ITU FACULTY OF ARCHITECTURE
DEPARTMENT OF INDUSTRIAL DESIGN
EUT220E INDUSTRIAL DESIGN STUDIO I
2020-21 SPRING SEMESTER

Instr. Miray Boğa, Res. Asst. Selin Arkan, Res. Asst. Onur Yılmaz

DESIGN FOR *Citizen Science*

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DESIGN FOR *Citizen Science*

Citizen science is a practice of non-scientist people who collect data to be used in scientific research.

It is a rising trend due to the development of technology while contributing to research projects of various fields such as astronomy, medicine, art history, and social sciences, most prevalently in environmental science (Goudeseune, et al., 2020). Whilst citizen science is an attempt at the democratization of science, a significant need for standardization occurs in terms of the quality of the acquired information (Heigl, et al., 2019).

This project aims to understand the motivation of people to be involved in citizen science activities and design products to enhance the dissemination and proliferation of those activities while standardizing the collected data.

In this project, students are encouraged to research user lifestyles (urban/non-urban dwellers, nature observers, extreme/outdoor sportspeople, etc.) and the environmental science fields to decide what kind of data will be collected. The research analysis will lead the students to design a product that can be integrated into the user's daily or special interest practices to collect data. The students need to research different ways of collecting data and choose the appropriate one that corresponds to the problem definition.

Possible user categories are exemplified below:
- Nature observers
- Extreme sportspeople
- Urban dwellers
- Non-urban / Rural dwellers
- Travellers
- Nature-related professionals - Farmers, fishers, breeders, etc.
- Children (Educational Programmes)
- Adult (Educational Programmes)

Keywords: Research-based problem definition, User-centered design, Human factors, Product semantics, Materials and manufacturability.

Goudeseune, L., Eggermont, H., Groom, Q., Le Roux, X., Paleco, C., Roy, H.E., van Noordwijk, C.G.E. (2020). BiodivERsA Citizen Science Toolkit For Biodiversity Scientists. BiodivERsA report, 44 pp.

Heigl, F., Kieslinger, B., Paul, K. T., Uhlik, J. & Dörler, D., 2019. Opinion: Toward an international definition of citizen science. Proceedings of the National Academy of Sciences. Apr 2019, 116 (17) 8089-8092; DOI: 10.1073/pnas.1903393116

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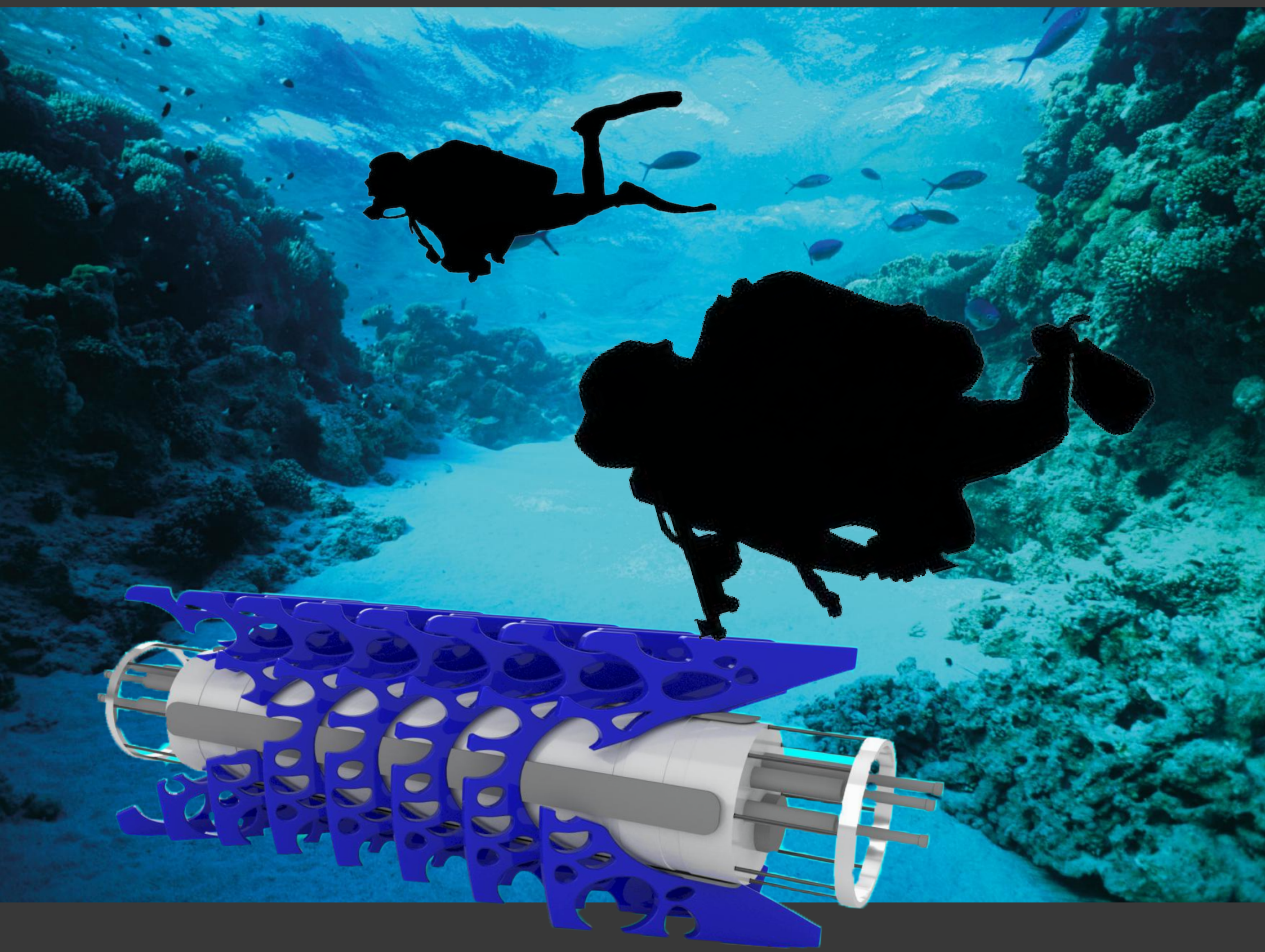
Passive Audio collectors are usually put on the ocean floor with 2 legs and the relation with the environment or the inhabitants. This artificial coral reef aims to be a stand for the passive audio collector while becoming a home for various sea animals. The design is sliced to increase the interaction and gives animals a place to explore rather than a large chunk of a solid.



Passive Audio Collector Stand & Artificial Coral Reef

"Sound of the Mediterranean"
Alp Şeker
sekeral18@itu.edu.tr

As seismic explorations, oil rigs are starting to be formed in the Mediterranean Sea, especially the Antalya-Mersin-Adana region. However, the inhabitants of those seas and how they are affected by human interruption and destruction are overlooked. This project offers a possibility for amateur and willing scuba divers to collect audio data of both sea animals and human-made sounds with two products. One of them is a wearable hydrophone/audio collector which is designed to actively collect sound during the dive. The second product is a passive audio collector stand and an artificial reef that allows sea animals to explore and inhabit while collecting sound for months without interruption.

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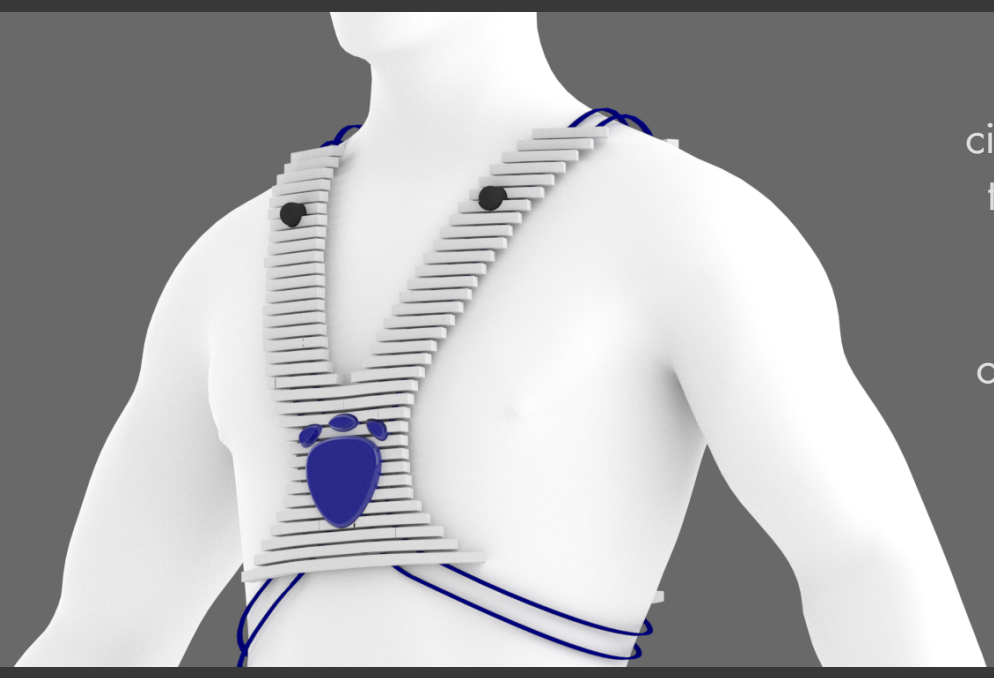
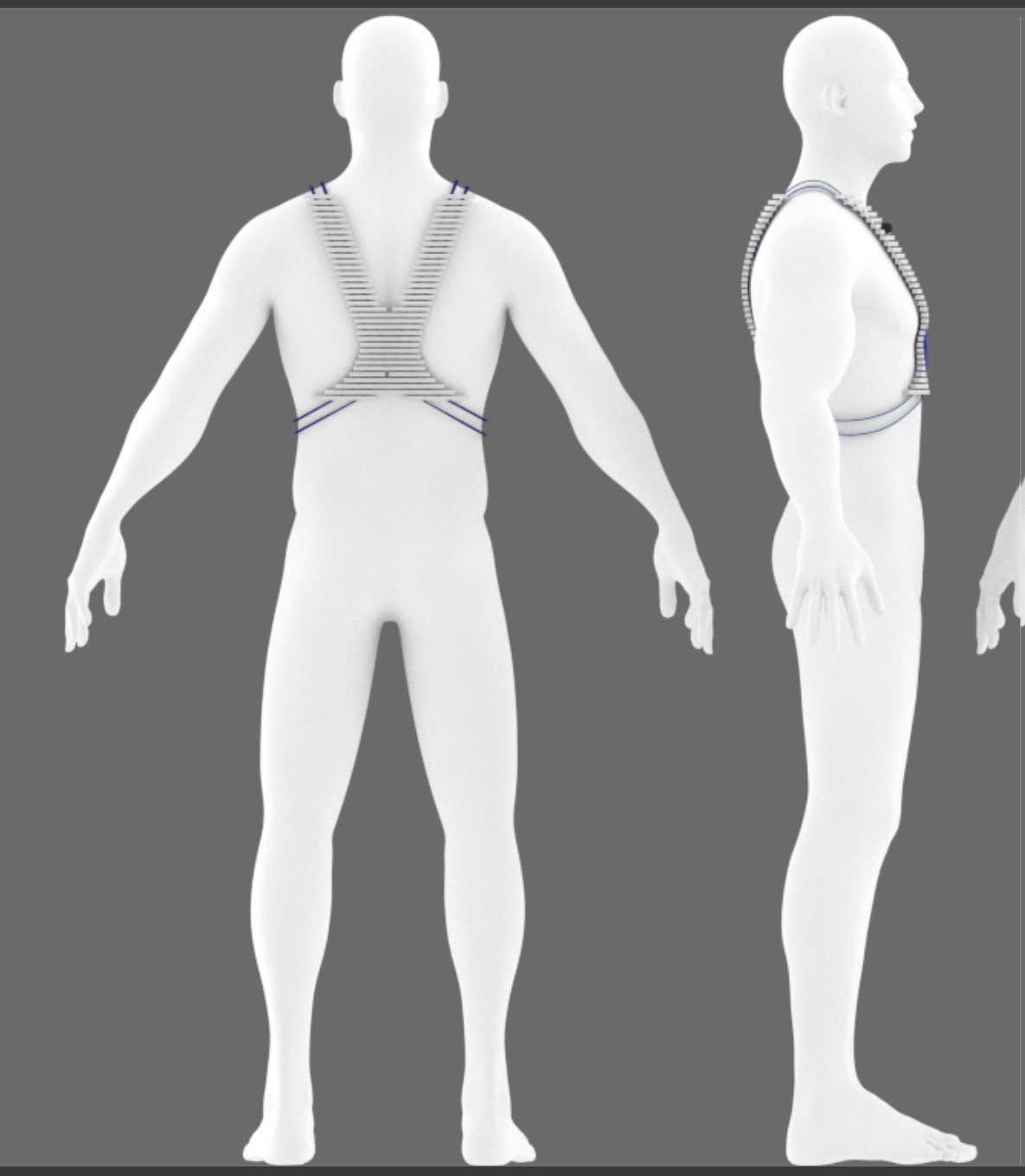


Hydrophones could be hard to manage underwater especially when you are exploring underwater, constantly having to hold it in one hand, to solve that problem this is a wearable hydrophone/audio collector that could work with your diving buddy as the analog interface on the chest changes color when it's working and when the battery is dead or the recording has stopped. The sliced form of the harness is to hold the cables, microphones and the interface in place while also allowing people with different body shapes to easily wear comfortably.



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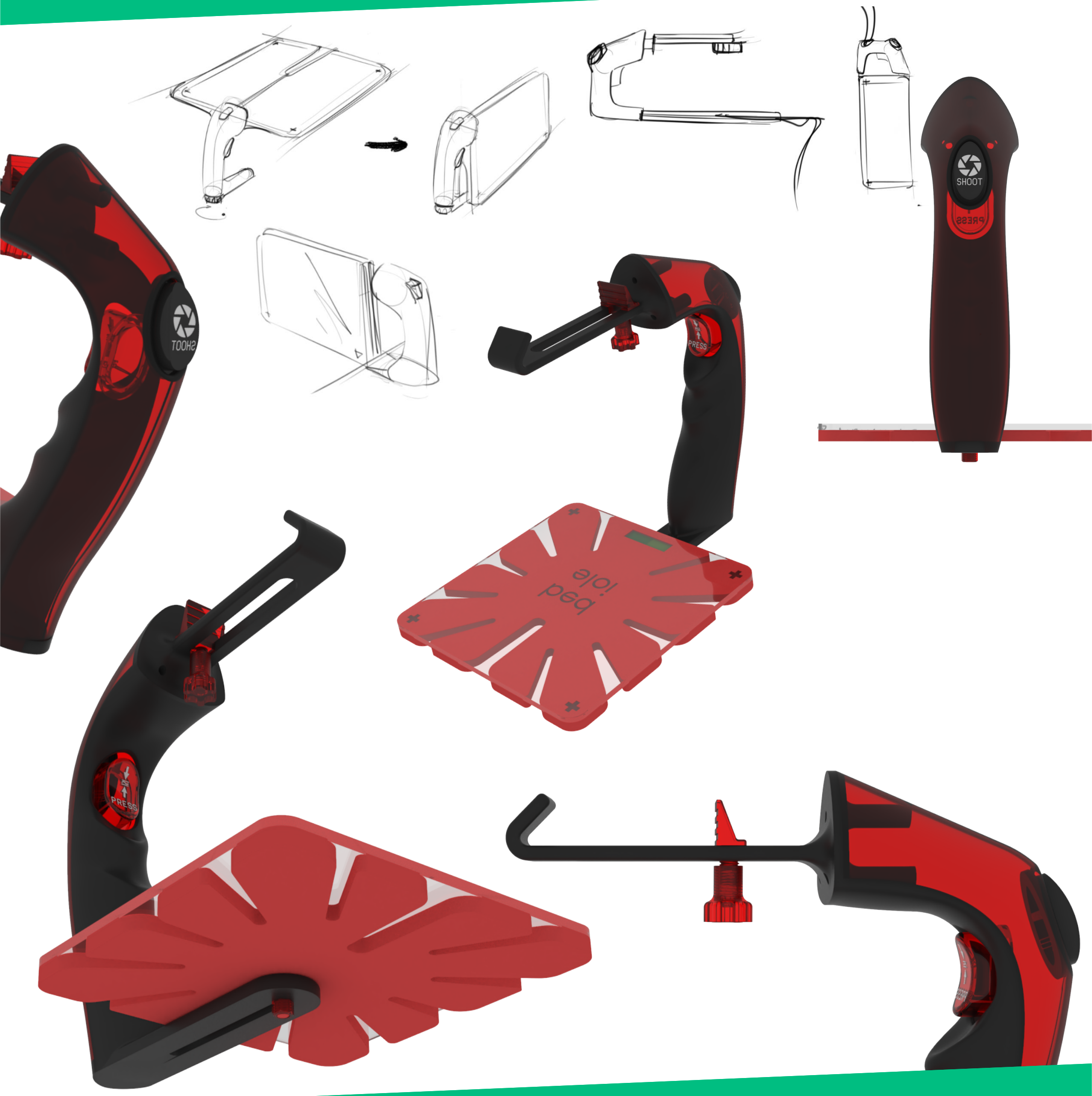

"Bediole"

Bedirhan Çakıroğlu
cakiroglub18@itu.edu.tr

"Bediole" allows the user to participate in agricultural citizen science projects by measuring leaf areas and DGCI indexes without plucking leaves. It flattens the leaf between the two surfaces and keeps the phone camera parallel to the plane on which the leaf lies. Thus, the area of the leaf can be measured accurately in the photograph.

Thanks to the color and distance calibration zones on the product, it can provide accurate results of measuring in situations such as change of light conditions and/or shooting distance. Moreover, it can be used by a single hand while doing all these.

