# TEAM OVERVIEW


## SMART GREEN ISLAND MAKEATHON 2025

# Team Overview

# Description of all SGI MAKEATHON 2025 Challenges

## 1. Smart Automation

All teams develop autonomous systems for efficient waste management, environmental protection, and resource optimization. Using AI, sensors, and robotics, their projects aim to improve waste collection, automate sorting, and optimize sustainability in various settings.

## 2. Smart Production

Digital control and automation optimize manufacturing processes. Team NXT Innovation's work on sensor-based ejection systems demonstrates at the MAKEATHON how smart production can reduce waste and improve quality in industrial settings.

## 3. Smart Recycling & Circular Economy

Transforming waste into resources, this MAKEATHON category promotes closed-loop systems. Projects by GreenElectronics, Banana Cup, and CIVTEL focus on reprocessing plastics, creating biodegradable products, and integrating recycling into production.

## 4. Smart Green Mobility

All teams develop sustainable mobility solutions using innovative technologies. From autonomous construction vehicles to eco-friendly tractors and robots for environmental cleanup, their projects leverage sensors, AI, and IoT to enhance efficiency, safety, and sustainability.

## 5. Smart Farming & Smart Green Logistic

Modern agriculture is enhanced by robotics, sensors, and data analytics. Teams like GrowSmartBot, Aquaponics, and Farmbot develop systems for automated plant handling, integrated aquaponics, and smart machinery to boost efficiency and sustainability.

## 6. Smart Green Energy

Renewable energy solutions ensure sustainable power. Contributions from teams Mojo Picon, Papas Arrugás, 3IQ, Anchieta, Visual CE, H2 Heros, and The Green Engineers highlight modular demonstrators, energy monitoring, and concepts for island self-sufficiency.

## 7. Smart Buildings

Intelligent sensor networks and data analysis reduce energy use and improve comfort. The Smart Buildings project demonstrates real-time monitoring and control for more efficient, sustainable spaces.

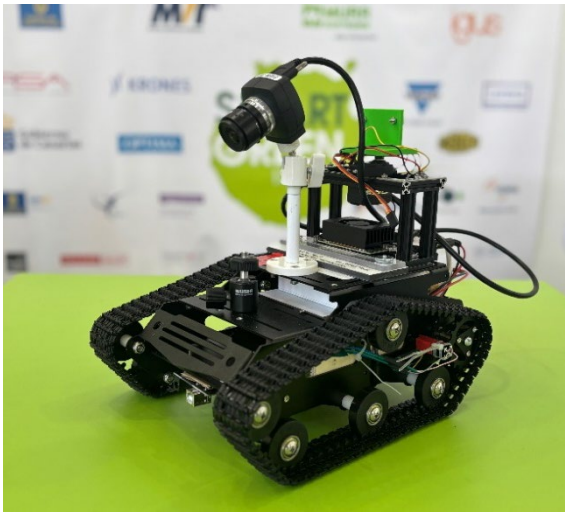
## 8. Artificial Intelligence

AI transforms data management and decision-making. Team BirdBrain's integration of machine learning and speech recognition streamlines research workflows and automates complex processes.

# 1. Smart Automation

## 1.1 Team Sensation, Platin Sponsor MVTec Software GmbH


*Team: Sensation*



*Prototype*

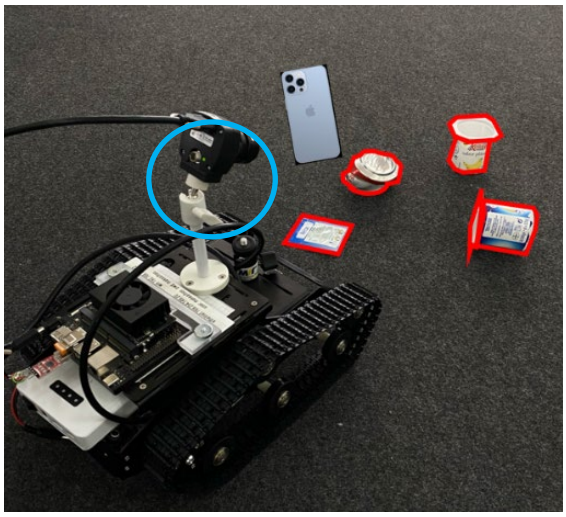
### Project Abstract

Manmade environmental pollution poses a critical threat to sustainability and environmental health. For example, islands and their beaches often suffer from pollution that also affects the oceans. To address this, we are enabling a mobile robot to autonomously collect litter and help mitigate the impacts of pollution. This robot's core functionality relies on a complex self-driving system integrated with various sensors that our team is actively implementing and coding.

Odometry plays a crucial in enabling the robot to recognize its path and maintain accurate navigation, even in the absence of GPS, by measuring changes in position. Furthermore, our team has developed a custom lidar system. This technology uses light detection and ranging to scan the environment, allowing the robot to detect and avoid obstacles safely and autonomously. This capability is essential for operation in diverse and unpredictable settings.

