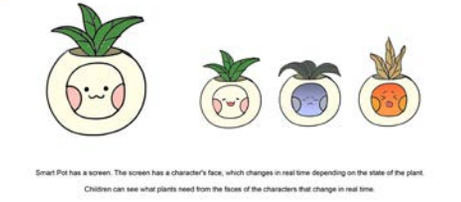
01 Sunbeam x Playing the guitar

Make music with constantly changing natural musical score!!



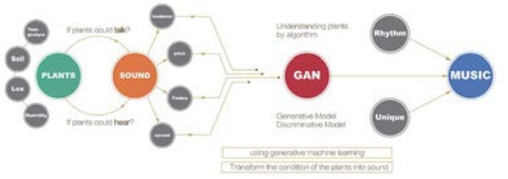


02 Smart Pot



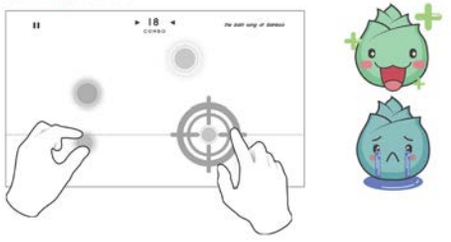
05 Plants Co-Maintenance Platform

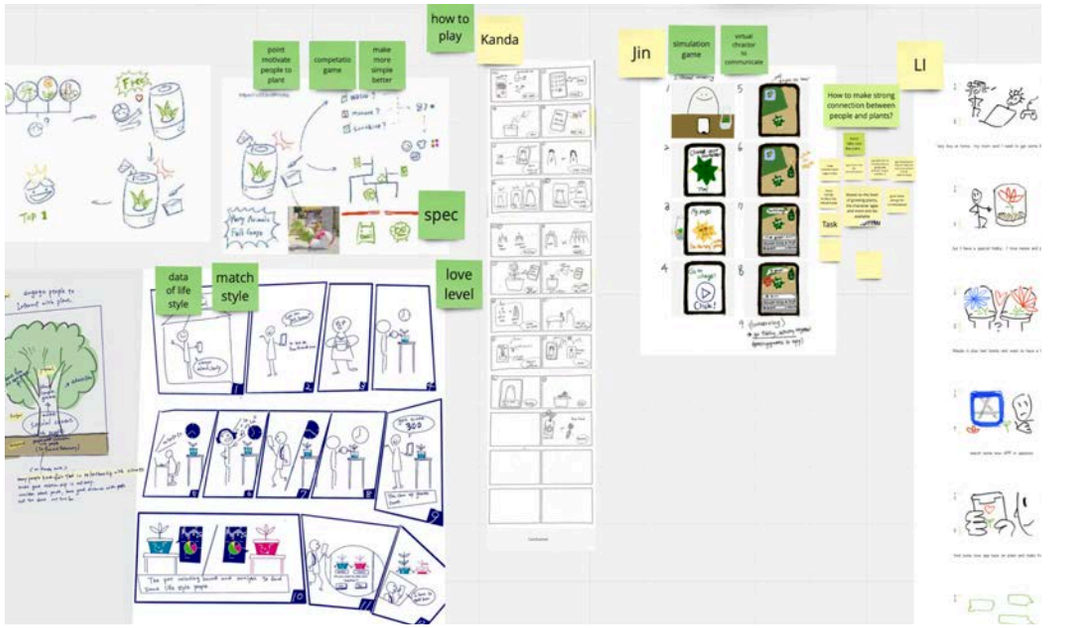
Logical Deduction

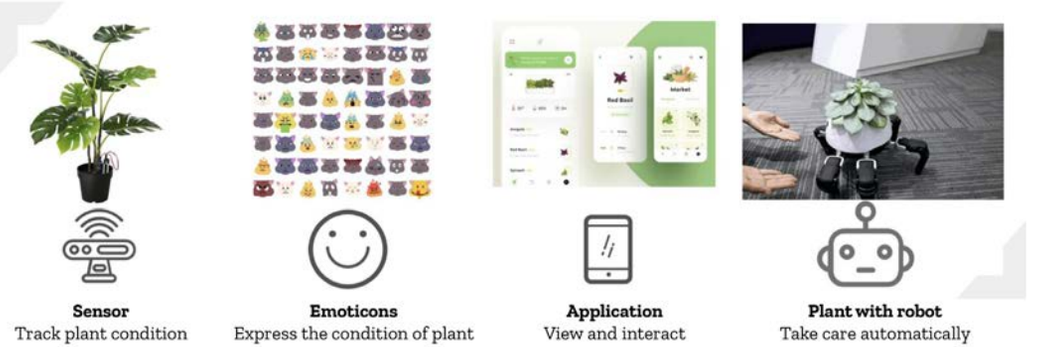


05 Plants Co-Maintenance Platform

the Gaming Inerface







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TEAM 1

10 - Design Outcomes

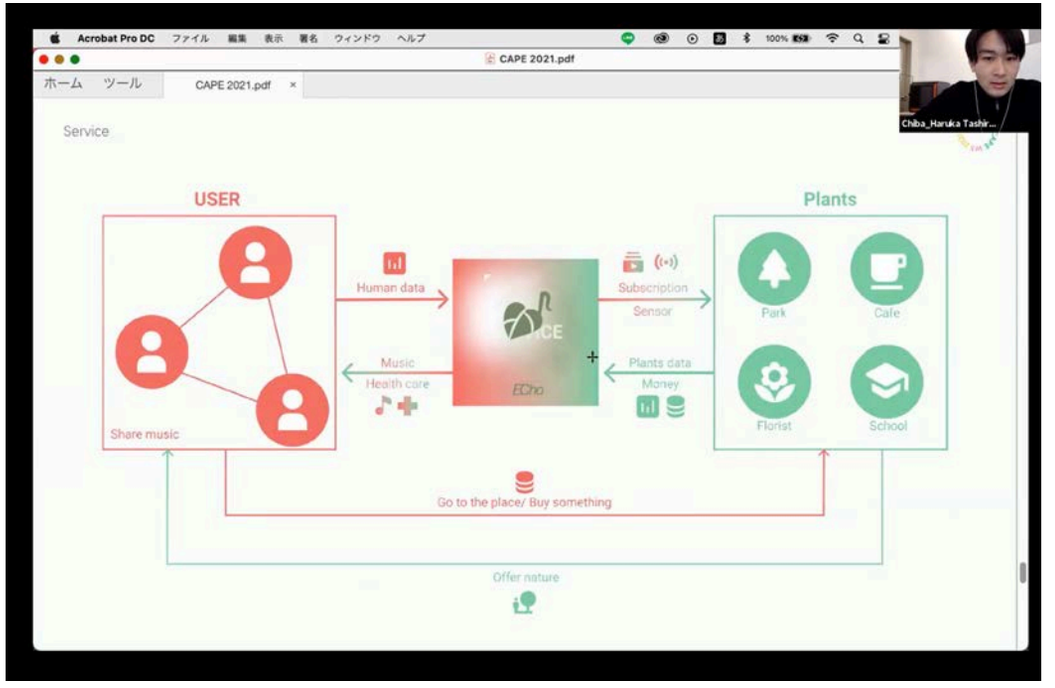