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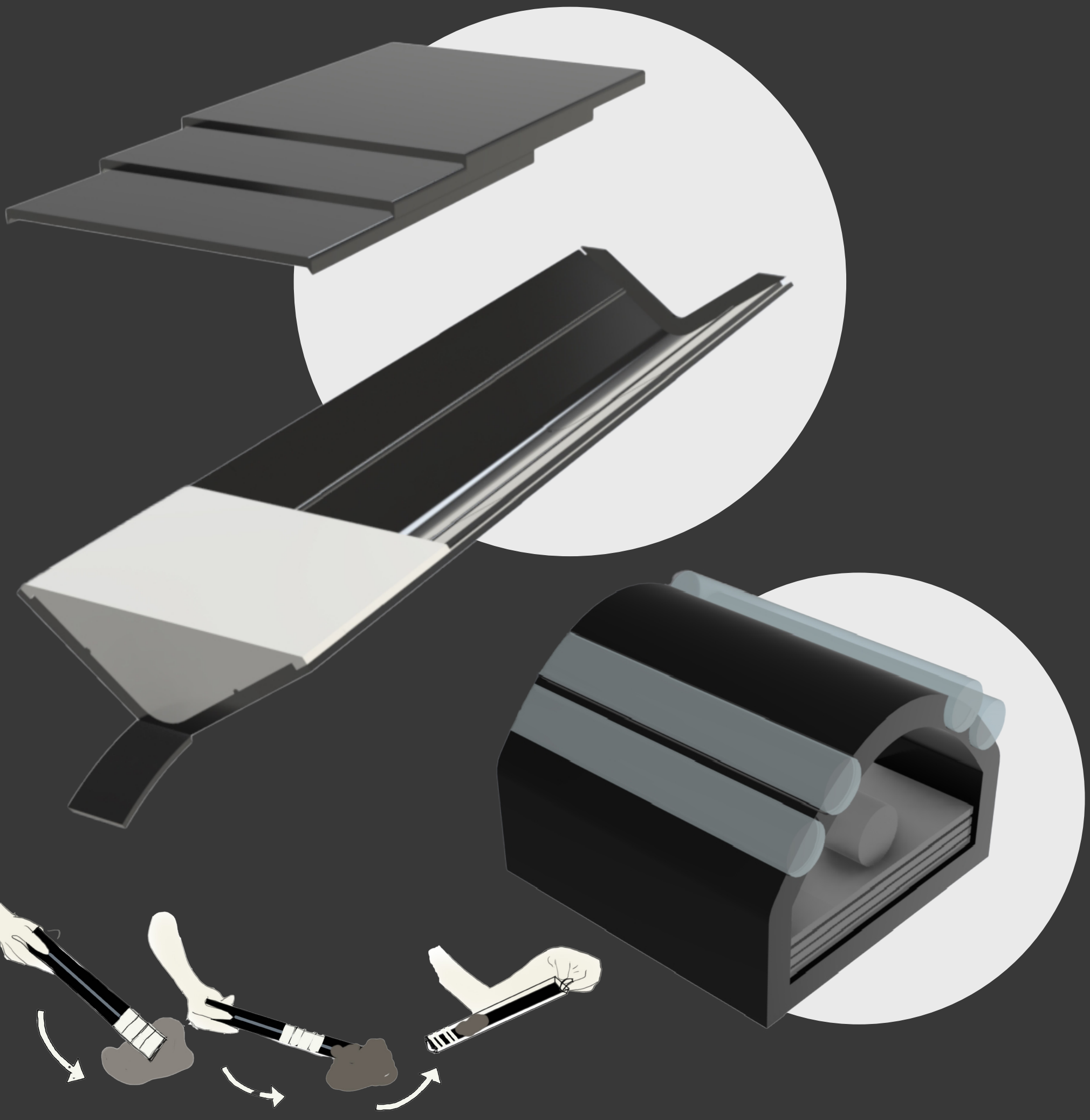

"Dip & Drip"

Beyza Ballı
balli18@itu.edu.tr

Soil health is one of the most important topics of sustainable agriculture. Overuse of fertilizers can affect the organic elements and pH levels of the soil terribly. Therefore it is important to know the amounts of organic elements and pH values of the soil. Dip & Drip is designed for simplified soil testing.

Dip allows the user to take soil samples easily from different parts of the field while Drip enables them to test the sample and identify the values by using color charts and stickers. After determining the P, K, N, and pH values, the farmer conveys the results to agronomists for data collection.

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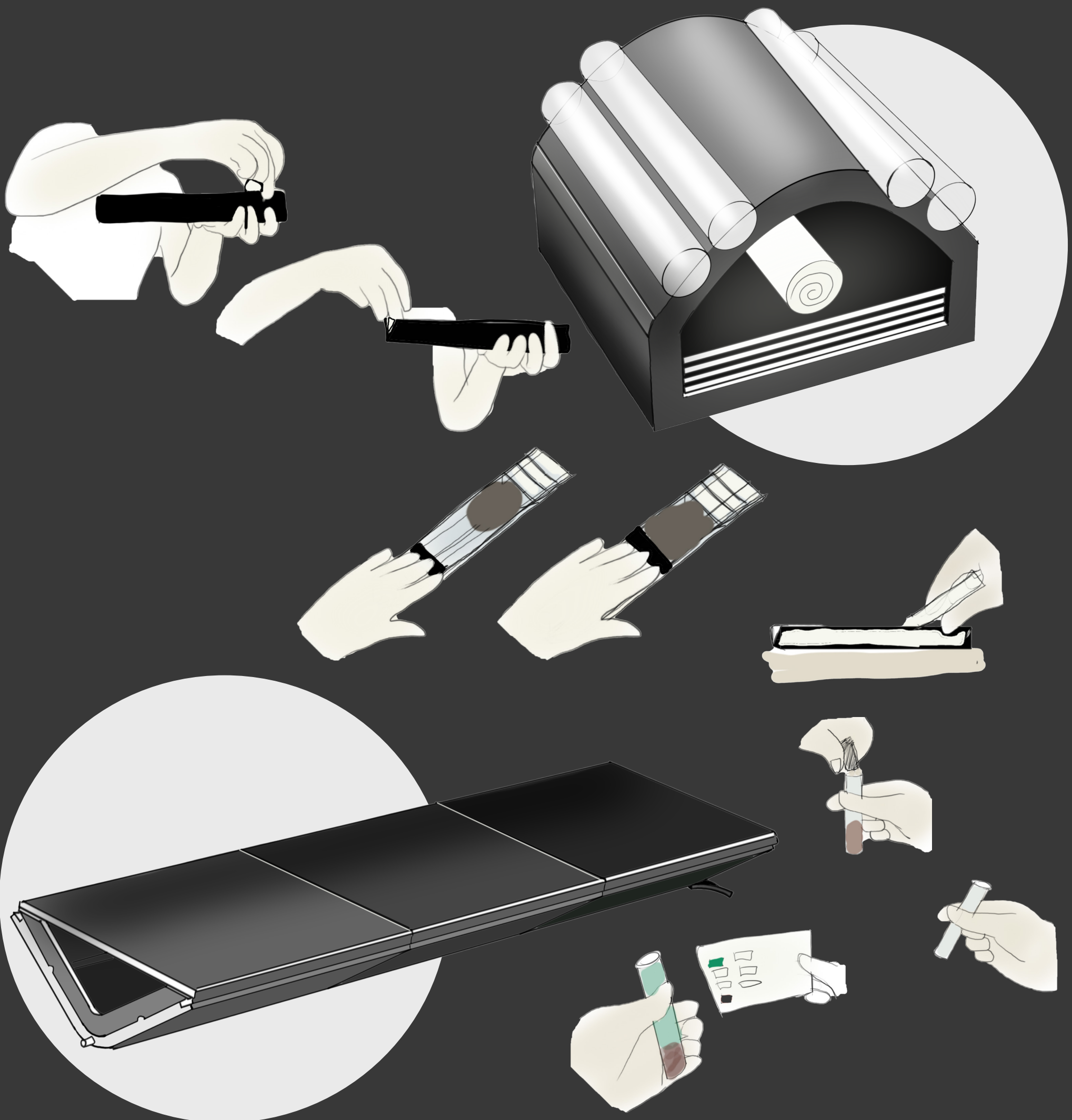

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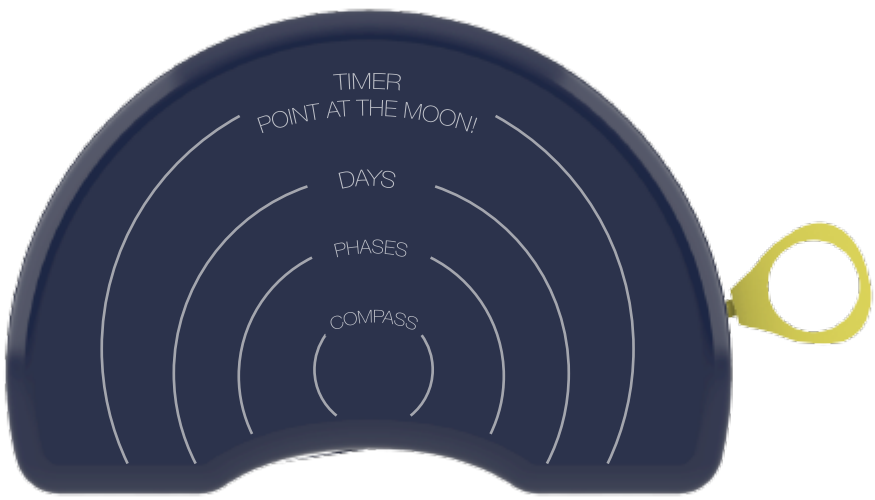
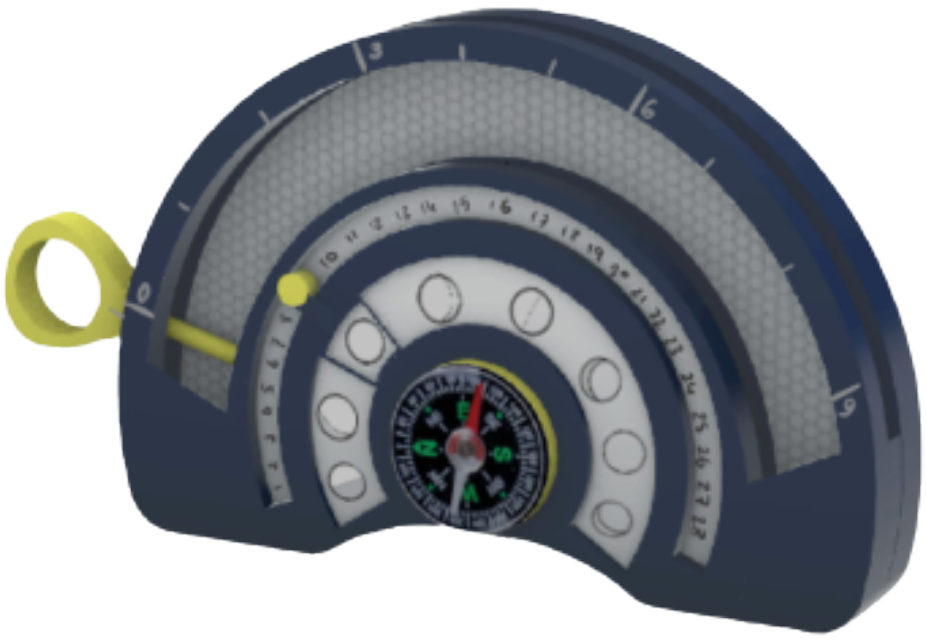
Instructions on the back of the product



Observation and Reference Stick

Hour Tracking



MoonBuddy

Time Measuring Tool and Moon Calendar

Citizen Science Education Tool for ages 12-14

Magnetic Drawing Pad for documenting time

"MoonBuddy"
Ecem Peçin
pecin18@itu.edu.tr

MoonBuddy is an educational time measuring tool and moon calendar based on the movement of the moon on the same day and the cycle of the phases. The moon can be observed through the hole and recorded through the magnetic drawing board with the stick that is also used as a pen. The dates can be tracked with the sliding button on the product and the rolling paper that help to understand the cycle of phases from start to end.

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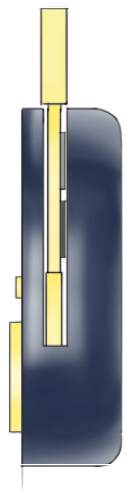
MoonBuddy

Time Measuring Tool and Moon Calendar

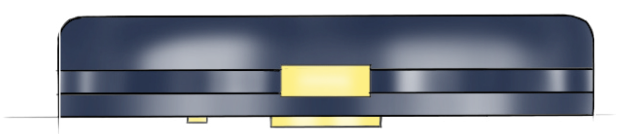
Citizen Science Education Tool
for ages 12-14

orthographic views



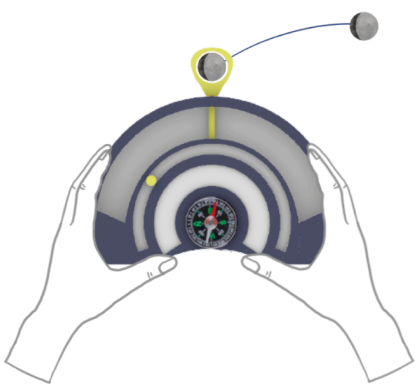
right view

front view

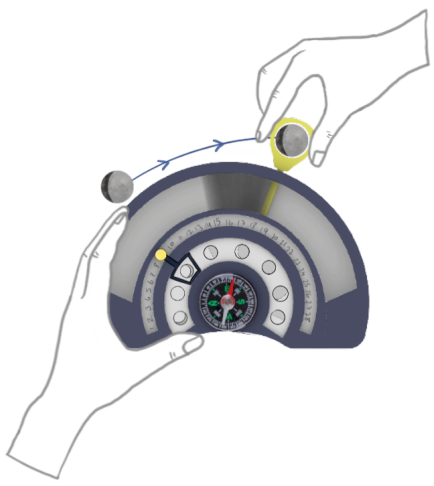


top view

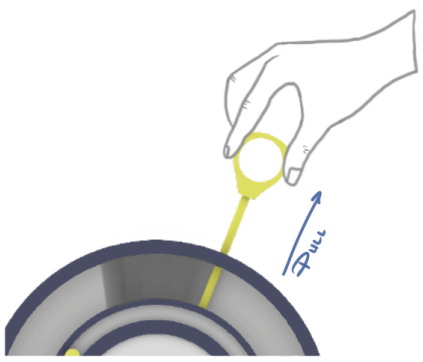
HOW TO USE?

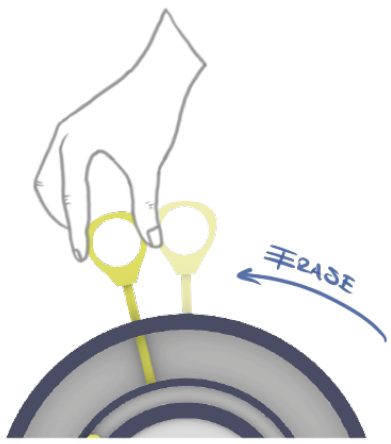


1 *To get a time data, with the help of the compass, the product should look the same way. After that, the moon can be tracked.*

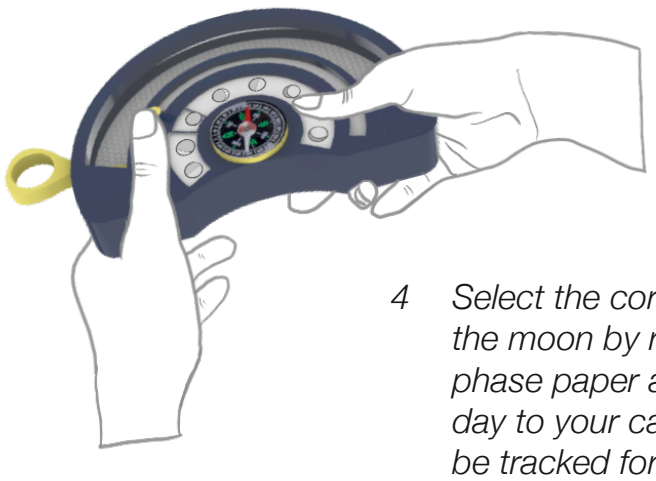


2 *Look through the hole in the reference stick and spot the moon.*





3 *If the time is measured for the day, it could be measured again and again. Pull the reference stick and drag it in a circular way to erase the time stamp.*



4 *Select the correct shape of the moon by rotating the phase paper and start at that day to your calendar. It could be tracked for 28 days.*

"MoonBuddy"
Ecem Peçin
pecin18@itu.edu.tr

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DESIGN FOR
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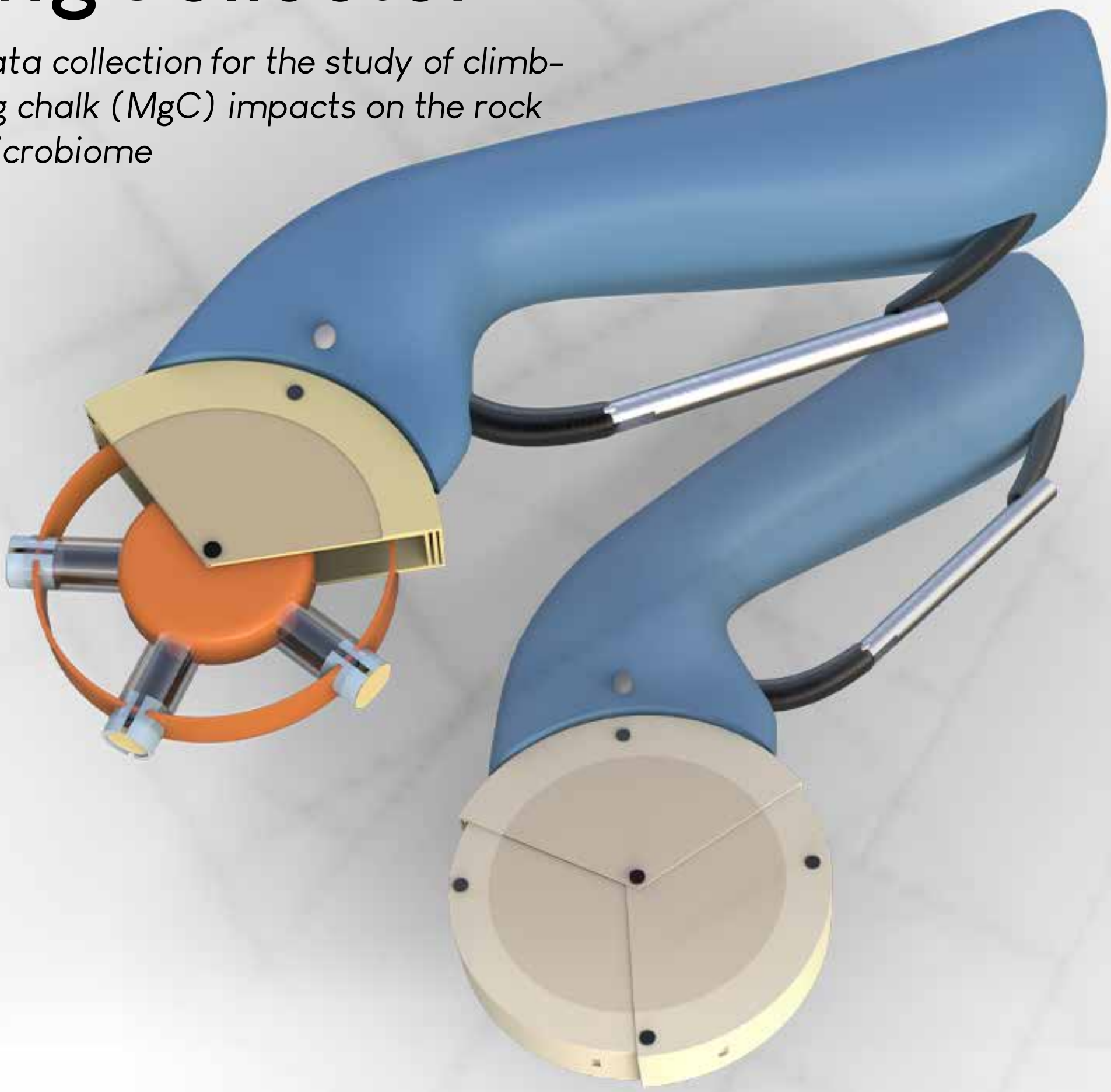
MgCollector

Data collection for the study of climbing chalk (MgC) impacts on the rock microbiome



"MgCollector"
Fatma Ilgın Kestir
ilgin2347@gmail.com

This product is expected to be used by rock climbers and collect data for microbiologists. It collects data to contribute to research on the impacts of climbing chalk (MgC) that is left on the microbiome of rock surfaces.