## 1.2 Team TrashTrackers, Platin Sponsor MVTec Software GmbH


*Team: TrashTrackers*



*Prototype (Our Focuspart: Camera)*

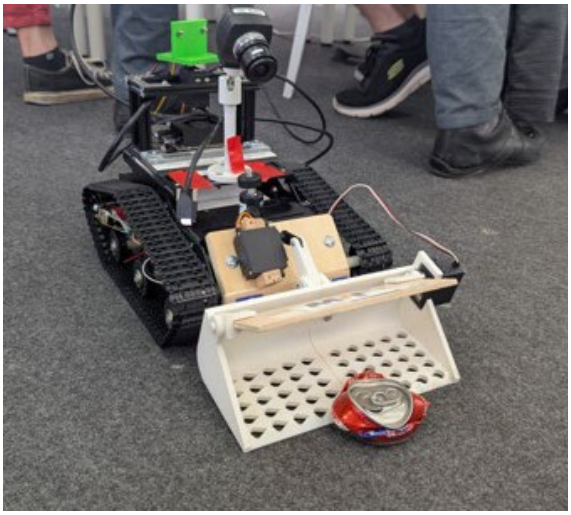
## Project Abstract

As part of our project, we are developing an autonomous robot capable of detecting and collecting waste. Our subgroup focuses on waste recognition using advanced camera technology and artificial intelligence. With the support of our sponsor, MVTec, we are implementing an AI-based system for object detection, specifically trained to identify different types of waste.

To achieve this, we created a dataset of 200 images, each containing approximately five different waste objects. These images were manually labeled to provide a precise training base for the AI model. Through iterative training and optimization, the model aims to achieve a high level of detection accuracy. The goal is to enable the robot to autonomously recognize, locate, and collect waste efficiently, contributing to cleaner environments and advancing smart waste management solutions.

## 1.3 Team Construction, Platin Sponsor MVTec Software GmbH


*Team: Construction*



*Prototype*

## Project Abstract

The overall aim of the MVTec challenge is to design an autonomous vehicle to detect, collect and dispose of trash left behind on the beaches of Gran Canaria. The subgroup Construction's responsibility is to design a mechanism which can collect trash from sandy terrain, securely transport it over rough terrain and finally unload it at a disposal site.

To accomplish this, an articulated excavator bucket was designed. It is mounted to the front of the provided all-terrain vehicle and is controlled by a servomotor. To sift the trash from the sand, the floor of the Bucket was designed with holes in a grid pattern. The dimensions of the bucket enable the robot to collect multiple pieces of trash during one trip. The fill level of the bucket is indicated by the closing angle of a moveable lid, which also secures the trash while moving over rough terrain.

## 1.4 Team NaviGators, Platin Sponsor MVTec Software GmbH


*Team: NaviGators*

*Prototype*

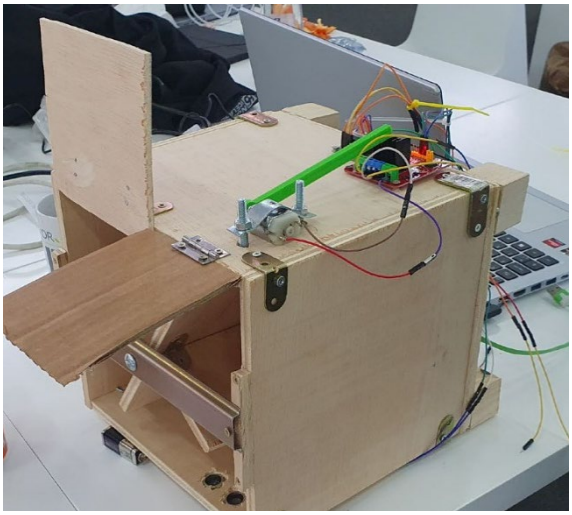
## Project Abstract

Our autonomous mobile robot is designed to detect and collect waste in public spaces, therefore contributing to a cleaner environment. The robot utilizes Halcon for image recognition to detect and classify various types of waste in real-time. By analysing visual data from on board cameras, it accurately identifies waste objects based on shape, size, and texture.

A self-developed localization and navigation enables precise localization and allowing the robot to navigate effectively in the environment. Path-planning algorithms optimize movement, avoiding obstacles and minimizing energy consumption. Infrared sensors provide crash protection, detecting obstacles in the robot's path. A light brake system ensures the robot detects its speed for safe, controlled stops. This system reduces human labour and increases operational efficiency while promoting sustainability.