Co-creating Music with plants

Under the motto Stay healthy with co-created music, team 1 project prose a solution for the depression epidemic derived from the human contact limitations imposed by the coronavirus.

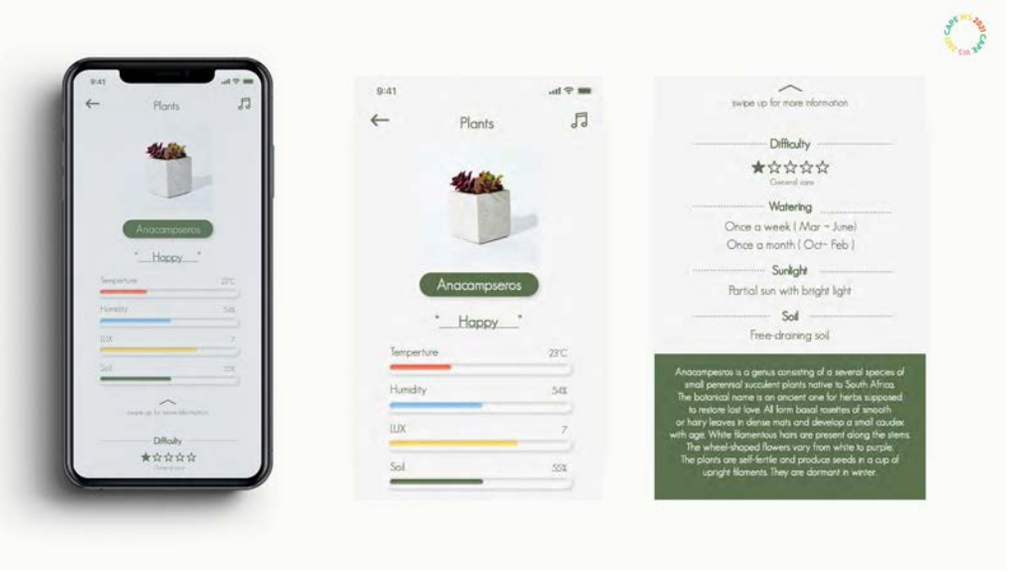
The proposed solution works as a co-creation service in which the human users and their plants can generate ambient and relaxing music by sharing and monitoring different aspects of the plant environment like humidity and temperature combined with the human user's heartbeat rhythm.