The product functions by rolling the circular disc that is controlled by the handle and makes the tubular areas (including cotton and micro solvent) get in contact with the rock surface.

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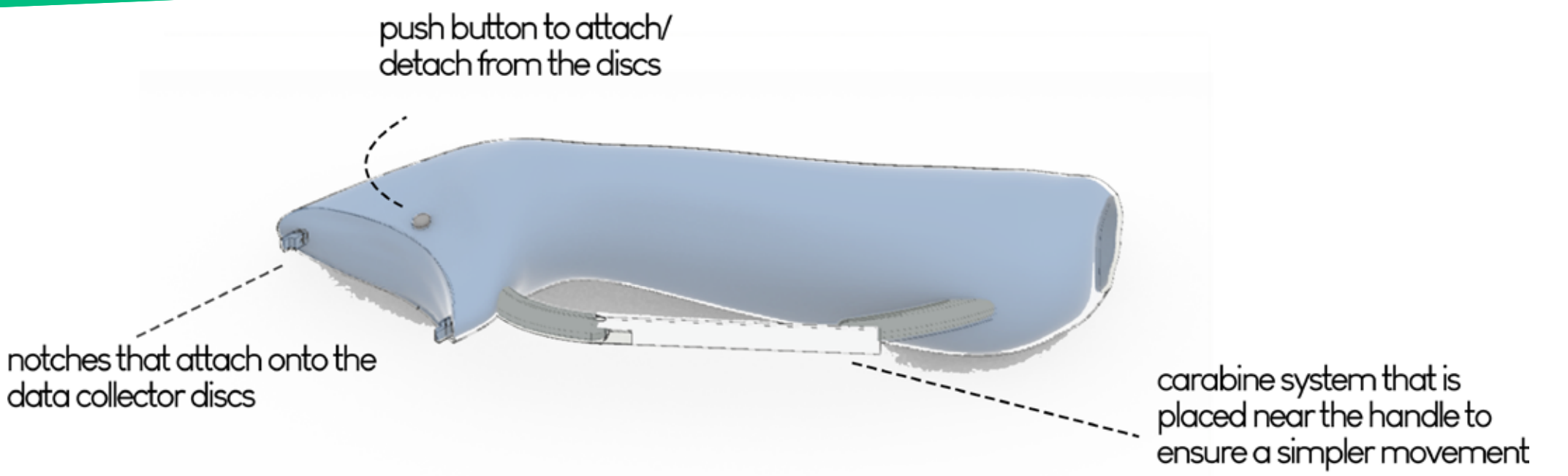

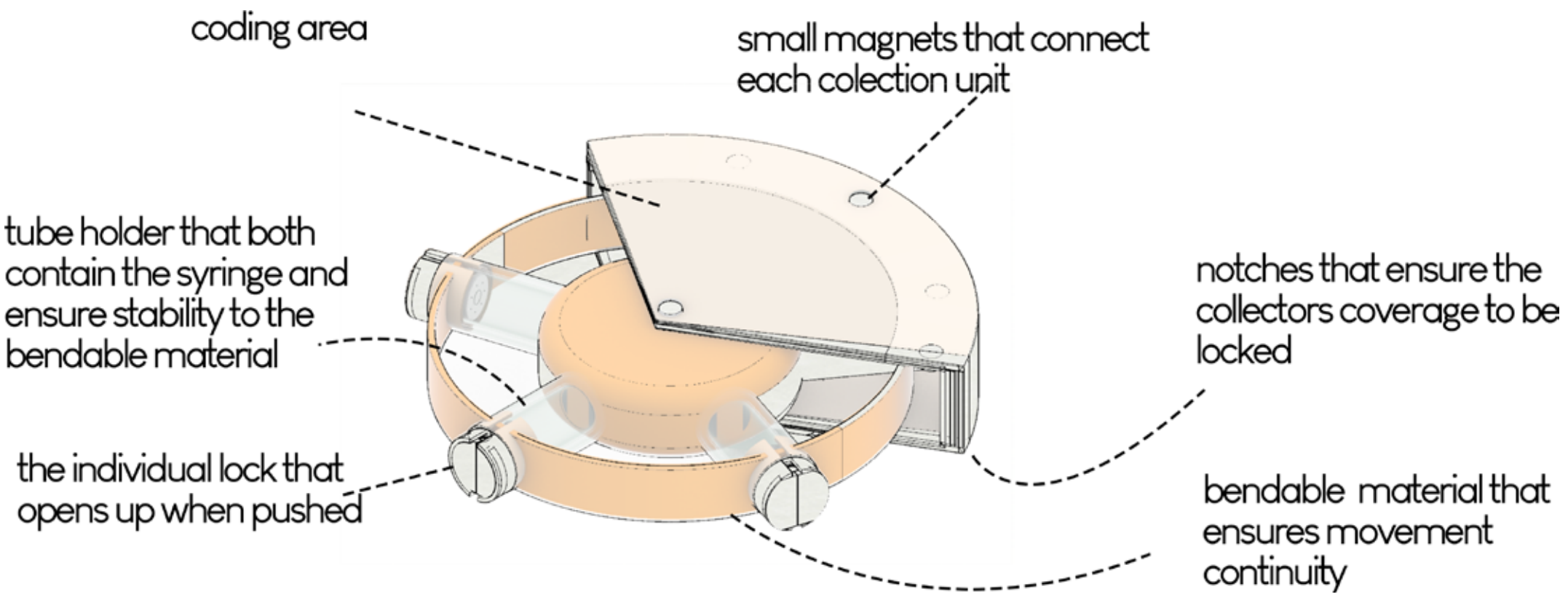

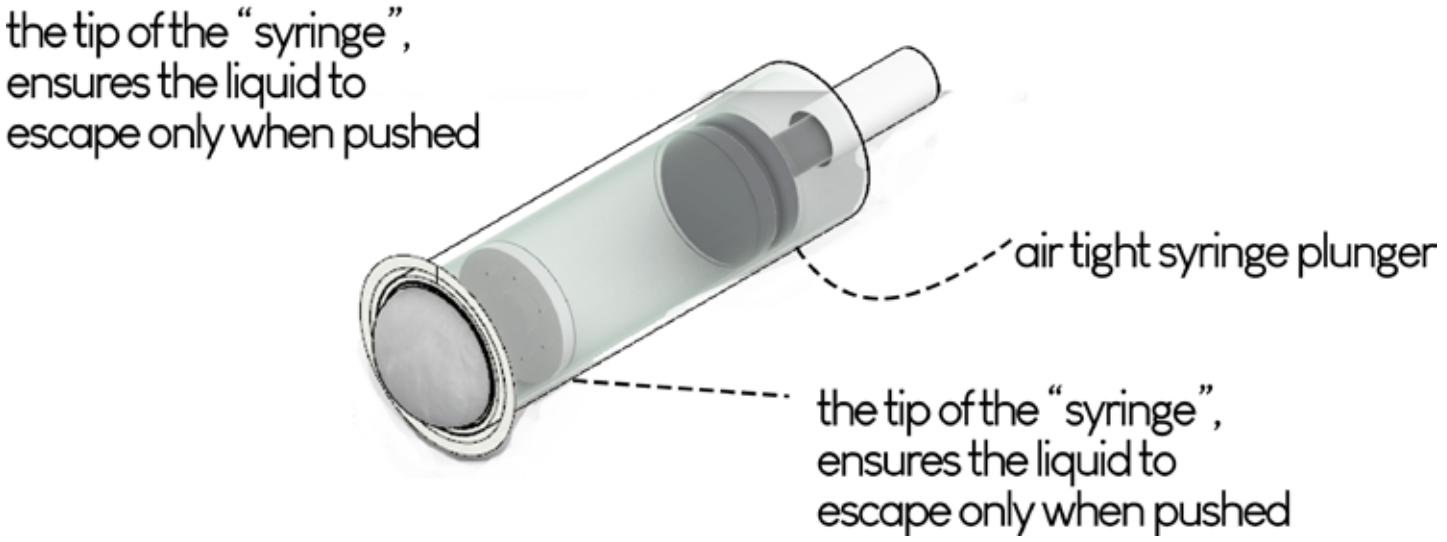

Component Features

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DESIGN FOR *Citizen Science*

Filiz Yer
yer18@itu.edu.tr

The product measures the daily amount of radiation and light intensity on the plants of soilless agriculture greenhouses. The ring of the product can be adjusted to different pipe diameters. Greenhouse farmers will transmit the data to scientists via Bluetooth. At the same time, they will transfer the nutritional values they use, the temperature and pH values of the water. Thus, they will support the greenhouse studies for life on Mars.

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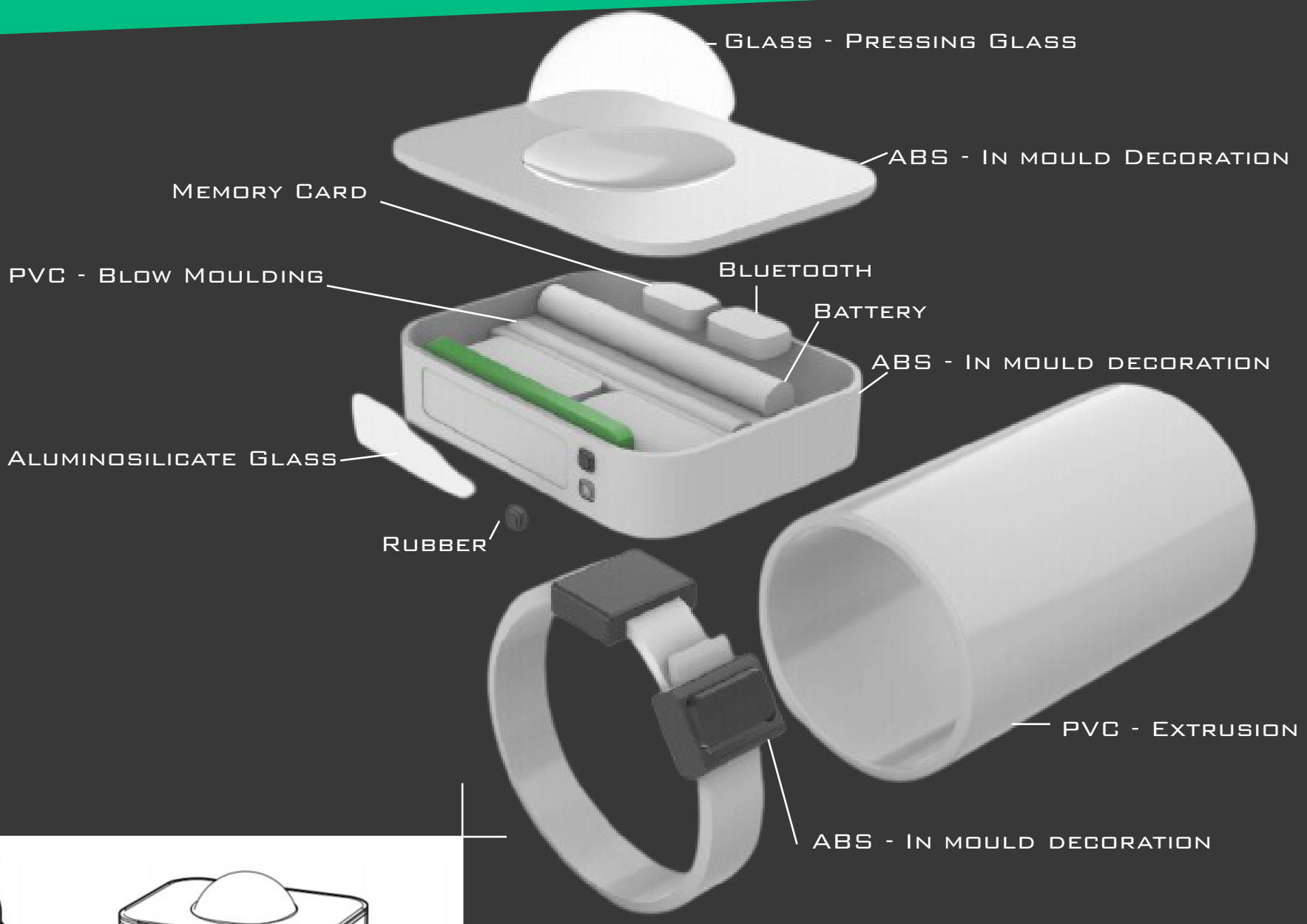

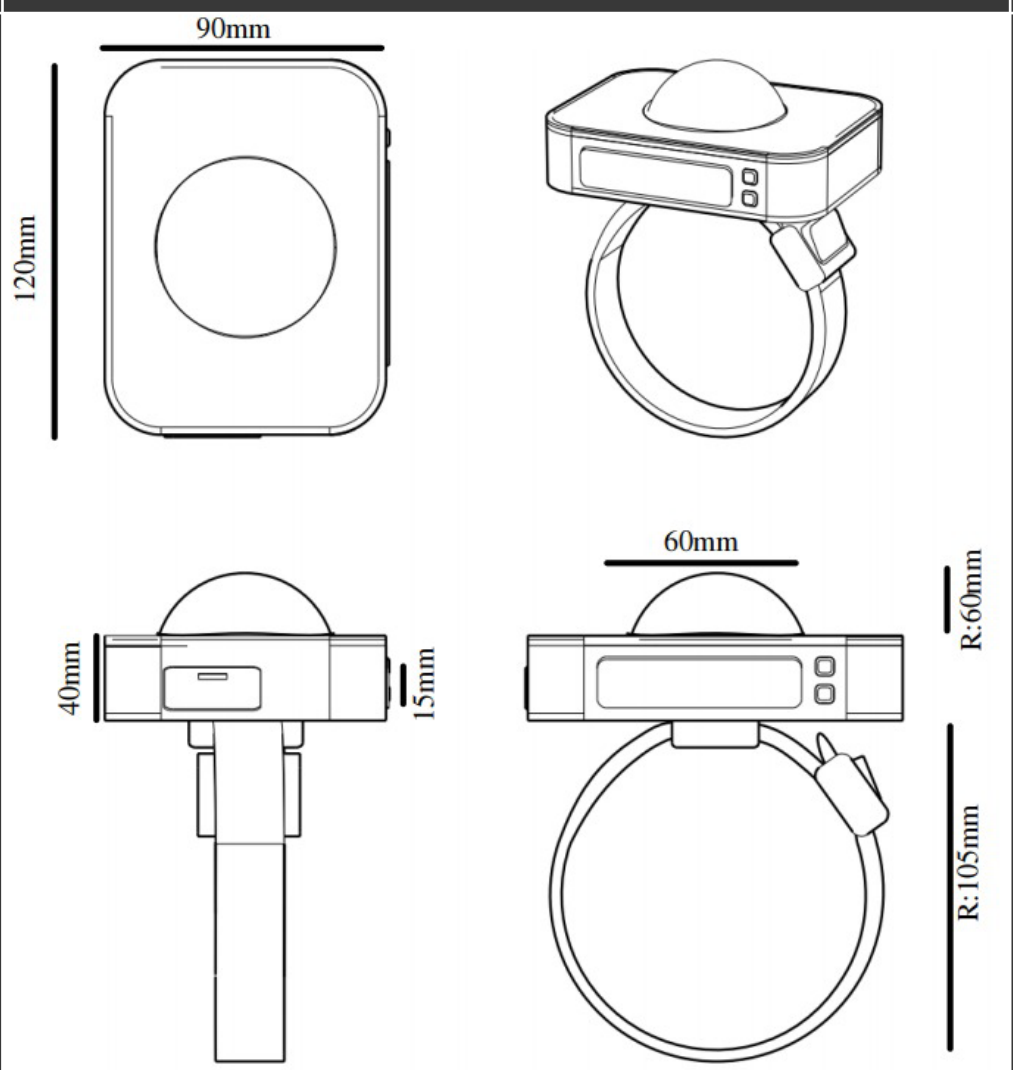

glass screen

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HYBBUD

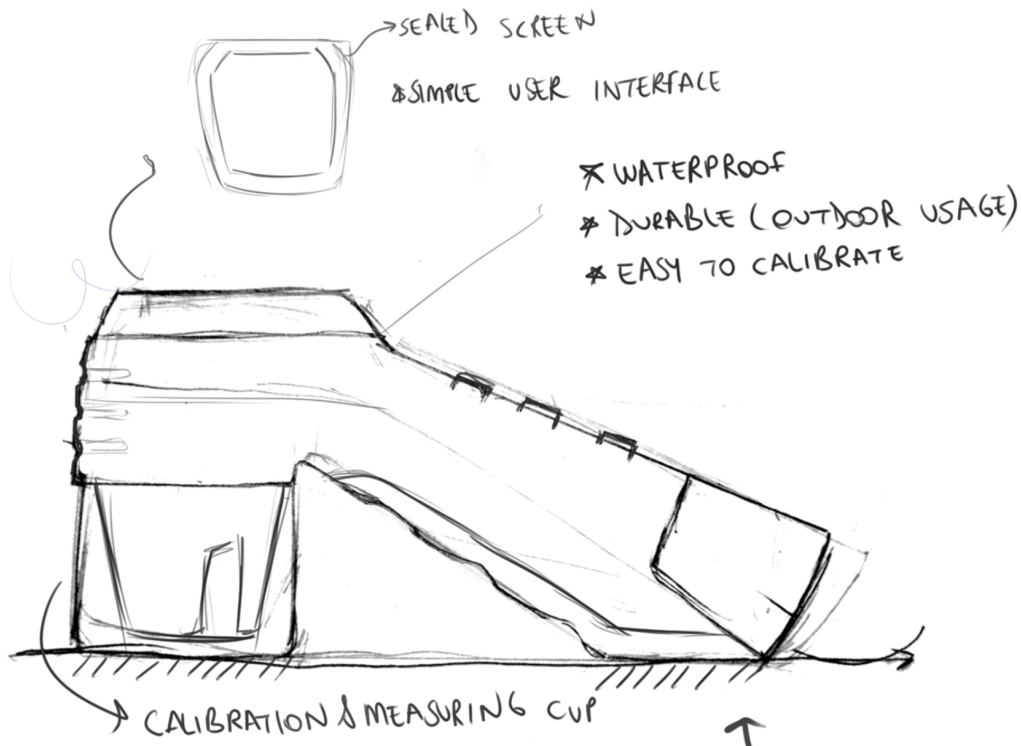
LEAVING NO TRACE | DETERMINING&MONITORING WATER QUALITY

LEAVE NO TRACE
keeping nature safe

EXTREME PLACES
importance of drinking water resources
importance of water quality
easy maintenance

BACKPACKING
good positioning of the contents of the backpack
no extras
compact items

SOLO/GROUP
HIKING



WATER QUALITY

MEASURING;
PH
EC
TDS

MAINTENANCE
cleaning with disstilled water
needs to be storaged in storage solution

BACKPACKING
equipments
tools
items for survival

HYDROGEOLOGY
CITIZEN SCIENCE
SOLO/GROUP

"Hybbud"
Gamze Öztürk
ozturkg16@itu.edu.tr

Hybbud aims to give early warnings to people about water pollution while monitoring the water quality in fountains and natural water resources on the hiking routes. It has been designed considering the extreme conditions in nature where the users hike.