## 1.5 Team Green Bin


*Team: Green Bin*



*Prototype*

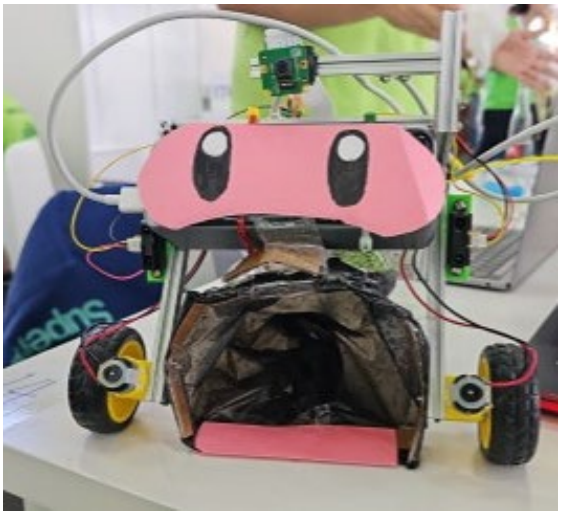
## Project Abstract

The objective of this project is to enhance waste collection efficiency through innovative technology. We aim to develop a smart rubbish bin capable of automatically sorting waste and notifying maintenance teams when it is full or requires servicing. This system will leverage machine learning and sonar sensors to optimize waste management processes.

The garbage detection system will classify waste into designated categories, such as paper, plastic, organic materials, and other types of waste, ensuring proper disposal. In collaboration with MVTec, we are implementing machine-learning algorithms for accurate waste identification. Additionally, sonar sensors will monitor the bin's fill level, transmitting real-time data to an SQL database for efficient management and timely interventions. The mission of Green Bin is to integrate eco-friendly technology into waste management, improving sustainability while simplifying waste disposal for both citizens and sanitation workers.

## 1.6 Team SRA ADRGC

*Team: SRA ADRGC*



*Prototype*

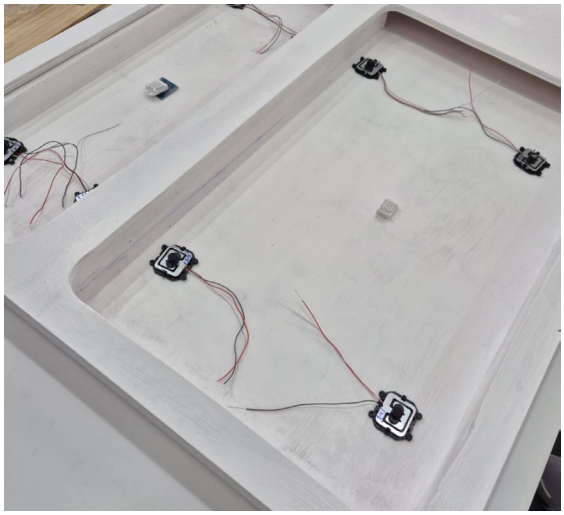
## Project Abstract

The aim of this project is to create an autonomous robot able to recognize garbage and pick it up. The robot will be composed of several sensors and a camera to avoid obstacles and find the way to recollect the garbage leveraging computer vision techniques for characteristics detection using different methods such as Canny, Sobel or Hough transformation. The movement will be driven by three wheels and 2 DC motors powered by a battery. The mode of operation will involve basic patrol pathing, where the robot follows random routes while continuously sweeping the environment to detect and collect garbage.

Through this robot we aim to contribute to automated waste management by reducing the need for human labor in routine garbage collection tasks, thereby enhancing efficiency, cleanliness, and sustainability in public spaces.

## 1.7 Team Livvo's Technicians


*Team: Livvo's Technicians*



*Prototype*

## Project Abstract

The Intelligent Buffet System is a project designed to monitor and optimize food management in Livvo Hotel Group buffets. Using sensors placed in a weight & temperature station, the system will track these parameters of buffet trays in real time. This data will be continuously transmitted to a kitchen display system via a custom Python-based software, allowing staff to respond quickly to food consumption trends and ensure proper storage conditions.

By preventing food from being kept at improper temperatures and reducing unnecessary waste, the system will improve hygiene standards, food safety, and operational efficiency. Real-time monitoring will help kitchen staff better manage food supply, ensuring that fresh meals are available without overproduction. Through the integration of sensor technology, data processing, and automated monitoring, the Intelligent Buffet System will enhance buffet management, making it more sustainable, cost-effective, and guest-friendly while optimizing kitchen workflow.

## 2. Smart Production

### 2.1 Team NXT Innovation, Gold Sponsor OPTIMA packaging group GmbH


*Team: NXT Innovation*

*Prototype*

### Project Abstract

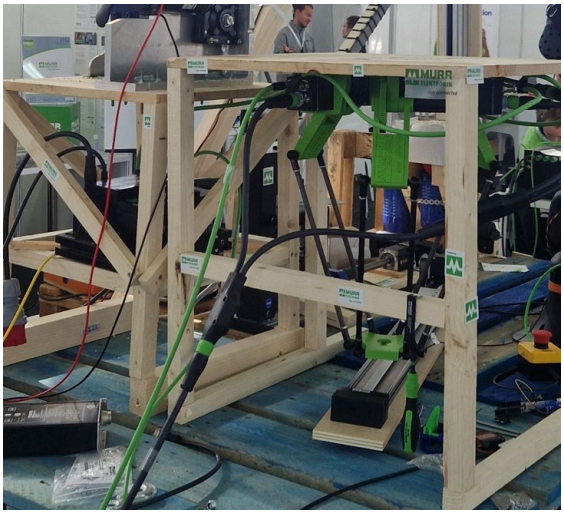
This project, developed by 16 students in collaboration with OPTIMA, aims to create an innovative ejection mechanism for removing defective products from a packaging machine's production flow. A demonstration model with a conveyor belt and integrated sensor-based flap system was built to precisely eject unsealed packages in real time without disrupting the flow.