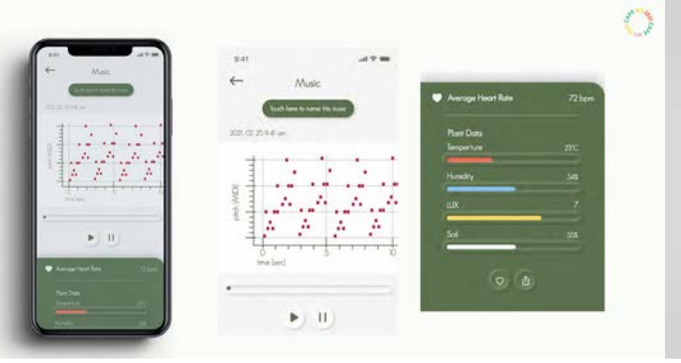
The team proposed and extended use case of the concept in which the interaction is not limited to a specific plant but rather, a complete service in which the used can take advantage of plants distributed in public spaces, like cafeterias and parks.

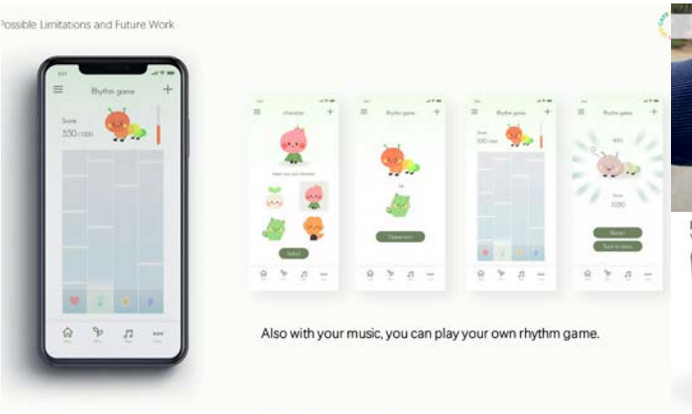
The team also proposed different applications for the resulting music. Like the opportunity to create a plant music streaming service, as well as other type of experiences like custom rhythm games and more.



Final presentation about music co-creation with plants.







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TEAM 2

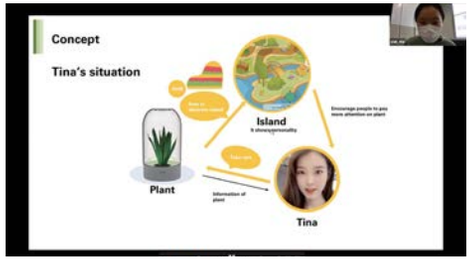
10 - Design Outcomes

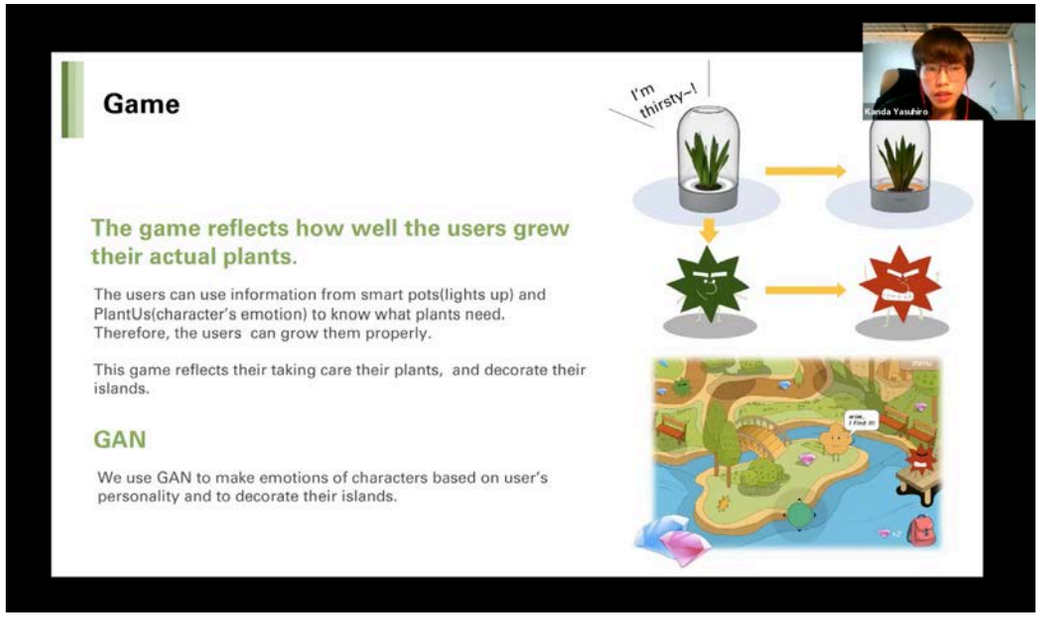
Plant US - Social game linked with reality