Hybbud stands out with its waterproof and durable structure and its dimensions that are considered to have minimal space in the backpack.

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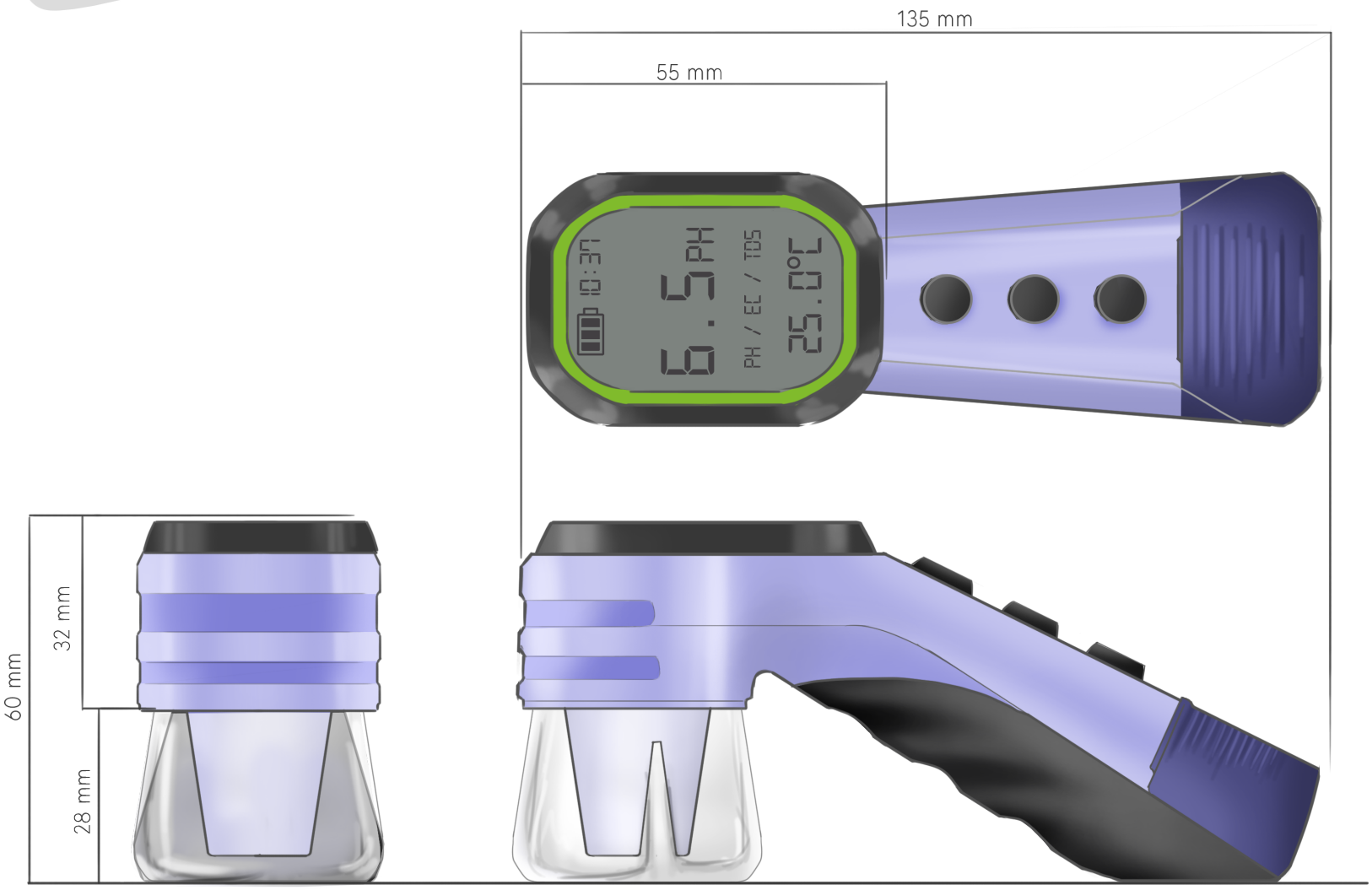

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DESIGN FOR
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Water Quality Probe

for citizen scientists

- Simple Interface
- Polyurethane coated grip
- Aluminium
- Bluetooth
- Telescopic

128cm

70cm

"Water Quality Probe"
Gökhan Türker
hanturker@yandex.com

This product is a Walking Pole that has the capability of analyzing the water quality. It is designed for users who like walking, nature, and science. They can easily check the water quality while they are walking in a natural park and share the data they collect with scientists.

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DESIGN FOR *Citizen Science*

Starting measurement

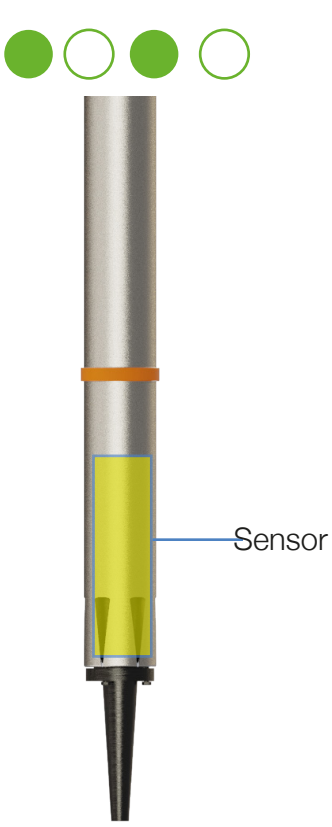
Stand-by
Connected Bluetooth

Not connected

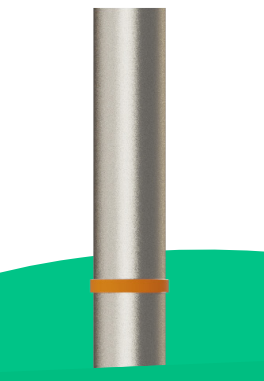
Signal lights give information about situation of product and measurement practice.

Product sends information to smartphone app. So you can easly share your monitoring results, or see device status such as battery power.

Sensor activation



Measuring



Measuring completed

Ready for measuring

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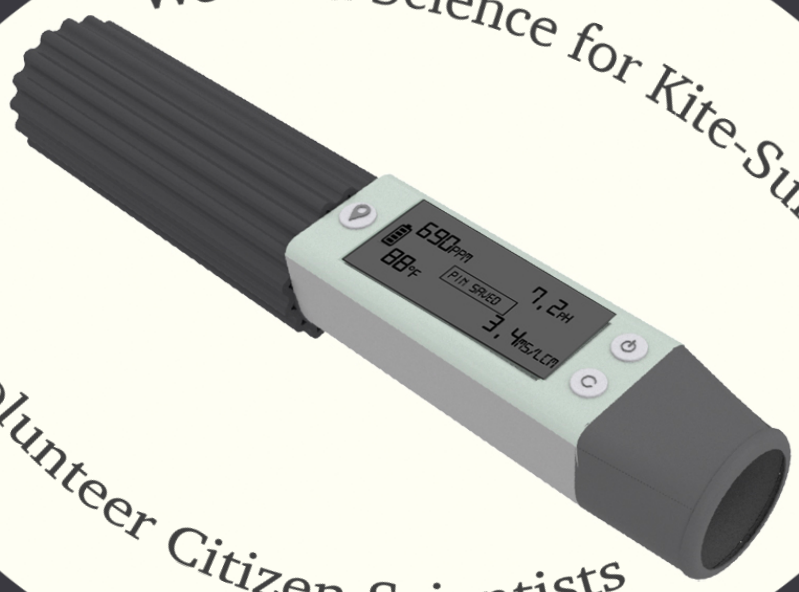
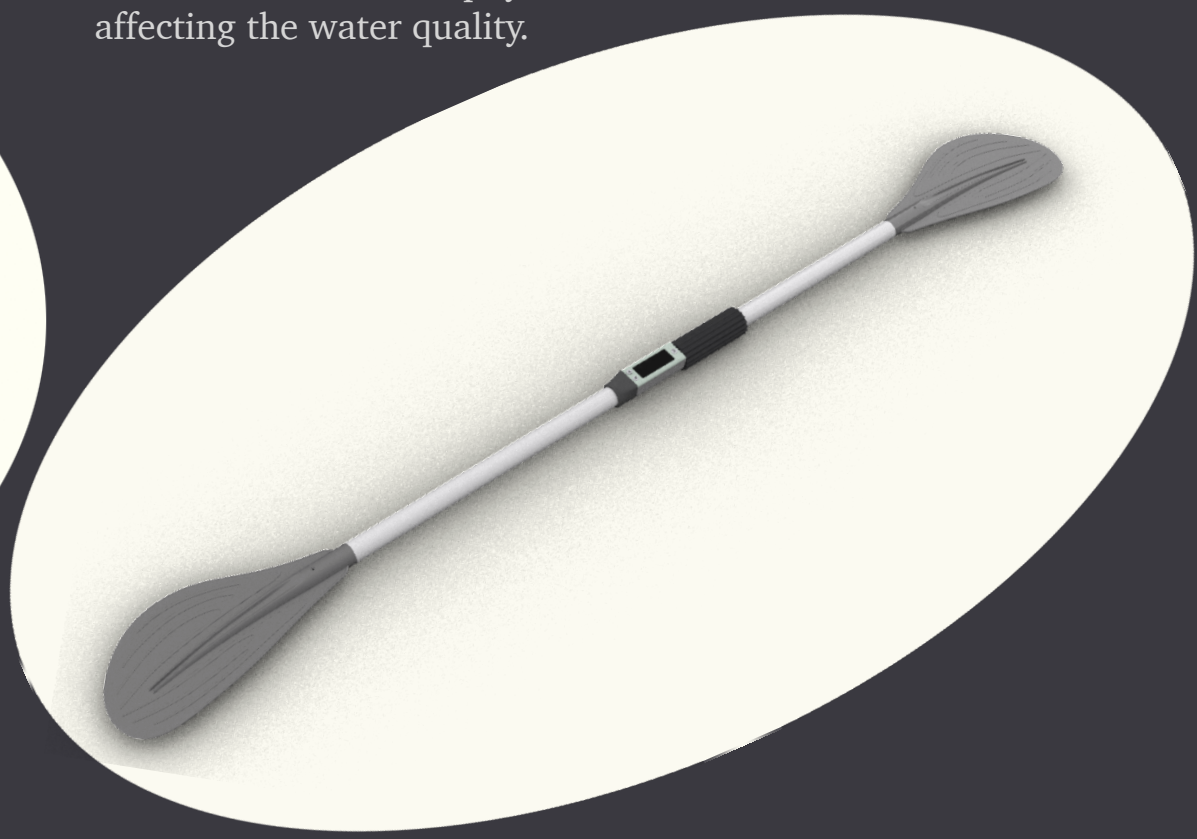
EUT220E INDUSTRIAL DESIGN STUDIO I
2020-21 SPRING SEMESTER
Instr. Miray Boğa, Res. Asst. Selin Arkan, Res. Asst. Onur Yılmaz

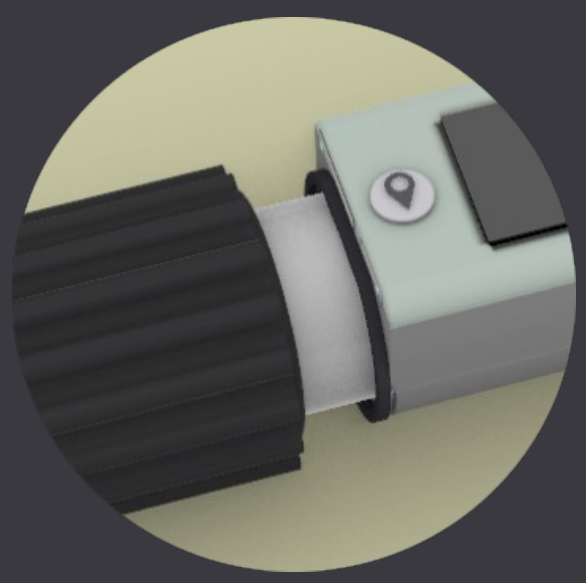
DESIGN FOR
Citizen Science

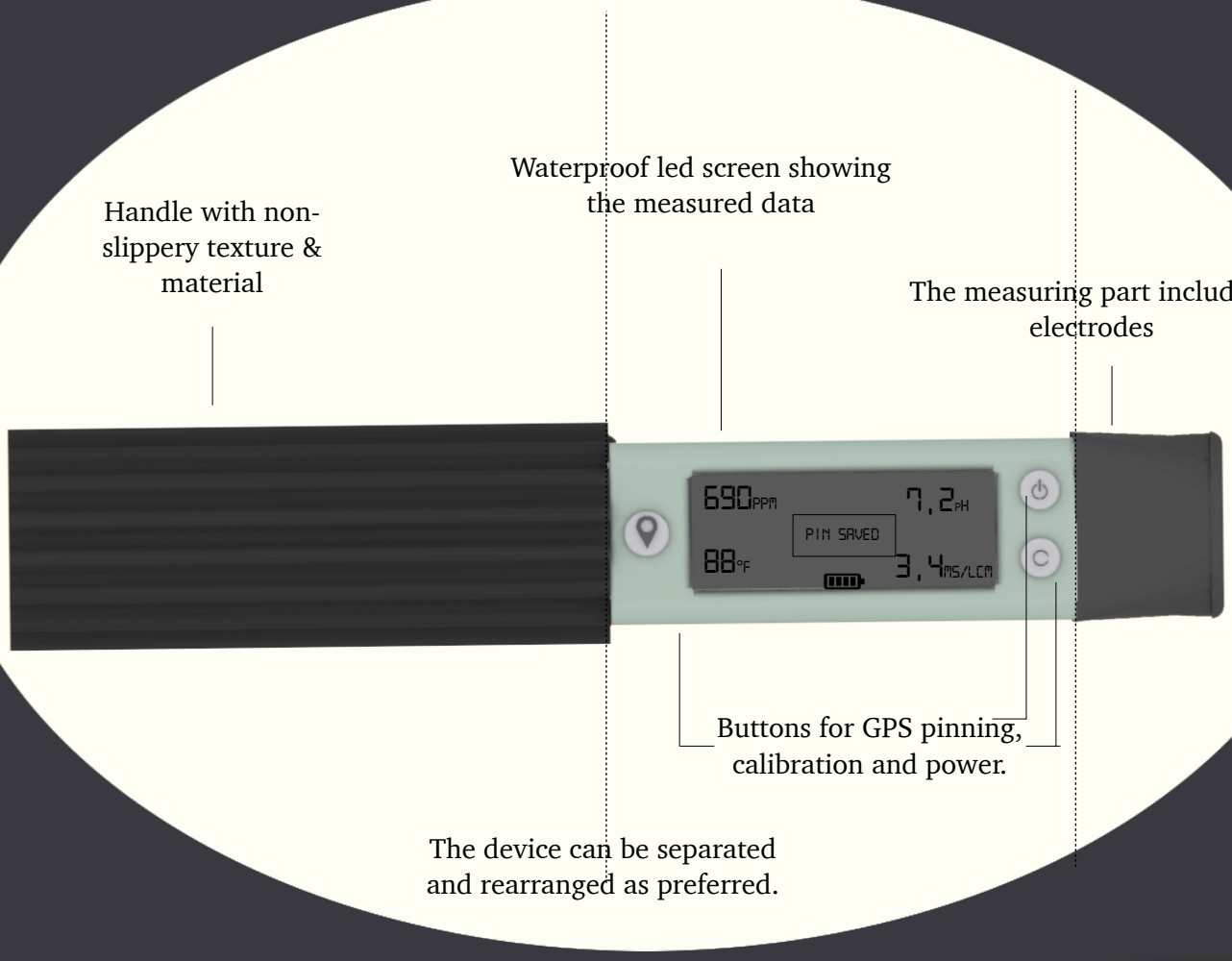
Designed for the use of citizen scientists willing to explore their surrounding water near wetlands. Data collected shows the chemical and physical factors affecting the water quality.

Wetland Science for Kite-Surfers and volunteer Citizen Scientists









"Wetland Science for Kite-Surfers"
Günseli Gürünlü
gurunlu18@itu.edu.tr

A device to measure the TDS, pH, EC, and temperature of the water which can be mounted on a paddle used for rowing, kayaking, paddle boarding, and canoeing. This device has accessibility preferences for right or left-handed users and is suitable for extreme sports. The collected data is pinned with GPS and shared with scientists and citizens who are interested in the local insights. Data is stored in the memory card under the screen.