Key challenges included high speeds, varying product sizes, and reliable defect detection. The solution combines high-resolution sensors with optimized control for efficient, energy-saving ejection. Using the TRIZ method (Theory of Inventive Problem Solving), the team systematically explored and evaluated mechanical, pneumatic, and electromagnetic concepts before selecting the most efficient and scalable design. The project showcases how structured innovation can improve quality control, reduce waste, and enhance efficiency in industrial packaging processes.

# 3. Smart Recycling & Circular Economy

## 3.1 Team GreenElectronics; Platin Sponsor Murrelektronik GmbH


*Team: GreenElectronics*



*Prototype*

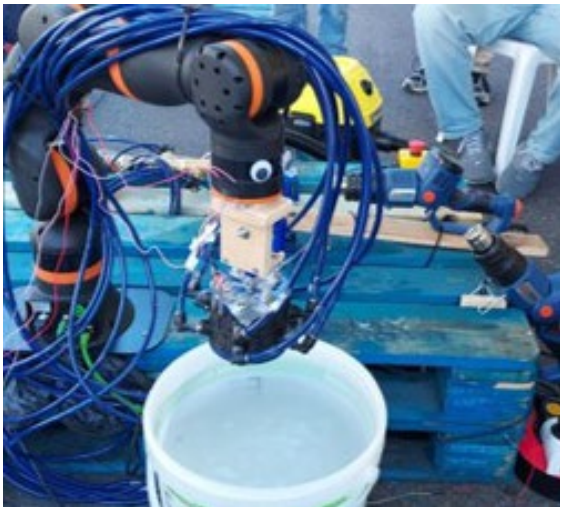
### Project Abstract

Sustainability has become one of the most prominent trends in recent years. However, despite this growing focus, 500 billion PET bottles are produced worldwide every year, with only a small percentage being recycled.

The challenge is designed with the goal of using the plastic from these bottles as a base material for overmolding electronic components. To achieve this, the plastic caps of the bottles need to be shredded to create plastic granulate, which will then be used to fill an injection molding machine. The electronic components are placed into an injection mold, where they are then overmolded with the plastic. For this process, participants are provided with a range of robotic systems, a manual shredder, a manual injection molding machine, and additional mechatronic hardware. The core challenge lies in automating all the steps involved in this system. The goal is to create a fully automated process that allows the efficient and sustainable recycling of PET bottles into valuable materials that can be reused for manufacturing electronic components.

## 3.2 Team Banana Cup, Gold Sponsor Krones AG with The MathWorks Inc.

*Team: Banana Cup*



*Prototype*

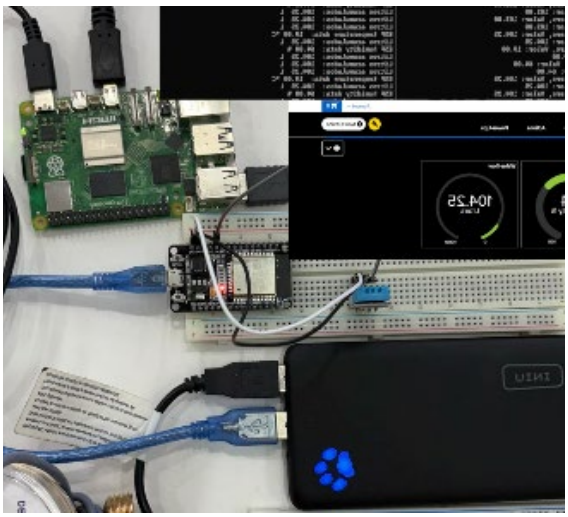
### Project Abstract

Our project team consists of 16 members divided into three teams: Team Cup, Team Robot, and Team Automate. Together, our teams have created an automated system for producing sustainable banana fiber shot cups.

The aim of this project is to develop an intelligent and automated production system for sustainable shot cups made from banana fiber. The system is designed to process banana fiber into biodegradable cups, reducing environmental impact and promoting sustainability. The production process follows several process steps. First, the banana fiberboard is dissolved in water and shredded down. Next, the fibers are soaked up using a vacuum suction system and evenly distributed onto a specialized mold. The material is then pressed into the desired cup shape before undergoing a drying phase. Finally, the cup is automatically getting coated on the inside with a natural protective mixture consisting of beeswax, carnauba wax, and linseed oil to ensure water resistance.

