# ITQ

# **TEAM OVERVIEW**





# **SMART GREEN ISLAND MAKEATHON 2023**





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#### **Description of all worked out MAKEATHON Challenges**

#### 1 Smart Recycling & Circular Manufacturing

Garbage Recycling is crucial for maintaining a healthy and sustainable environment. By recycling waste, we can reduce the amount of garbage that ends up in landfills and reduce the need for new raw materials. At the SMART GREEN ISLAND MAKEATHON 8 Teams formed about the topics of Smart Recycling & Circular Manufacturing. From detecting and collecting garbage from the oceans to recycle and upcycle old PET bottles. The students had various ideas to clean the oceans and protect water quality. Even a great solution for the upcycling of Seagrass was found.

#### 2 Smart Farming

Smart Farming applications are becoming increasingly important due to the growing demand for sustainable agriculture practices. These applications can monitor soil moisture levels, nutrient content, and weather patterns to inform decisions around irrigation, fertilization, and planting. 7 Teams worked on different stations of a connected smart farm. Besides the aspect of reducing manual labor and making farming autonomous the Teams designed prototypes to connect different farms together and use synergies by transferring water, energy, and organic residue.

#### 3 Smart Watering & Green Energy

Smart Watering is essential for efficient and sustainable use of water resources in agriculture, landscaping, and gardening. With increasing water scarcity and environmental concerns, it is important to optimize water usage while ensuring that plants and crops receive adequate water for healthy growth. During the SMART GREEN ISLAND MAKEATHON 5 Teams concentrated on Smart Watering Systems that can provide plants with the correct amount of water based on their individual needs. 1 team developed a smart IoT-based Sun Tracker Systems to secure the most efficient energy generation.





#### 4 Safe Workplace

A smarter workplace utilizes technology and innovation to create an efficient, productive, and comfortable work environment. These technologies not only improve productivity and efficiency, but also promote employee well-being by creating a comfortable and healthy workspace with reduced energy costs, improved sustainability, and a modern and innovative work environment. 2 Teams worked on exoskeletons to decrease the risk of injuries that are caused by repetitive manual load and one Team focused on a platform to detect to heavy weights on the employee's body.

#### 5 Smart Mobility

By investing in Smart Mobility, cities and communities can improve quality of life for residents, reduce environmental impacts, and promote economic growth through improved transportation infrastructure. 1 Team at the SMART GREEN ISLAND MAKEATHON focused on the existing E-Scooters which still need to be fueled with power at night. They use solar energy to make the green E-Scooters even more sustainable.





# 1 Smart Recycling & Circular Manufacturing

8 Teams formed about the topics of Smart Recycling & Circular Manufacturing. From detecting and collecting garbage from the oceans to recycling and upcycling old PET bottles the students had various ideas to clean the oceans and protect water quality. Even a great solution for the upcycling of Seagrass was found.

#### 1.1 BottleCut

Team Photo	Short Description
BottleCut	The Team BottleCut wanted to build a machine that can cut any bottle made of PET, the system mixed an electric circuit with a structure of wood and metal. A bottle cut machine for PET is a device that is designed to cut plastic bottles made from PET into smaller pieces. PET is a commonly used material for beverage bottles due to its durability, lightweight, and ability to be easily molded into various shapes and sizes.

#### 1.2 FilaPET

Team Photo	Short Description
Fila Pet	The Team FilaPET developed a machine to transforms PET bottles into 3D-printing filament. The first machine is a crusher that cuts PET bottles into flakes. An extruder melts the flakes and produces hot PET filament. Measurement systems control the correct diameter before it gets winded up to a spool.

#### 1.3 Sandstorm

Team Photo	Short Description
Makeathev202 Makeathev202 Construction Co	The Team Sandstorm was working on the Industry Challenge of igus which is based on the collection of Seagrass as it offers economic and ecological benefits. The Team designed an autonomous car for the detection and collection of Seagrasses from the beaches, and it could also be re-programmed easily in case it's needed to clean the beaches from trash.





#### 1.4 Seaweed Sorters

Team Photo	Short Description
Fila Pet	The Team Seaweed Sorters has developed a prototype using igus technology to clean Seaweed. As a first step a vibrating plate and a sieve shake off sand and small particles of garbage from the Seaweed. Ae Cobot picks up the garbage with a 3D-printed gripper and places it on a conveyor belt that leads to the garbage can. Seaweed is an excellent insulating material for building houses in regions near the sea.