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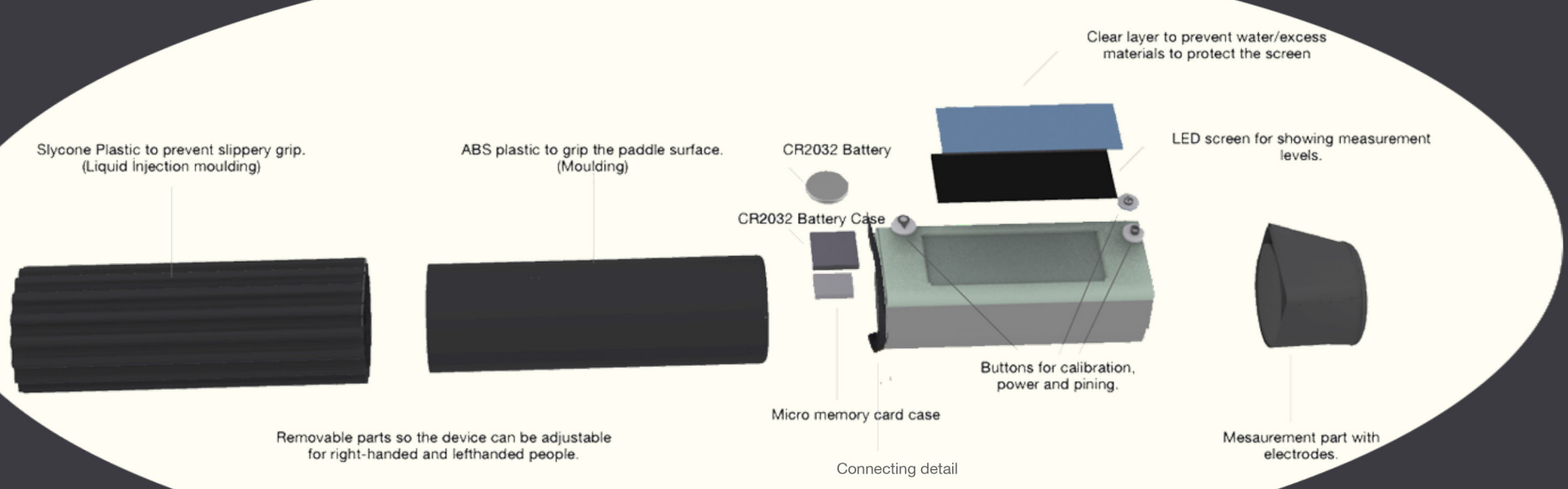
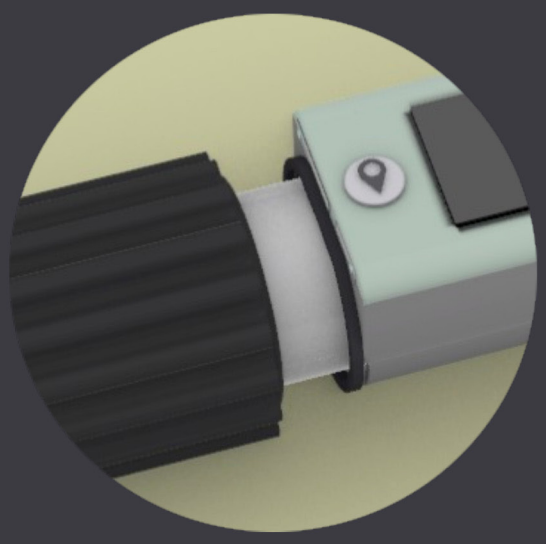
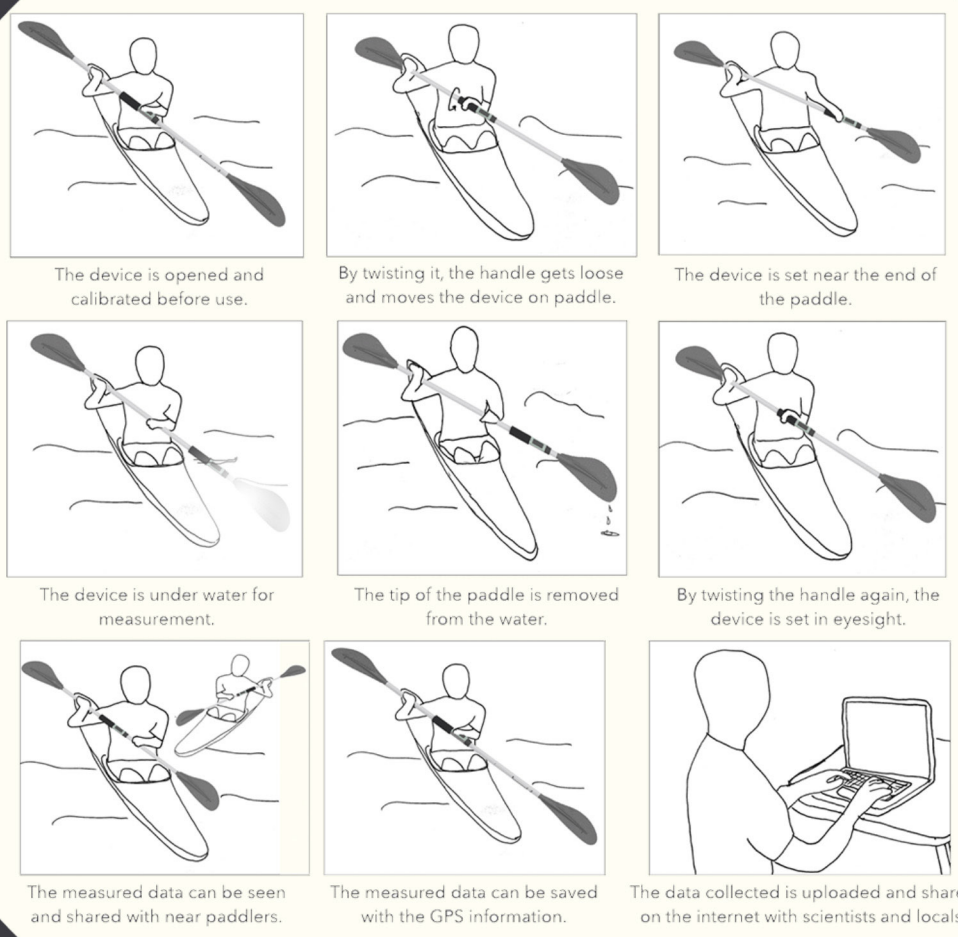
DESIGN FOR *Citizen Science*







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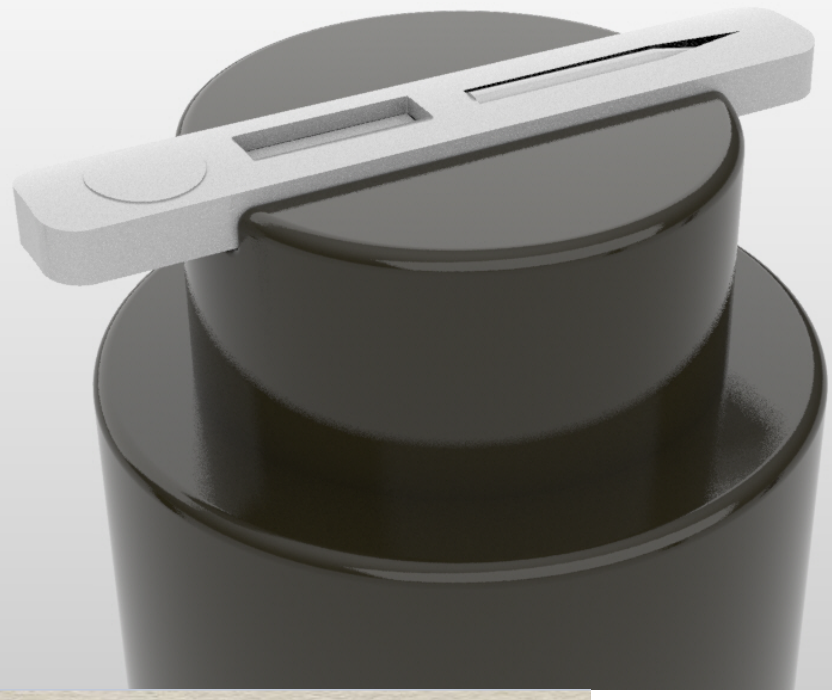

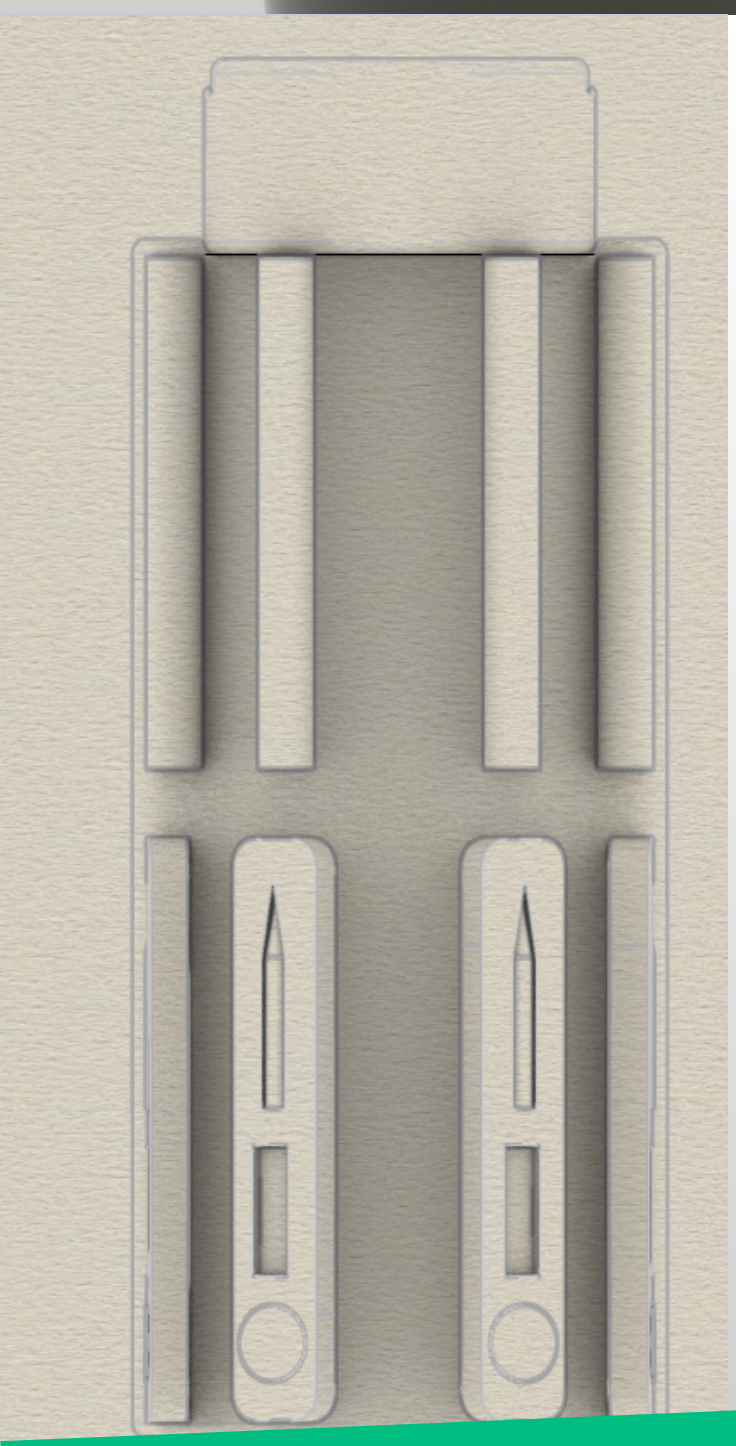

"Container"

Hayati Karakurt
karakurt17@itu.edu.tr

This water bowl, which will be kept by people who do sports in hard-to-reach places, is a product that serves Citizen Science. This water container not only meets the water needs of the user but also detects whether the water of a village fountain is drinkable or not within 10 minutes. In addition, thanks to the samples they take, it makes it possible to examine the values of the water source in detail. Both the user can instantly access the information about the water source they want to drink from, while scientists can access samples and some data from places that are very difficult and time-consuming for them to access.

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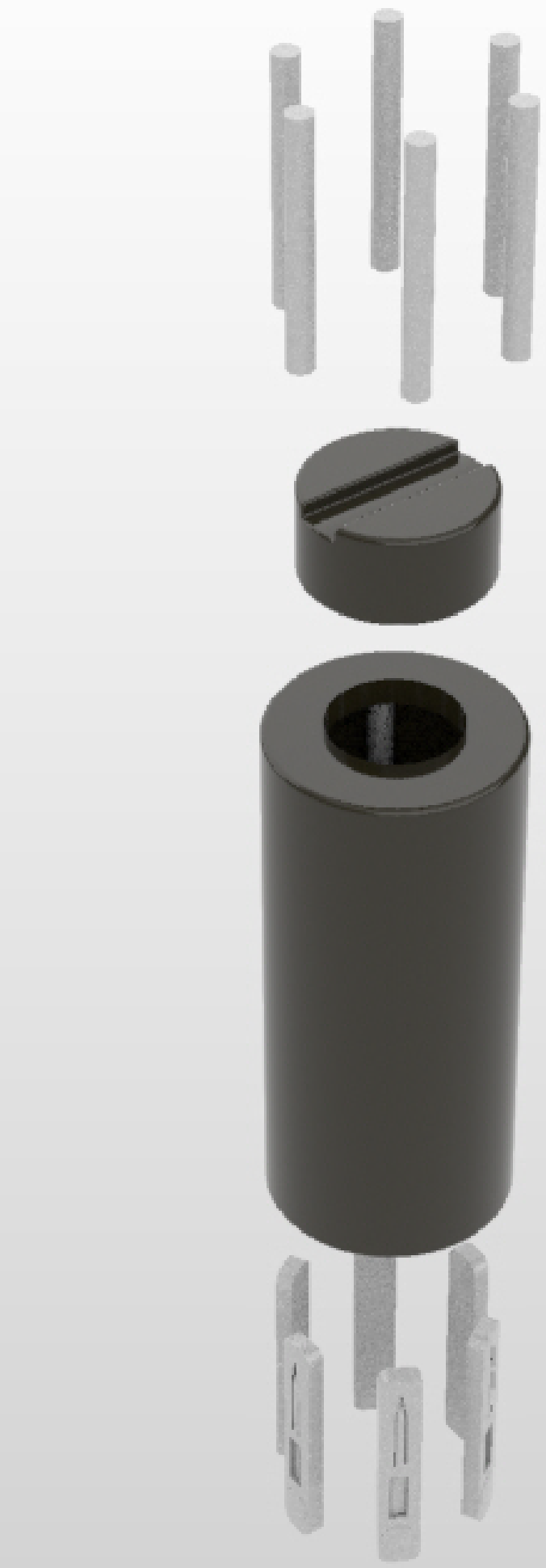

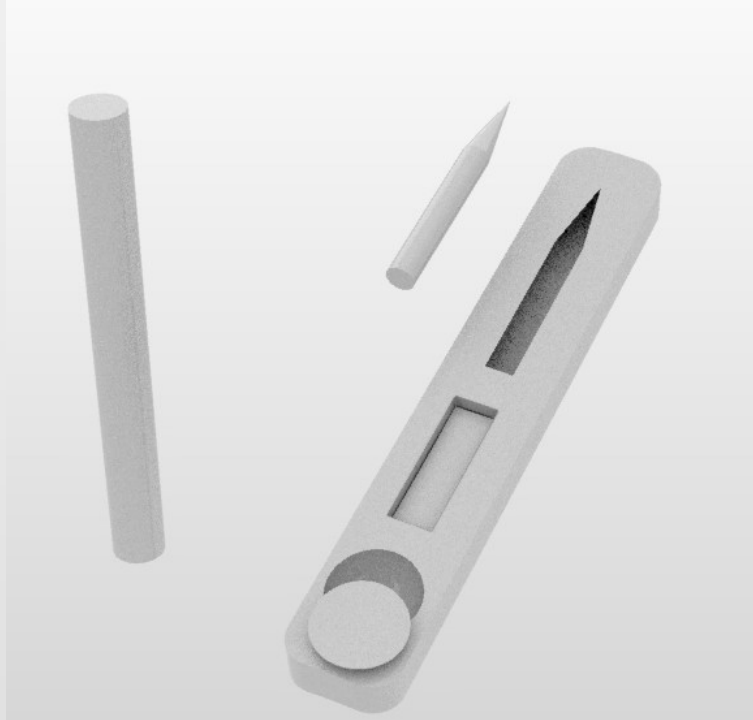

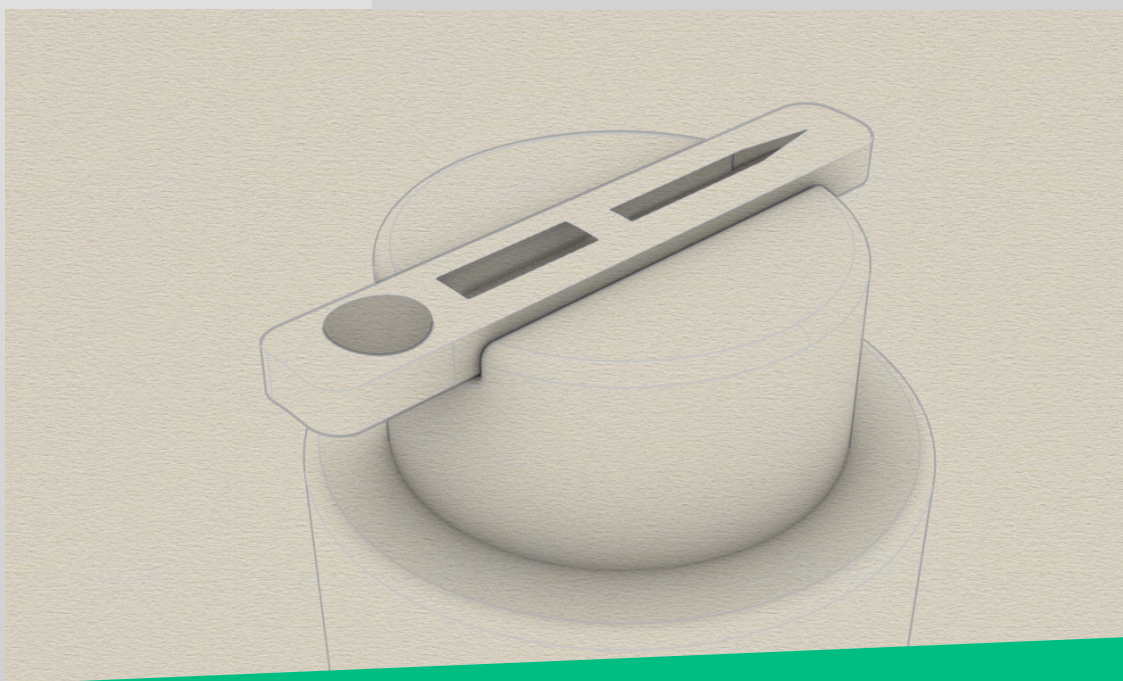

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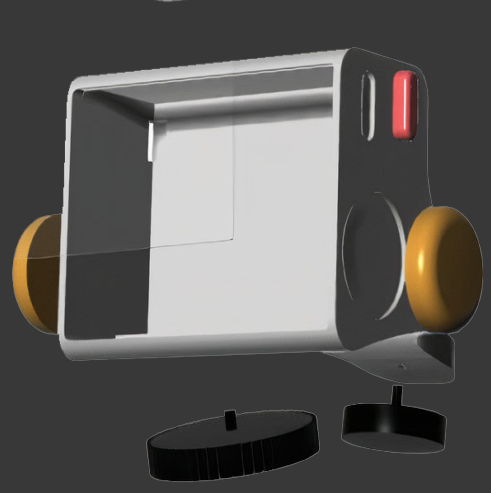
DESIGN FOR
Citizen Science

MEMOCO

MemoCo, which is actually an action camera, was designed to collect special moments and then experience them collectively. The video shooting feature and the GPS in it work together, allowing the recording of the moments to be "pinned". At the same time, the GPS inside it sends signals to the necessary places in case of emergency and acts as a first aid for the user



The fact that it can be easily attached to the helmet and easily changed is an advantage for the user. It can be attached to different parts of the helmet thanks to its vacuums that can be adapted to any helmet

"MemoCo"
İrem Aslan
aslani18@itu.edu.tr

MemoCo functions as a housing for action cameras and collects GPS data. Visual data collection tool also serves earth scientists. This product, which is focused on saving memories for users, allows the memories to be collected in a pool in the post-use scenario. Besides, it creates a collective sharing area with earth scientists and other parachuters.