## 3.3 Team CIVTEL, Gold Sponsor Lorenz GmbH & Co.KG

*Team: CIVTEL*



*Prototype*

## Project Abstract

This project aims to develop a smart home system to optimize water and energy consumption, reducing waste and promoting sustainability. The system connects to the domestic Wi-Fi network to monitor and control temperature and water usage efficiently. The CIVTEL team has designed an integrated solution using Lorenz smart meters and an ESP32 module to create a precise water control system.

The system utilizes temperature, humidity, and water flow sensors, providing real-time data through MQTT-based wireless communication. A Raspberry Pi collects and uploads the data to a dedicated webpage, where users can track and adjust their consumption. This real-time monitoring promotes environmental awareness, reduces energy and water waste, and helps users' lower utility costs. By optimizing resource usage, the system contributes to sustainable living and efficient home management.

# 4. Smart Green Mobility

## 4.1 Team Meiller Milestone, Gold Sponsor MEILLER GmbH & Co KG

*Team: Meiller Milestone*

*Prototype*

### Project Abstract

The aim of this project is to automate the loading and unloading of a container truck. The system will locate the container on the construction site, then positions the truck towards it to collect the container. Afterwards, it will drive to a target location and unload the container to its final position. During this process, the truck avoids obstacles and maintains a safe distance from objects and humans.

The Meiller Milestones team has engineered a smart vision system that can identify the container, pick it up, drive it around, and place it back down at a specified location. Once the container is identified, the truck is visually guided towards it, assumes the correct position to hook the container, and loads it. Once this step is complete, the system calculates the distance and position to the new location for the container. It then drives autonomously towards it. By using depth cameras and LiDAR, this system will make construction sites a safer environment for workers and objects by avoiding accidents and reducing the required workload.

## 4.2 Team Blue Bucket, Gold Sponsor Vishay Electronic GmbH

*Team: Blue Bucket*

*Prototype*

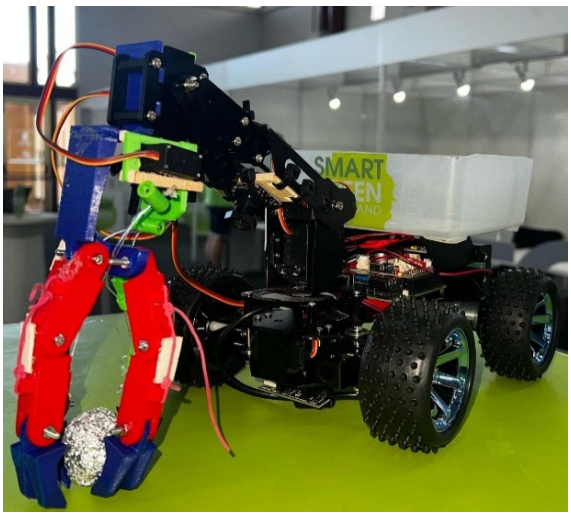
## Project Abstract

The Blue Bucket project addresses the growing challenge of global water quality. The goal is to develop an easy-to-use, all-in-one device for water quality testing, enabling people worldwide to assess their local water conditions.

At the same time, a global community will be created to collect and share data, fostering a better understanding of water quality trends. The project takes not only a technological but also a community-driven approach to raise awareness about clean water and make a positive impact on the environment.

## 4.3 Team Waste Hunters, Gold Sponsor Vishay Electronic GmbH


*Team: Waste Hunters*



*Prototype*

### Project Abstract

Our project “WasteHunter” addresses the global crisis of ocean plastic pollution by introducing two innovative robotic systems: LIMP-E and GRASP. Together, they form a smart, sustainable solution for detecting, locating, and collecting floating plastic waste. Equipped with advanced cameras and intuitive hand-controlled navigation, our robots can identify various types of debris and remove them from the environment using a strong, wide-range gripper arm.

With over 10 million tons of plastic entering the oceans each year – up to 95% of it being single-use plastics – the urgency to act is clear. WasteHunter is designed to be cost-effective, easy to deploy, and operable from anywhere in the world via remote control. GRASP allows for intuitive, gesture-based manipulation, making cleanup more accessible and engaging.

## 4.4 Team AgroSoS Tractor, AgroSos Project

*Team: AgroSoS Tractor*

*Prototype*

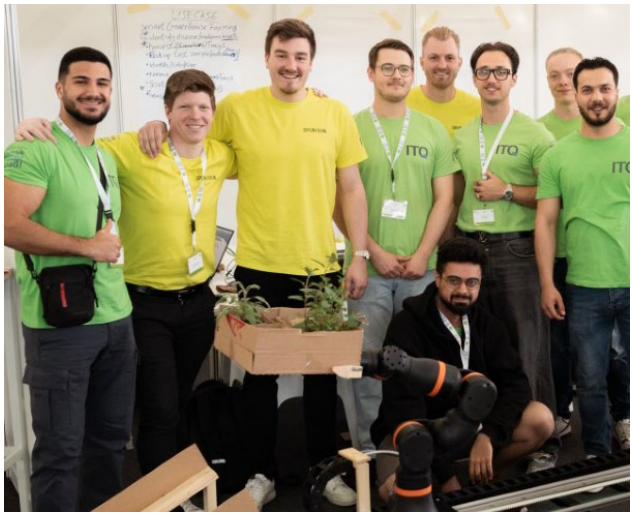
## Project Abstract

The project focuses on converting an old tractor into an electric vehicle –integrating various sustainable mobility options such as an electric powertrain, photovoltaic panels, hydrogen cells, and IoT technology. To achieve this, we dismantled the old tractor and installed a new electric powertrain and batteries.