#### 1.5 weSeaWeed

Team Photo	Short Description
Fila Pet	The Team weSeaWeed built in cooperation with Sigmatek a prototype for an intelligent machine to dry Seaweed. To secure energy-efficiency, the dryer uses current weather predictions, as well as the humidity of the Seagrass and the humidity outside of the dryer. The construction is like a Greenhouse to take advantage of the Canarian sun.

# 1.6 Garbage Detection & Collection

Team Photo	Short Description
Barbage Detection & Collection	The Team Garbage Detection & Collection addressed the problem of plastic pollution in the oceans. To solve this problem, the project proposes the development of a machine vision system for localizing plastic waste and dividing it into productive zones for more efficient collection. Additionally, the project aims to improve the control of floating garbage collectors for better waste management.





# 1.7 Flying Fish

Team Photo	Short Description
CREEN Flying Fish	The Team Flying Fish worked on the Industry Challenge of Vishay to detect plastic in water. A combined system consisting of an energy self-sufficient buoy equipped with sensors for high quality measurements. The collected data will be transmitted wirelessly to an autonomous drone which evaluates the data and sends it to a base station.

# 1.8 Taburiente

Team Photo	Short Description
Tauriente	The Team Taburiente was working on an intelligent garbage can consisting of 3 buttons to categorize the type of waste. Additionally, it can contain light signals that corroborate the choice. It consists of a lid with buttons and light signals, the waste hole, a body made up of a rotating base with different tanks and a servomotor that manipulates the rotation of the container according to the user's choice.





# 2 Smart Farming

7 Teams worked on different stations of a connected smart farm. Besides the aspect of reducing manual labor and making farming autonomous they designed prototypes to connect different farms together and use synergies by transferring water, energy, and organic residue.

# 2.1 Aquaturbs

Team Photo	Short Description
Aquaturbs	The Team Aquaturbs is part of the Smart Farming project to design a smart and sustainable water harvesting system which utilizes a set of nylon sails and adapted turbine blades to harvest water from fog at night combined with the ability to generate wind energy during the day. The generated water can be used for the Smart Farming applications.

#### 2.2 Bogota

Team Photo	Short Description
Bogota	The Bogota Remote Teams were working on two different and innovative projects in the field of Smart Farming. The first Team incorporated IoT Technology into an aquaponic system to monitor real-time temperature and pH levels via a Node MCU. The second Team implemented wireless IoT sensors to monitor critical crop development variables such as temperature, relative humidity, and soil moisture.





#### 2.3 Duck Norris

Team Photo	Short Description
Duck Norris	The Team Duck Norris worked on a Smart Digital Gardening Robot. Its goal is to reduce manual labor in the Greenhouse Gardening and make Farming Autonomous. The multifunctional robot can water plants, harvest crops, remove pests and bring out fertilizer. With its Machine Vision Software, it can detect and monitor health and status of plants.

# 2.4 Farming

Team Photo	Short Description
Phakeation2023 Benerokkopf Ben	The Team Farming was working on an inclined farming system, where water flows through the channels due to gravity. Pots are easily removable, so soil can be changed. There are sensors in each pot to control the state of it and on each tank of water. Tank A has fresh water to water the plants when it is necessary. Tank B stores used water. Sensors later compare tank A and B to see if tank B s water is reusable.

#### 2.5 Fish Farm

Team Photo	Short Description
Fish Farm	The Team Fish Farm was creating an intelligent Fish Farm. With sensors to detect parameters like temperature, water level, water flow rate and the exact height of the water every fish in the tank feels like on vacation. Our aim is to deliver the "used" nutrient rich water to another farm, which they can use to water crops. Fish food leftovers can be used for soil production.





#### 2.6 Mushroom Cultivation

Team Photo	Short Description
Mushroom Cultivation	The Team Mushroom Cultivation was working on a prototype for an automated Mushroom Farm which is integrated in the overall smart green garden project. The farm automatically takes care of maintaining the temperature and CO <sub>2</sub> saturation of the air necessary for the mushrooms. Excess CO <sub>2</sub> is then transferred to the Produce Farm, where the plants can use it for photosynthesis.