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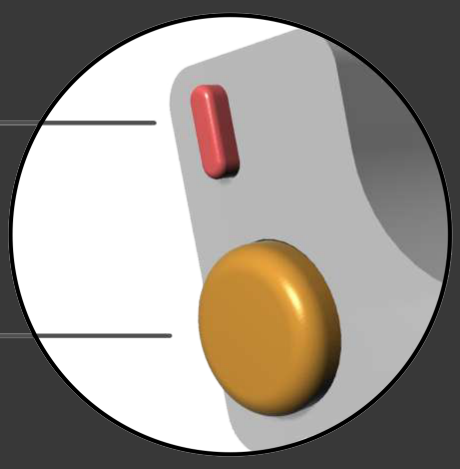
DESIGN FOR *Citizen Science*

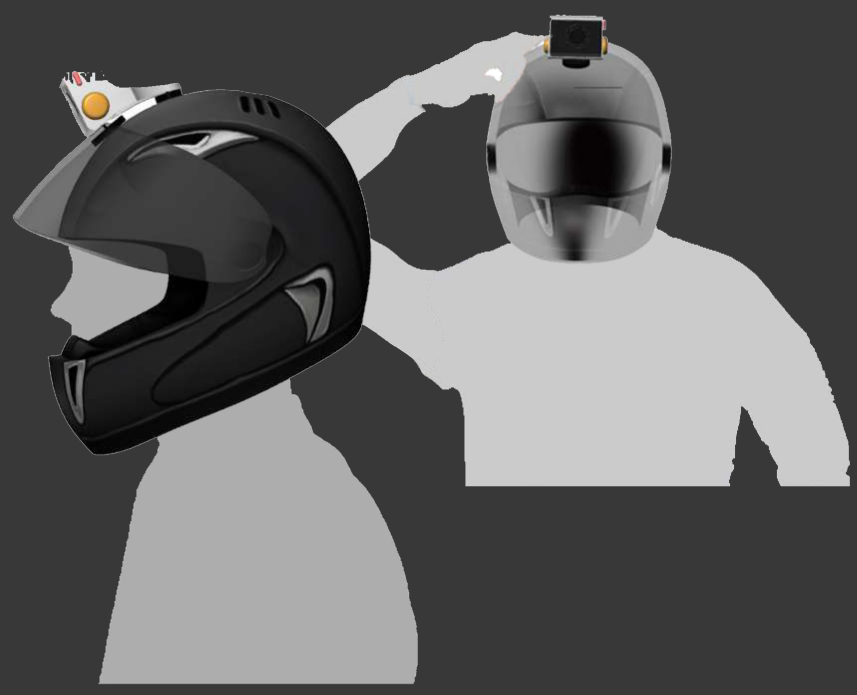
on/off button

pin button

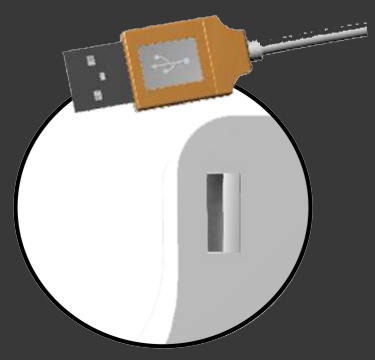


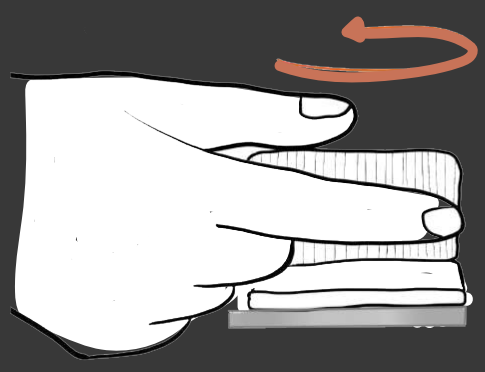
the form of the back of the product slows down the passage of wind without the need for additional parts, the product does not have a balance problem

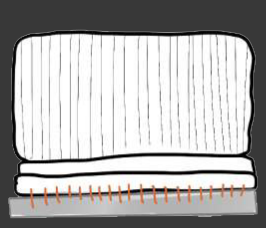
locked vacuum mechanism



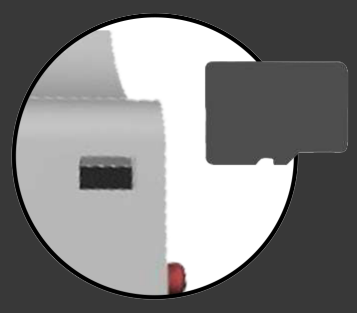
usb charging port







the part that is turned left and right locks the vacuum at the bottom and the product sticks



GPS

sd card input

the collected visual data is then transferred to the computer.

"MemoCo"

İrem Aslan
aslani18@itu.edu.tr

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DESIGN FOR *Citizen Science*

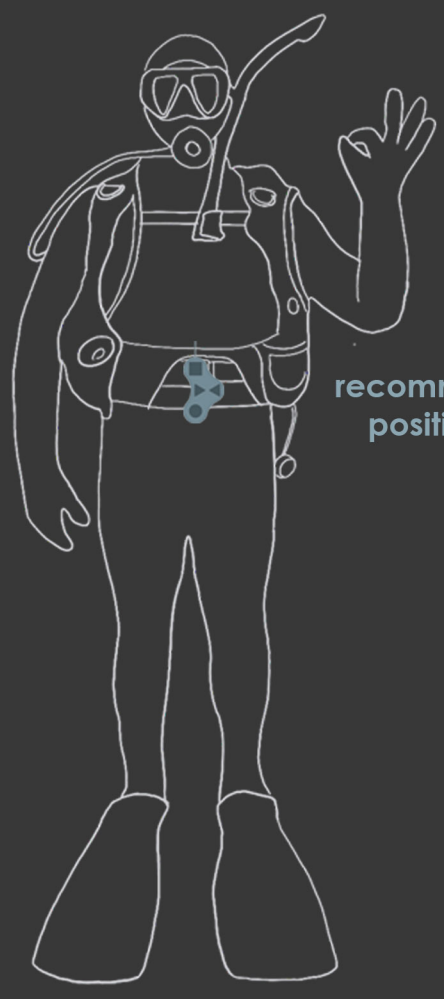
saw x type of invader

among the cliffs: press

among moss/plant: press

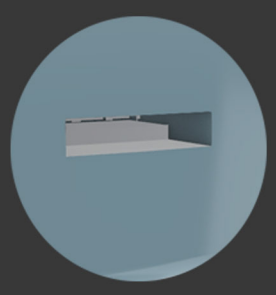
on high-sea: press

on other: press



recommended positioning

connector
push-on
attach the product to the waist of the bc,
which is one of the diving equipment,
with this apparatus



data processing
enter data by squeezing/pressing both front and back
it has a softer structure than the main body of the product
due to comprehension, it feels like we are entering data

usb input
it provides data transfer to the computer,
and also serves to charge the product.
since the product will be used underwater,
it is closed with a suitable waterproof cover
before diving.

"data'ticket"
İrem Selvi
selvi17@itu.edu.tr

data ticket is designed as a GPS data logger for mapping the density of invasive species. The double-sided product has an ergonomic structure for both right and left-handed users.

The product contains 4 codes. These are seaweed, reef, open sea, and other. If the user sees 'x' invasive species among rocks/moss or high-sea, they process the data into corresponding codes. If the user sees 'x' invasive species in a place where it cannot identify it, encodes it as other and reports it after diving.

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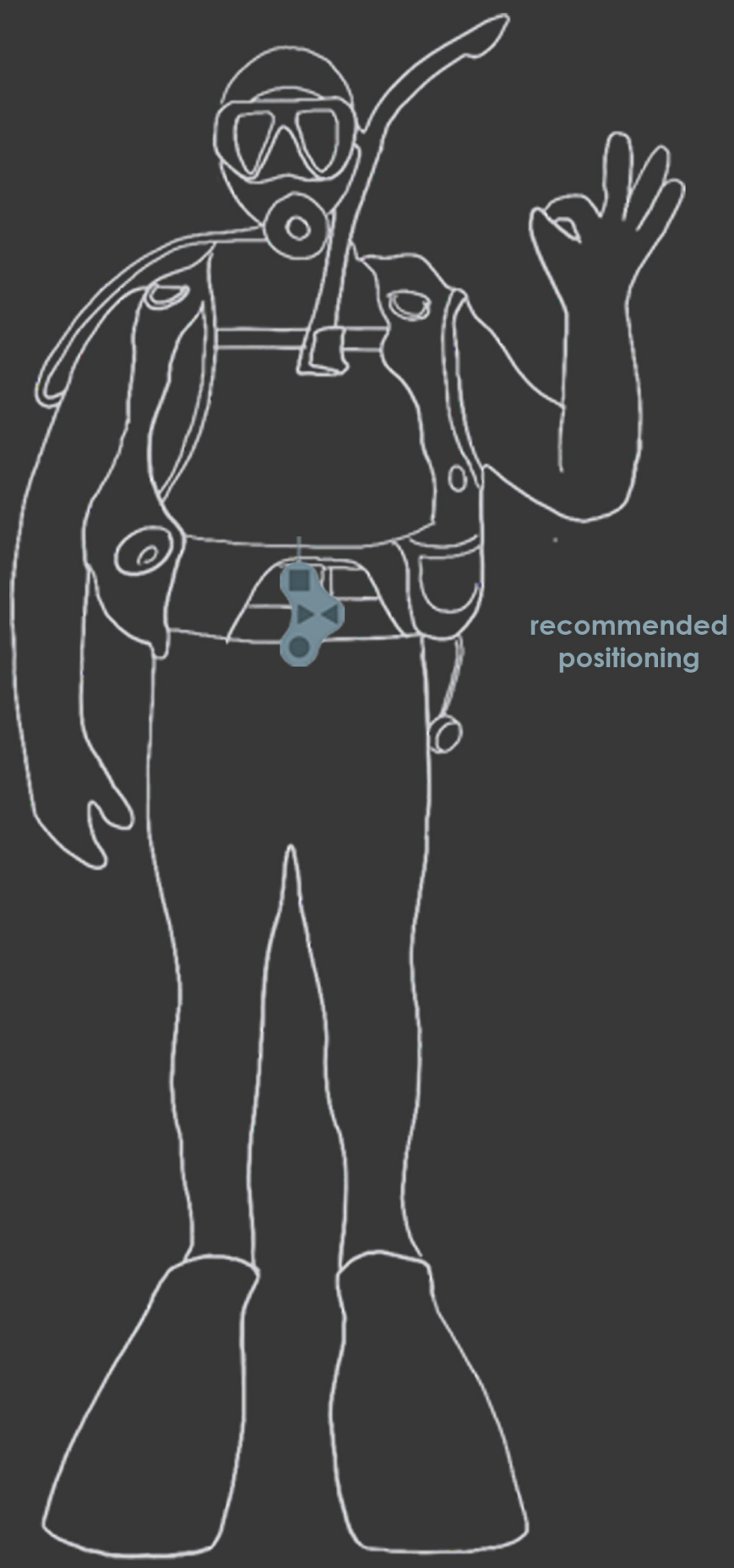

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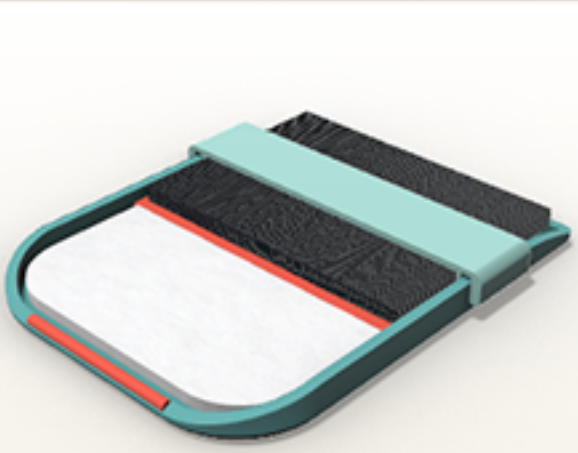

"Concha"

İzay Göksu Ünlübaş
unlubas18@itu.edu.tr

This product serves citizen science by collecting data on the size and shape of seashells. It also allows to draw the contour of shells on paper and take photographs easily and correctly. The molding template is adapted to the scale of shells and small-scale pieces and used to define the shape of the amorphous creatures.

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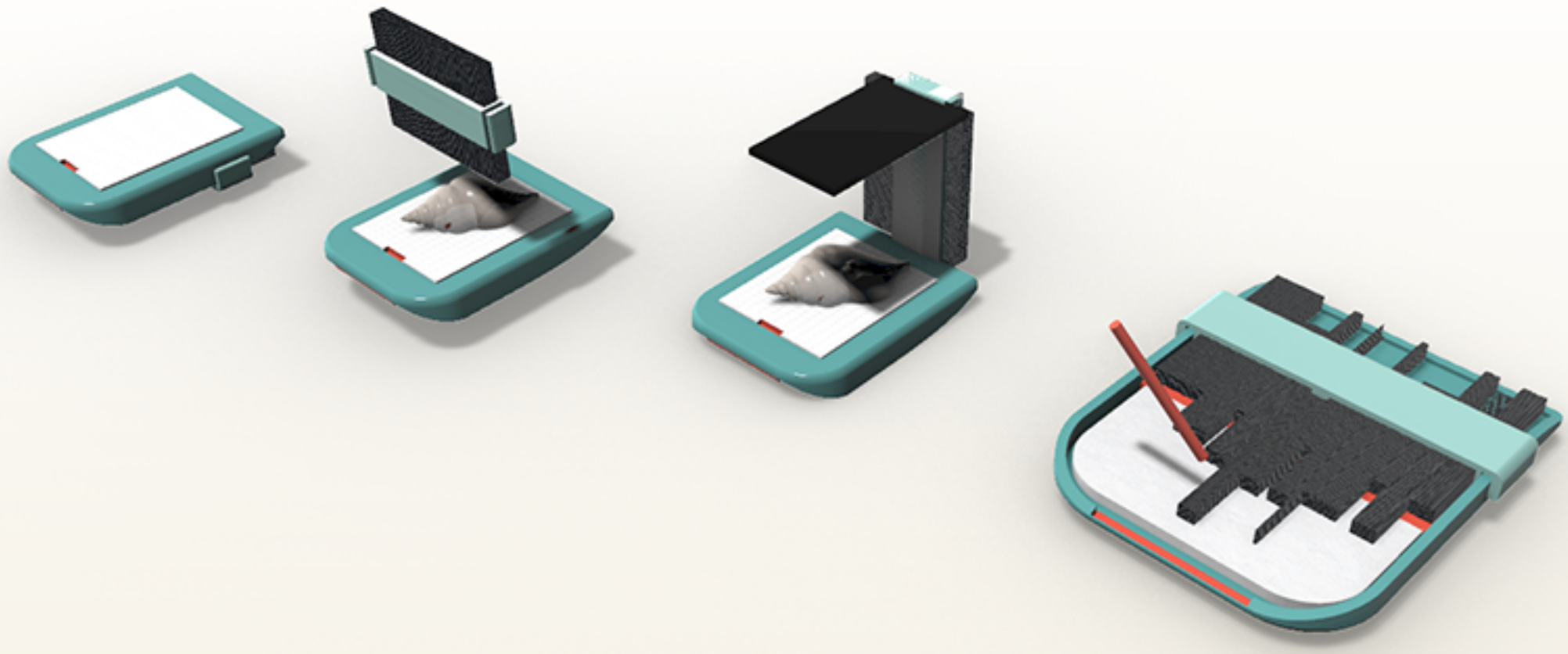