Additionally, we mounted four photovoltaic panels to the tractor's roof to extend its range, while a hydrogen cell provides further mileage for our e-tractor. Additionally, we added horn and LED lights to ensure safety and functionality in various working conditions. The implementation of IoT systems elevates the efficiency of agricultural operations with our e-tractor, as the data provided empowers farmers to make well-informed decisions regarding optimal tractor utilization. Through this project, we demonstrate that adopting green mobility solutions in agricultural settings can effectively address the climate crisis.

# 5. Smart Farming & Smart Green Logistic

## 5.1 Team GrowSmartBot, Platin Sponsor igus GmbH



*Team: GrowSmartBot*

*Prototype*

### Project Abstract

The aim of this project is to develop an advanced robotic system for automated plant handling using the ReBel Cobot on a linear axis. The system is designed to efficiently grasp trays with plants from a storage rack and place them at a predefined end position for further processing.

To ensure optimal handling, the system integrates computer vision technology to analyze the plants and fruits in real-time. By utilizing an OpenCV model, the system can assess factors such as plant health, fruit ripeness, and potential defects, allowing for intelligent decision-making and optimized sorting.In addition to precise plant identification and handling, the system is designed to adapt to dynamic environmental conditions. By leveraging camera-based recognition, machine learning, and automation, this project enhances efficiency in agricultural and industrial applications, promoting higher yields and improved quality control.

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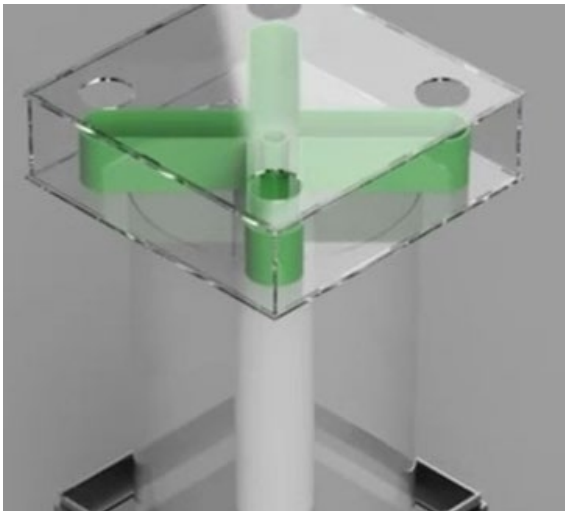
## 5.2 Team Aquaponic, Remote Bogota

*Team: Aquaponic*



*Prototype*

## Project Abstract

The aim of this project is to develop an advanced aquaponics system in Bogotá, combining sustainable agriculture with smart automation. The system integrates fish farming and hydroponic plant cultivation, creating a closed-loop ecosystem where fish waste serves as natural fertilizer for plants, and the plants help purify the water for the fish.

To optimize efficiency, the system employs sensors and automation technologies to monitor water quality, nutrient levels, and plant health in real time. By leveraging IoT-based data collection and machine learning, it ensures optimal conditions for both fish and crops, reducing waste and increasing yield. This innovative approach enhances food security and sustainability, particularly in urban environments. By combining precision agriculture with aquaponics, the project aims to promote resource-efficient farming while minimizing environmental impact.

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## 5.3 Team AgroSoS Farmout, AgroSoS Project

*Team: AgroSoS Farmbot*

*Prototype*

### Project Abstract

The objective of the project is to create an automation system for small orchard crops. The system will allow us to control variables such as soil moisture, sowing different types of seeds, watering, weeding and other functions.

The team has built the prototype and accurately programmed the robot using X, Y, Z coordinates identifying the positions of the different heads, as well as the plants located in the orchard. Once the system has been programmed, it will be possible to know the location of all the elements to automate the cultivation without the need for human presence. In this way it is possible to perform actions such as automatic irrigation, sowing or weed removal, thus increasing crop yields and simplifying plant care.