#### 2.7 Soil Production

Team Photo	Short Description
Soil Production	The Team Soil Production aims to produce high-quality Soil for Gardening, Agriculture, etc. The project will involve the collection of various organic residue from Fish Farming waste and to create fertile soil that is nutrient-rich and conducive to plant growth. It includes compost, manure, garden waste, leaves, grass clippings, sawdust. Once the soil has reached the desired level of maturity, it can be used at the farm again.





# 3 Smart Watering & Green Energy

During the MAKEATHON 5 Teams concentrated on Smart Watering Systems that can provide plants with the correct amount of water based on their individual needs. 1 Team developed a smart IoT-based Sun Tracker System to secure the most efficient Green Energy generation.

#### 3.1 GBT Watering

Team Photo	Short Description
MART BEEN GBT Watering	The Team GBT Watering created an intelligent Smart Watering System that can provide plants with their individual water needs. The system will consider various factors such as plant species, local climate, humidity of the soil. It will be designed to adapt to changing weather conditions. By utilizing humidity sensors, RFID technology, previous dataset, and weather forecast it will help to promote healthy growth.

#### 3.2 OHM

Team Photo	Short Description
HECK HOW TO	The Team OHM showcases innovative possibilities of Smart Watering for plants in the Home Garden as well as in urban environment is.The developed mobile robot detects air and soil moisture, temperature, brightness and identifies pests via image recognition for the relevant plant. The user can conveniently control the robot via webapp with integrated voice interaction.

#### 3.3 Sun Pirates

Team Photo	Short Description
Warren et al la construction de	The Team Sun Pirates developed smart IoT-based Sun Tracker Systems. The algorithm for Sun Tracking is provided by the IoT cloud based on the world coordinates, date, and time setup for each tracker. The system allows multiple control and easy access to the tracking algorithm by any tracker hardware. The Team focused on assembly, commissioning, and programming both trackers.





# 3.4 The Enginerds

Team Photo	Short Description
The Enginerds	The Team Enginerds developed a system for a Smart Water Truck to keep waste of water as low as possible. A sensor device constantly measures all the information about the soil and the surrounding and sends all the data to the web server. A database contains all the locations of the different plants and sensor devices and can calculate the amount of water. The pumping system keeps track of the water flow.

# 3.5 Watering Smart

Team Photo	Short Description
Watering Smart	The Team Watering Smart focuses on developing a Smart Watering System for plants in large urban spaces such as roads, by integrating them into the island's current desalination and Energy Infrastructures. The product uses magnetic coils, pumps, and relays to automatically detect soil moisture and provide the required water amount to the plants.





# 4 Safer Workplace

2 Teams worked on exoskeletons to decrease the risk of injuries that are caused by repetitive manual load and 1 Team focused on a platform to detect too heavy weights on the employee's body.

#### 4.1 Cable Kitchen

Team Photo	Short Description
Cable Kitchen	The Team Cable Kitchen developed in cooperation with Murrelektronik two prototypes for a more ergonomic workplace in cable confectioning making the day-to-day experience of the cable production worker more comfortable. The team built a platform to step on for the workplace. It measures the weight standing on it and indicates with a LED bar to the worker if he is carrying too much cable mass at once.

#### 4.2 Exolutions

Team Photo	Short Description
Exolutions	The Team Exolutions worked exoskeletons to decrease the risk of injuries that are caused by repetitive manual load handling. This purely mechanical, passive exoskeleton takes the weight off the user's shoulders and arms and transfers it to their center of gravity so that the user obtains increased endurance during their tasks.

# 4.3 Lyft Up

Team Photo	Short Description
Lyft Up	The Team Lyft Up in cooperation with Murrelektronik was to make the workflow of a production line worker efficient and socially sustainable with the help of a collaborative robot. This robot adapts to the task that the worker wants to perform, allowing them to still move freely and lift heavy objects off the ground, without the need to program or alter the existing workflow.





#### **5 Smart Mobility**

1 Team at the SMART GREEN ISLAND MAKEATHON focused on the existing E-Scooters which still need to be fueled with power at night. They use solar energy to make the green E-Scooters even more sustainable.

#### 5.1 Solar Scooter

Team Photo	Short Description
SMART CREEN SOlar Scooter	The Team Solar Scooter powered by OPTIMA, modified a conventional E-Scooter by integrating a solar cell so that it can be charged during the day in standby-mode without generating additional emissions. This technology allows environmentally friendly transportation and further reduces the carbon footprint by eliminating the need for juicers to pick up and recharge the E-Scooters with conventional vehicles at night.