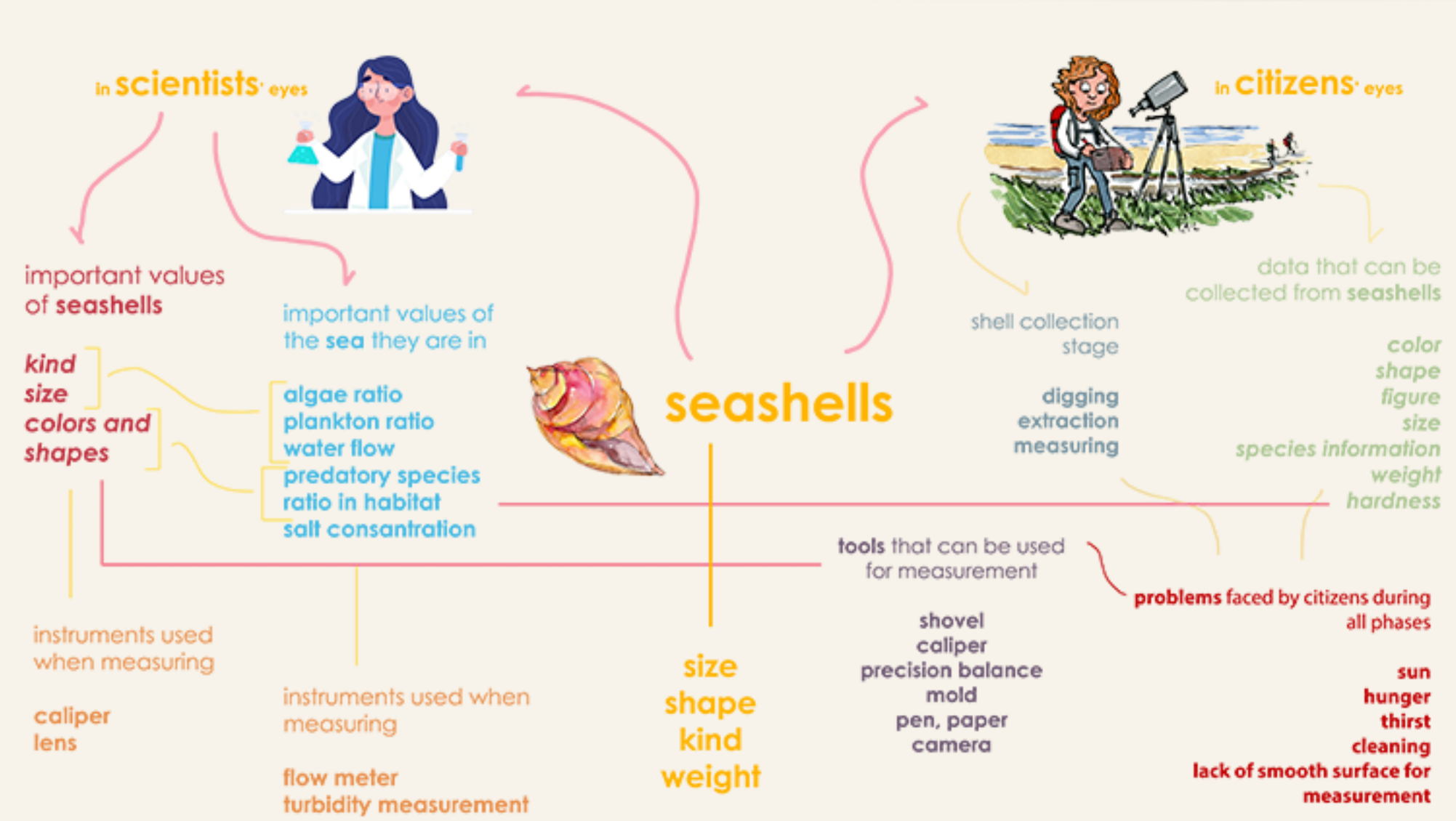

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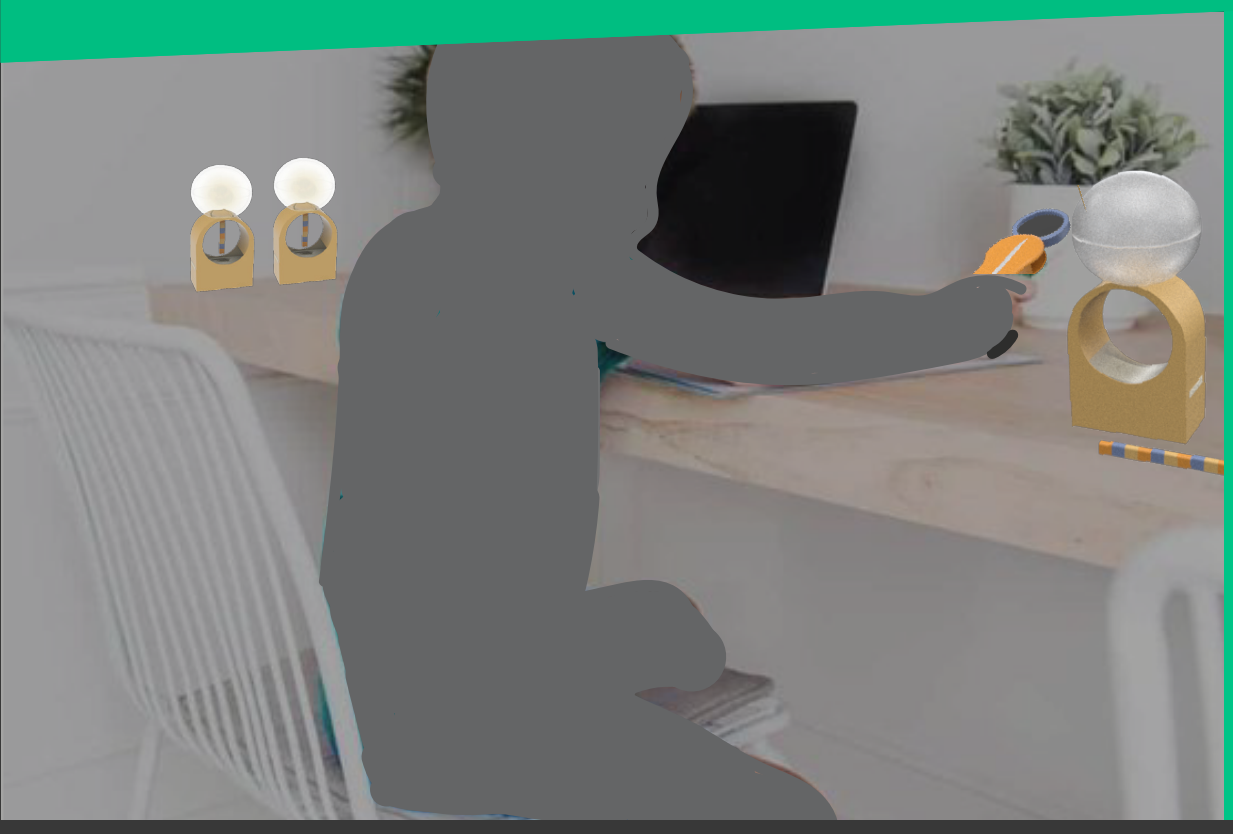

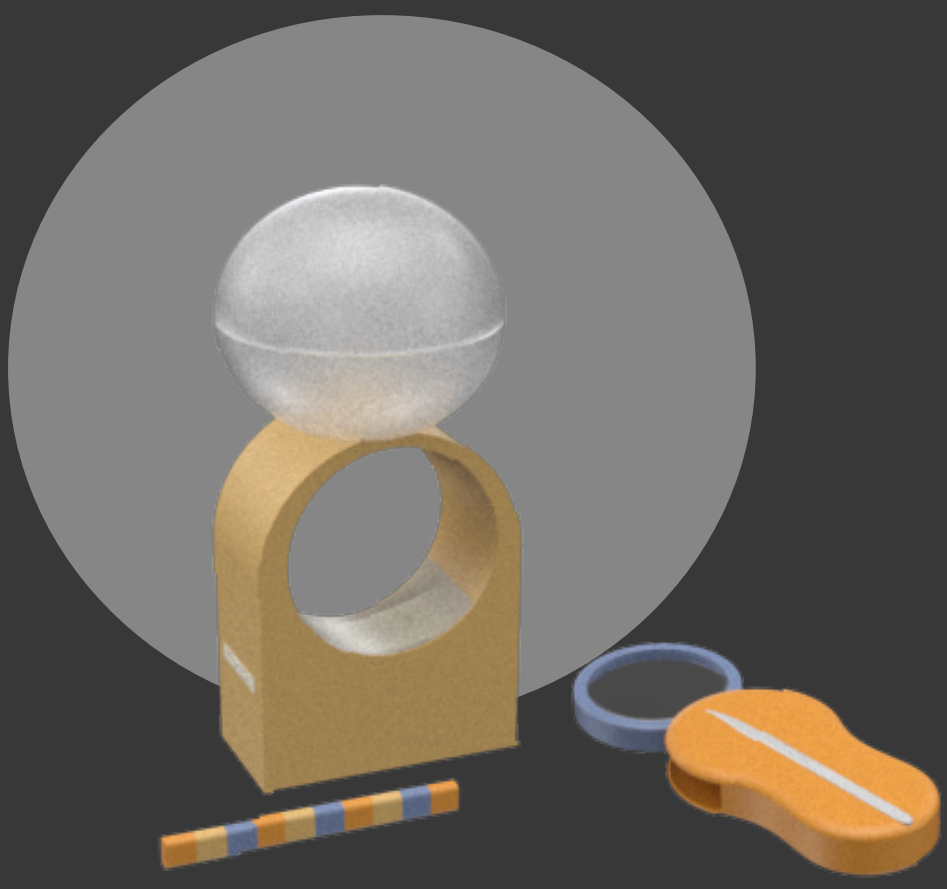

"Archeokeeper"

Lara Erdir
erdir18@itu.edu.tr

Archeokeeper is a research kit for kids to practice an archaeological excavation process and make sense of the findings.

Magnifying Glass - to examine the surface qualities
Scratch Tool - to dig soil & to check the hardness of the found object
Streak Plate - to get the mineral streak and color of the surface
Molding Sphere - to imitate the volume of the found object by creating a void
Stand - to gather all the information and display

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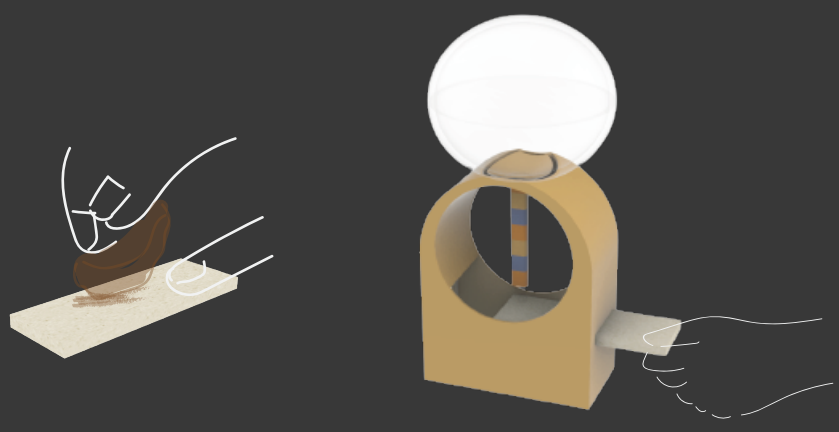
DESIGN FOR *Citizen Science*

STEP 1: Research

STEP 2: Define



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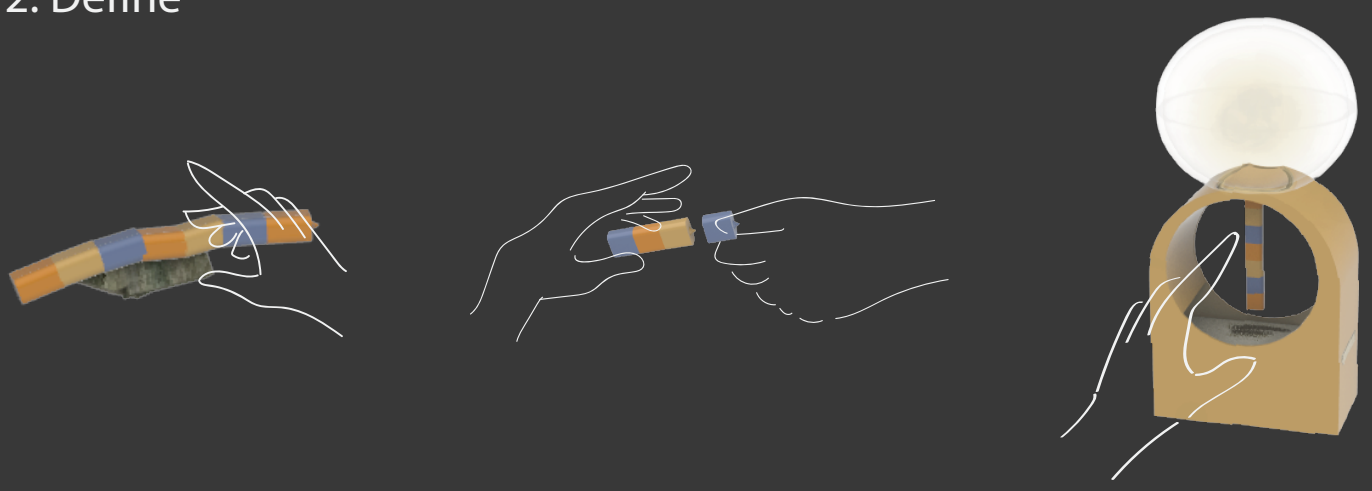

STEP 3: Turn into Data

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DESIGN FOR *Citizen Science*

"My First Plant Observation Kit"

Nil Naren Yıldırım
narenyldrm@gmail.com

The primary goal of citizen science projects conducted with children is to actively involve the child in the process and ensure that they are informed on the subject. Throughout the design process of this product, the child's motivation was in the focus while the correctness of the collected data was the secondary goal.

This kit includes units that the child would use from the beginning to the end of the plant observation and drawing process. In line with the needs and motivations of the child, the following items are included within the kit: A magnifying glass with 3 different light options (red-blue-yellow), a stand on which the child can draw and keep their other belongings, and a ruler. The units are suitable to be moved and adjusted to amorphous surfaces.

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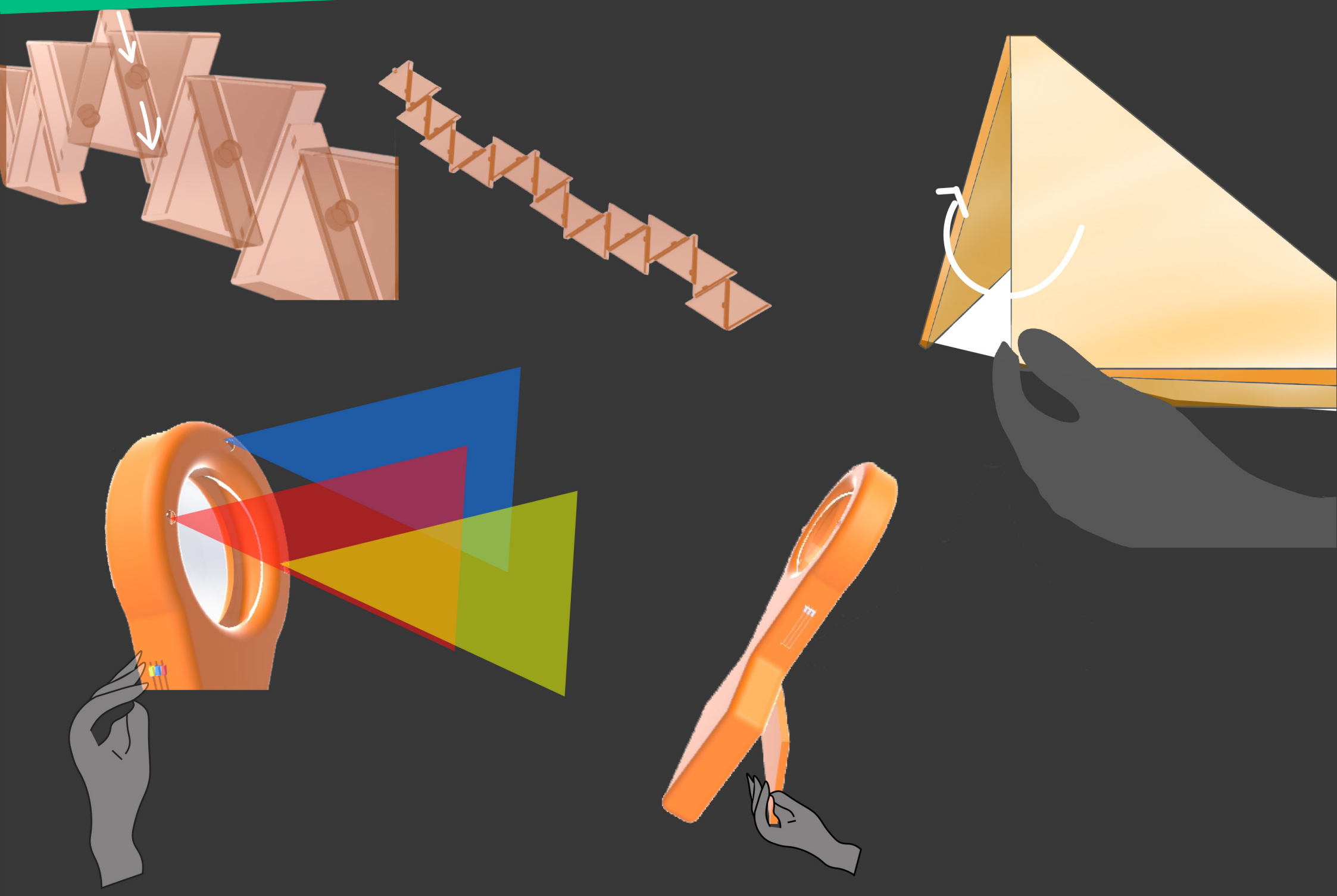

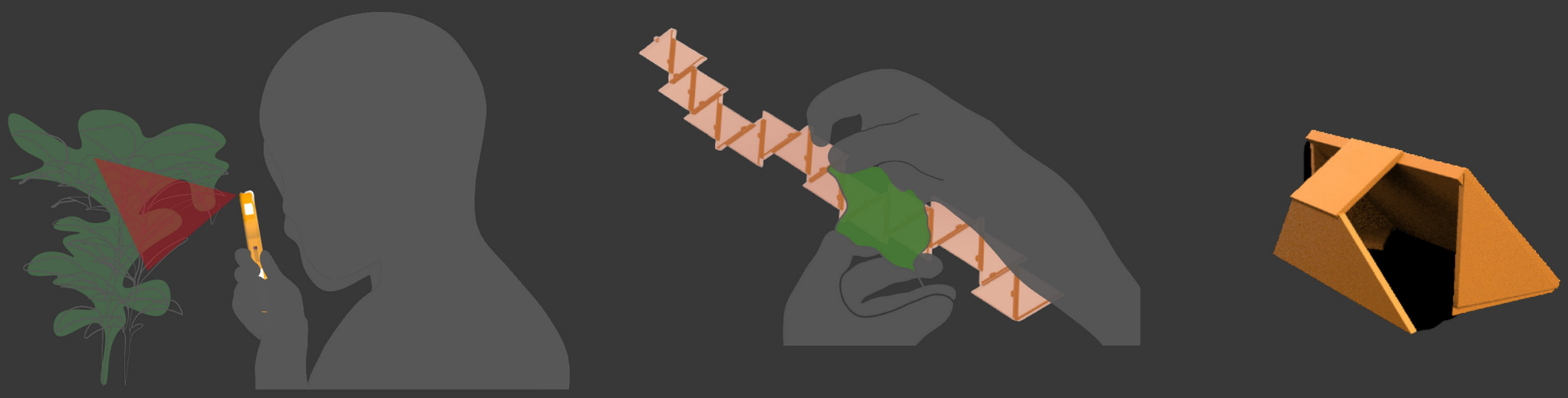

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DESIGN FOR
Citizen Science

Track-Pod
for climbers

"Track-pod"

Pınar Gültekin
gultekinp18@itu.edu.tr

This product enables the user to take photos of animal tracks from a right angle and distance. In addition, there is a ruler at the bottom of the product so that the dimensions of the footprint can be photographed and sent to scientists for analysis.