# 6. Smart Green Energy

## 6.1 Team Mojo Picón, EduDemoS Project


*Team: Mojo Picón*

*Prototype*

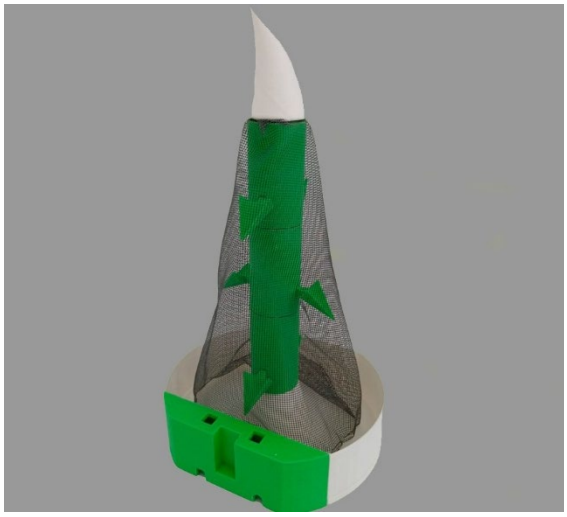
### Project Abstract

This project demonstrates the benefits of renewable energy through a 2x1 modular demonstrator inspired by the Tajin Aste and Cresta de Gallo de Moya, both endemic plants from the Canary Islands that are in heavy danger of extinction.

The system has two modes: one collects humidity from the air using a net, storing it in a compartment monitored by a sensor, with LEDs to indicate capacity levels. The second mode, with a simple leaf exchange, focuses on solar energy collection. A solar panel powers a motor that rotates an axis with magnets, adjusting the leaves between open and closed positions based on light availability. This project teaches the next generation and promotes sustainability and adaptability in renewable energy applications to ensure our future.

## 6.2 Team Papas Arrugás, EduDemoS Project


*Team: Papas Arrugás*



*Prototype*

### Project Abstract

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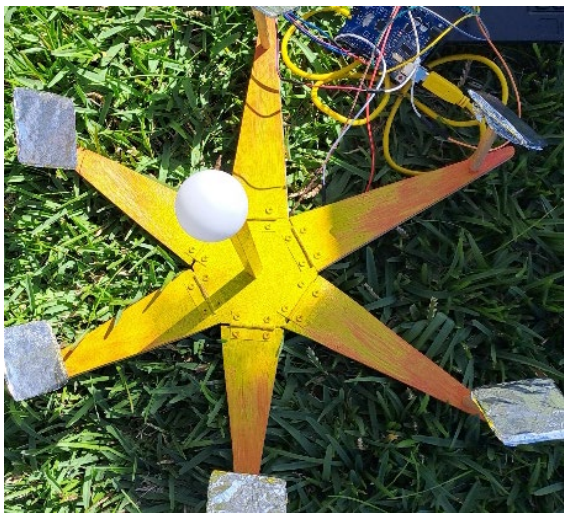
## 6.3 Team 3IQ, EduDemoS Project

*Team: 3IQ*



*Prototype*

### Project Abstract

EduDemoS was created as an innovative educational model that allows young people and teachers across Europe to be part of the fight against climate change. There are three key actions to achieve their goal: the design of three sustainable demonstrator models that will be easily replicable, with the aim that students will later devise their own; a "step-by-step" guide to develop each model; and finally, open-source software for teachers and students across Europe.

In our project we added two new demonstrators for wave power and solar thermal energy. The wave power model comes in the form of a Bird, whose legs are moved by water waves. If the legs are moved, the bird will happily chirp and move it wings. The solar thermal energy model is a model of a simple sun with mirrors on its side. The mirrors heat up a sensor in the middle of the object and it starts to change its color from blue to red, depending on its temperature.

## 6.4 Team Anchieta, Gold Sponsor Lorenz GmbH & Co. KG


*Team: Anchieta*

*Prototype*

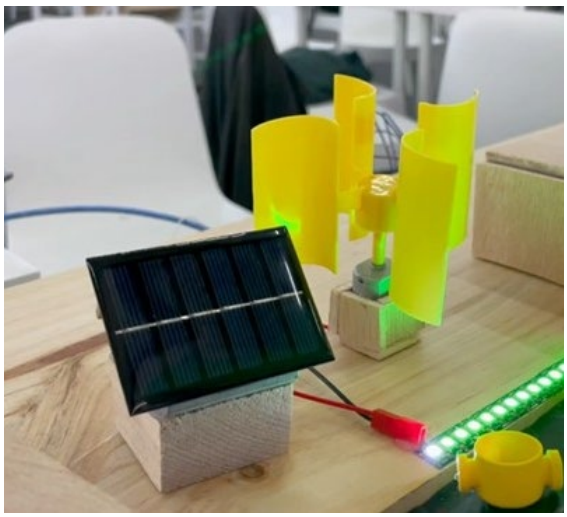
### Project Abstract

Team Anchieta tackled the challenge of monitoring water usage and detecting leaks in hotels, focusing on sustainability and cost reduction.

Partnering with Lorenz, the team developed a smart water flow meter using Arduino-based real-time monitoring. Their solution provides instant alerts for excessive consumption, potential leaks, and flooding, helping to optimize water management. By implementing optical sensors for water quality analysis, they also explored pollution detection. The project demonstrates how IoT and automation can contribute to sustainable resource usage in the hospitality sector.