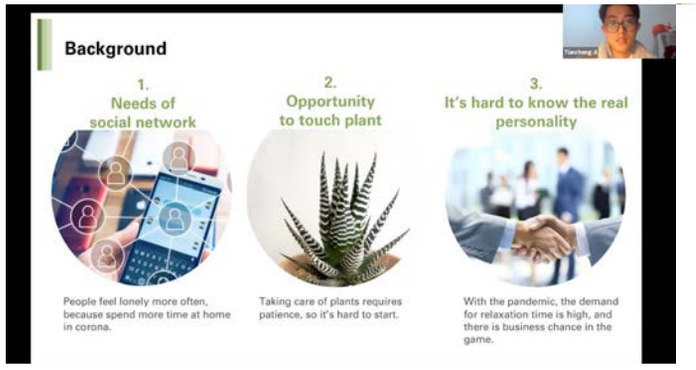
Team 2 proposed project is focused on human - plant socialization and gamification. By providing a product based service that transforms a regular house plant into a social game interface through the use of an smart pot.

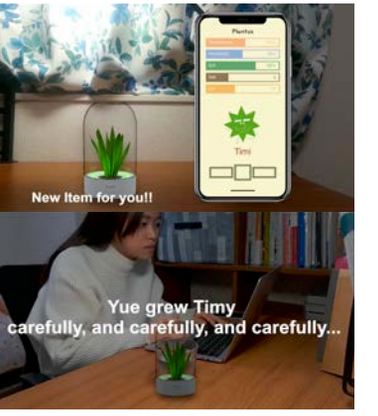
After acquiring and installing the smart pot users are presented with a game interface in which their actions towards their physical plants are translated into items and environmental changes, promoting the interaction with the plant through a generated avatar.

Over time the resulting digital environment can be recognized as a reflection of the users values, and dedication towards the plant, projecting their personality and encouraging other users to interact with the user based on these characteristics, transforming the human plant interaction system into a human to human interaction platform.









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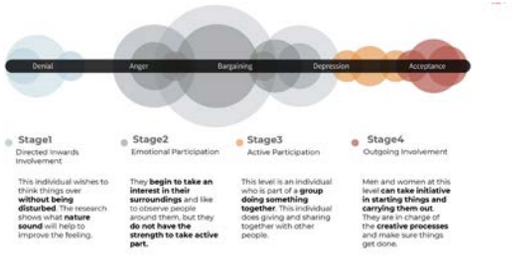
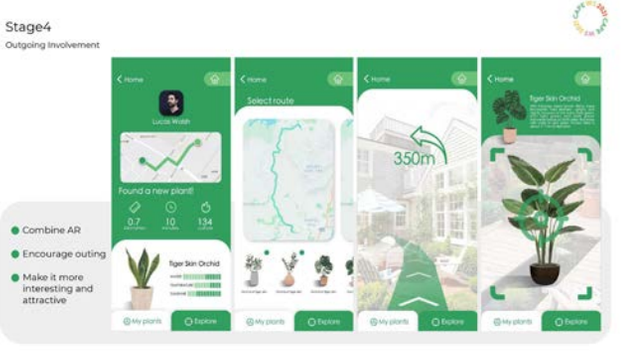
TEAM 3

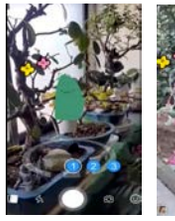
10
-
Design
Outcomes

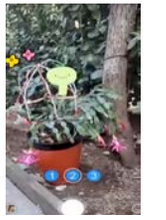
Plant Soulmate

Team 3 proposed project is focused on providing a therapeutic solution through human - plant interaction aiming at comforting those suffering from loss and post-traumatic stress disorder. Focused on a 4-stage approach. In stage 1, the user wants time alone without being disturbed. The plant will play nature sound according to its condition which can help the user to improve their feeling. In stage 2, the user will start to pay attention to the plant. They want to express some emotion and stress. And the user can receive positive feedback and message from the plant. In stage 3. At this stage, users are gradually extroverted, hoping to have some communication with the outside world, so the interaction at this stage is not only between users and plants, but also between users and users. We hope to form a plant community to heal heart. Stage 4. At the last stage of therapy, users have been willing to communicate with others. At this stage, we need to consider how to encourage users to go out and communicate with the outside world frequently, so as to communicate with more people and become positive and outgoing.









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