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DESIGN FOR *Citizen Science*

"Fructometer"

Sevinç Sayar
sayarse18@itu.edu.tr

This product enables the farmers to obtain the data of fruits and their leaves' growth process by measuring the radius of the fruit and the height of the leaf. Thus, the farmers can provide data for agricultural engineers.

The data from each kind of tree is represented by different colors. The colored buttons contain ink to mark the measure of the week. The same goes for leaves but the mechanism is different due to the geometrical differences of fruits and leaves. Farmers can do the measurement while they are harvesting.

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DESIGN FOR
Citizen Science

Which fruits?

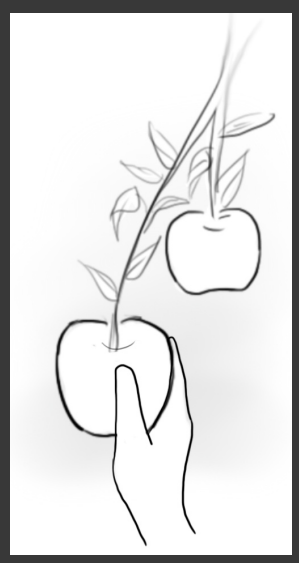
April May June July August September

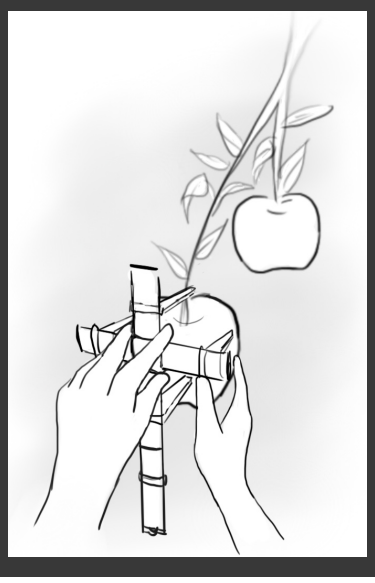
Apple

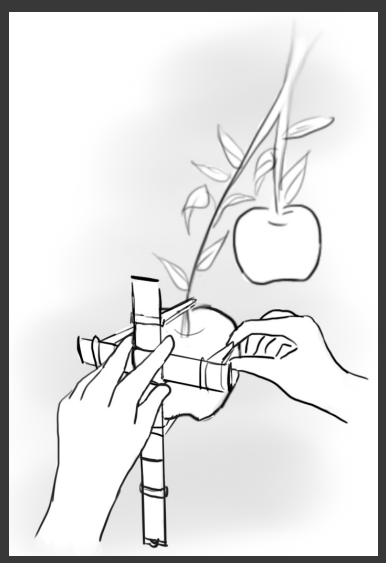
Pear

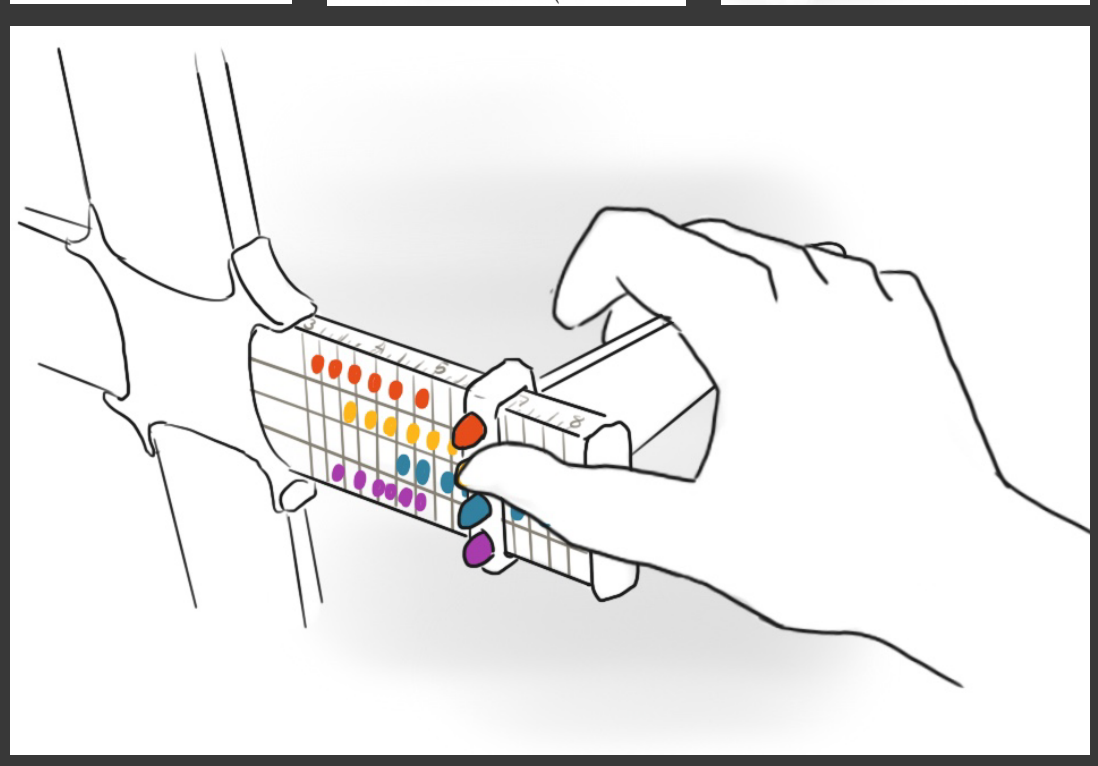
Peach

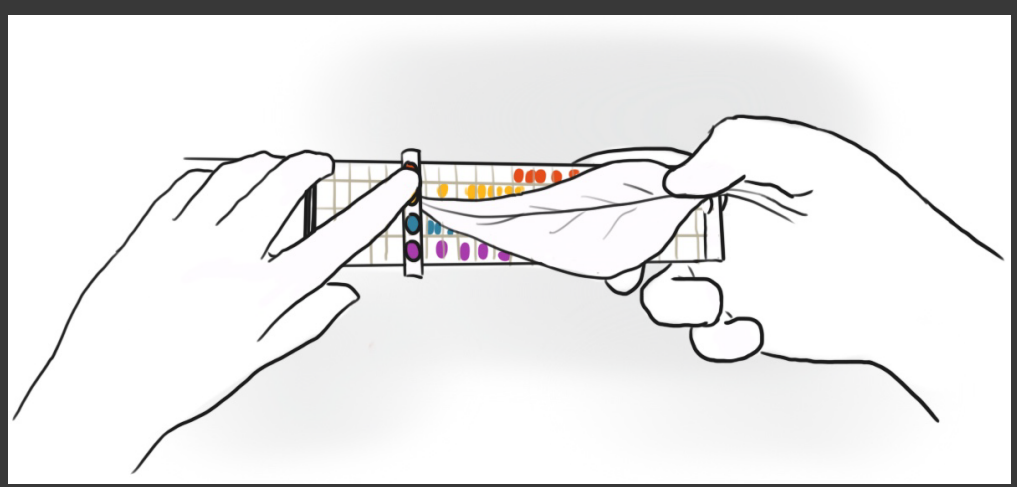
Quince

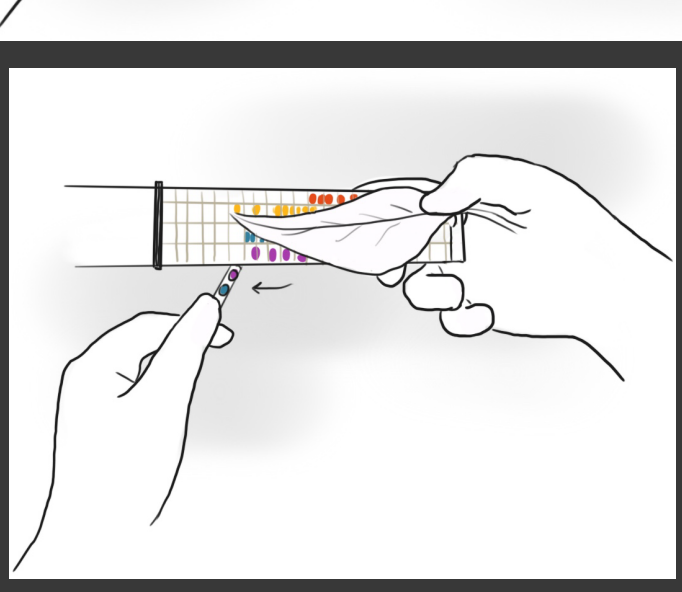












"Fructometer"

Sevinç Sayar
sayarse18@itu.edu.tr

This product enables the farmers to obtain the data of fruits and their leaves' growth process by measuring the radius of the fruit and the height of the leaf. Thus, the farmers can provide data for agricultural engineers.

The data from each kind of tree is represented by different colors. The colored buttons contain ink to mark the measure of the week. The same goes for leaves but the mechanism is different due to the geometrical differences of fruits and leaves. Farmers can do the measurement while they are harvesting.

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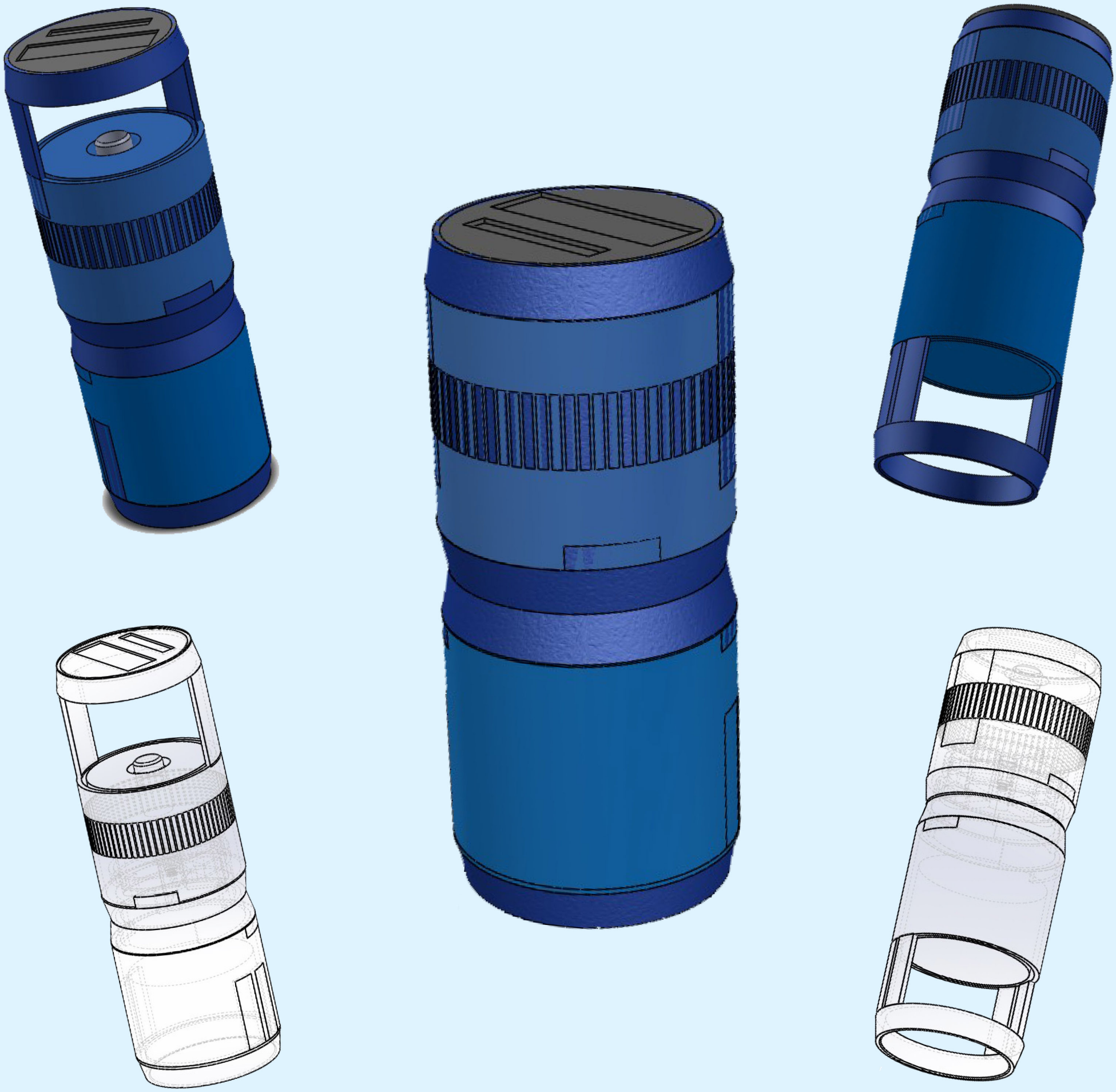
DESIGN FOR *Citizen Science*



"Open Call for Plastic Pollution"

Uğur Zülkadiroğlu
zulkadiroglu18@itu.edu.tr

This project mainly focuses on recovering and degrading plastic waste, which has been left in natural environments, with the help of volunteer citizens who are involved in camping activities by providing samples for material and genetic engineers. The aim of the product here is to collect samples and field data from waste plastics and establish a network between the participants, and also potential participants, by leaving a "mark" in the wilderness.

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HOMO GENOUS

AN INSTURMENT MEASURING WEATHER DATA
FOR CITIZEN SCIENCE AND FOR OURSELFS

WE CAN DEFINE HOMOGENOUS AS "BEING THE SAME" OR "ALIKE". IT MAY BE USED TO DESCRIBE ENTITIES SHOWING SUCH FEATURES. FOR EXAMPLE, HOMOGENOUS SUBSTANCES ARE SUBSTANCES THAT ARE UNIFORM THROUGHOUT THEIR VOLUME AND COMPOSITION ARE VERY COMMON. EXAMPLE OF HOMOGENOUS IN OUR DAILY LIFE IS WHEN A COLOR (SUCH AS INK) IS MIXED WITH WATER, THE RESULTANT SOLUTION IS VERY HOMOGENEOUS. THE COLOR EVENLY MIXES WITH WATER AND THE COMPOSITION OF ANY PART OF THE SOLUTION IS THE SAME. HOW CAN THE SUBSTANCES IN A MIXTURE BE SEPARATED?OUR WORLD CAN DESCRIBE AS A HOMOGENOUS SUBSTANCES.HOW CAN YOU SEPERATE THE WORLD? THIS PRODUCT AIMS TO COLLECT WEATHER DATA ; WIND SPEED,TEMPERATURE,AIR PRESSURE . THIS PRODUCT USER TARGET IS SURFERS(WINDSURFER/KITESURFER).

"Homogenous"

Yağmur Güneri
guneri19@itu.edu.tr

We can define homogenous as "being the same" or "alike". It may be used to describe entities showing such features. The color evenly mixes with water and the composition of any part of the solution is the same. How can the substances in a mixture be separated? Our world can be described as a composition of homogenous substances. How can we separate the world? This product aims to collect weather data such as wind speed, temperature, air pressure for the surfers (windsurfer/kitesurfer).

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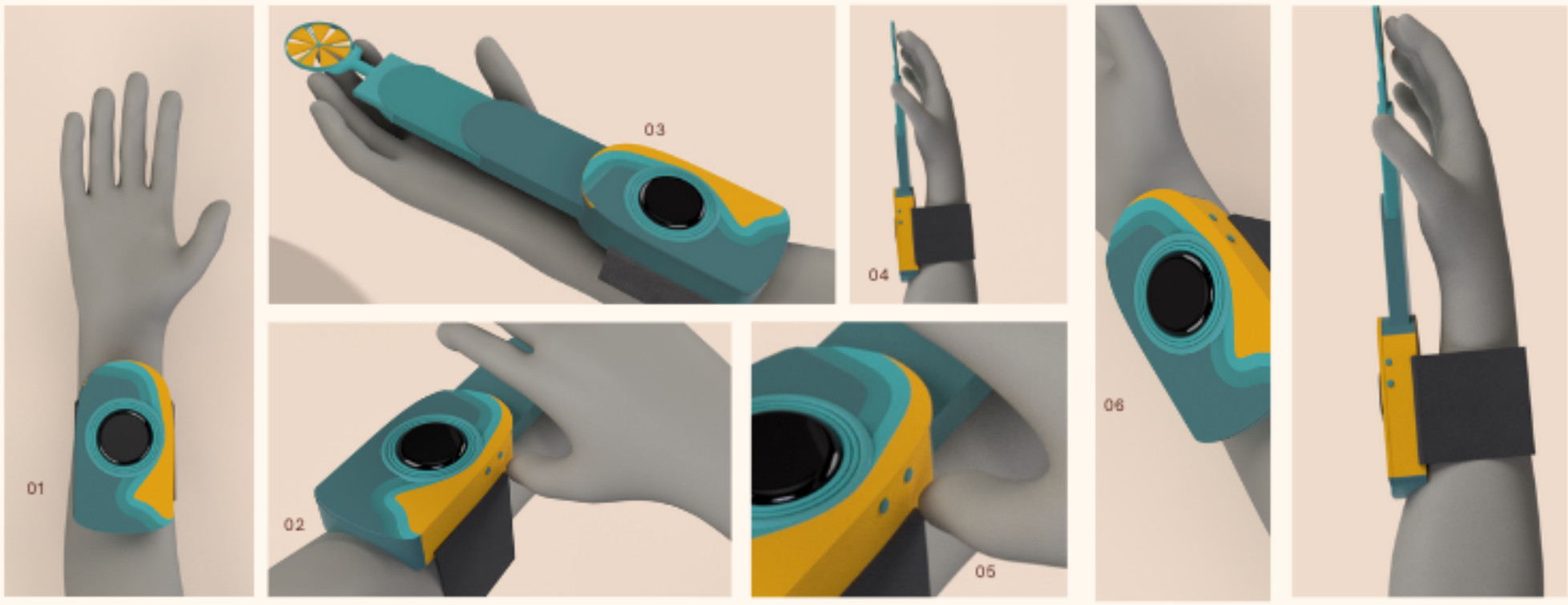

PRODUCT-USER RELATIONSHIP AND DETAILS

"Homogenous"
Yağmur Güneri
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2022