## 6.5 Team Visual CE, Gold Sponsor Lorenz GmbH & Co. KG


*Team: Visual CE*



*Prototype*

### Project Abstract

The aim of the project is to demonstrate the advantages of this economic system to companies, using the example of the Lorenz company and its product. The Visual CE team has designed a model with an interactive dashboard. Used products arrive at the entrance to the model. These are first disassembled and cleaned. The various elements are then transported on a conveyor to a quality control station in the middle of the model. The quality is defined by the percentage values for the reuse of the parts entered by the user on the dashboard. When the part cannot be used, a light signal appears, and the user must press a button to produce a new part. The parts are then transferred via a conveyor belt to the right-hand side of the model, where the product is reassembled.

Parts that cannot be reused are then recycled. The recycling rate is also defined by the user via the dashboard. An LED tube changes color according to the recycling rate, ranging from red to green to blue. The company's energy mix, particularly the influence of renewable energies, is also represented by the solar panel and wind turbine at the top of the model. Finally, the results of the carbon footprint as well as the cost savings achieved by the modifications are displayed on the dashboard in relation to the initial situation. In this way, users have an immediate representation of the impact of the circular economy.

## 6.6 Team H2 Heros


*Team: H2 Heros*

*Prototype*

## Project Abstract

Our project “Hydrogen Challenges” explores sustainable mobility through hands-on prototypes powered by hydrogen. As the H2-Heros team, we built a fuel cell-powered boat, a hydrogen-filled shark model, and a remote-controlled zeppelin. We designed and soldered custom circuit boards, programmed microcontrollers, and developed propulsion systems. The goal is to showcase hydrogen as a clean energy source and inspire innovation through practical, fun, and educational engineering challenges.

## 6.7 Team The Green Engineers


*Team: The Green Engineers*


*Prototype*

### Project Abstract

The aim of this project is to generate a concept that helps islands to become self-sufficient with exclusively renewable energy sources. To achieve general results, concepts were developed for two islands, Gran Canaria and Curacao, because there we were able to draw on a lot of very good and well-founded data.

We were able to speak to Javier Morales, a member of parliament for the Canary Islands. This gave us a lot of information about the circumstances and conditions of energy supply on islands. Furthermore, the conditions and space requirements for solar and wind power plants were worked out. In addition, attention is also drawn to types of power plant that have not yet been widely used, such as wave power plants. The required amount of energy storage is also determined by looking at the typical consumption and seasonal weather effects of the respective island to ensure that no emergency power plants are needed. Cost estimates and space requirements per installed capacity as well as the reutilization of decommissioned plants are also part of the concept.

# 7. Smart Building

## 7.1 Team Smart Buildings

*Team: Smart Buildings*

*Prototype*

## Project Abstract

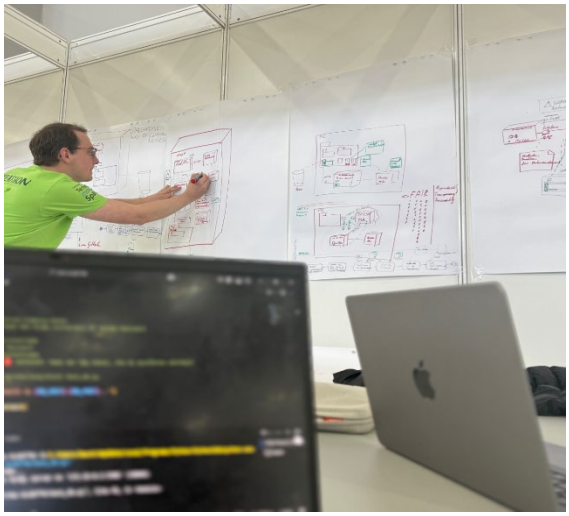
The project, developed by the IES El Rincón team, tackles the pressing issue of high energy consumption in buildings – particularly in Gran Canaria, where the aerage usage per inhabitant exceeds the European average by 25%. Recognizing that up to 65% of this energy is consumed in buildings, we saw a clear opportunity for impactful innovation.

We designed a smart sensor network combined with advanced data analysis tools to continuously monitor, analyze, and optimize energy usage in real time. This allows for the identification of inefficiencies, peak consumption patterns, and potential areas for savings – ultimately helping users make more informed decisions.

# 8. Artificial Intelligence

## 8.1 Team BirdBrain

*Team: BirdBrain*



*Prototype*

### Project Abstract

The aim of this project is to deploy an IT system using an existing containerized Electronic Laboratory Notebook (ELN) and enhancing it with AI-powered handling and analysis capabilities. This ensures FAIR (findable, accessible, interoperable, reusable) experiment management. This tool holds great potential for the scientific community, especially students interested in various research fields. It improves experiment reproducibility, transparency, and traceability. The project advances social sustainability by enabling students to explore scientific research independently of their starting conditions, fostering a more diverse scientific community.

The system supports researchers across disciplines by providing an ELN where the “cool researcher” can take notes using an enhanced speech-to-text model. The tool also allows users to start experiments or scripts with a single button click via an integrated GUI. Additionally, AI-driven time-based data analysis identifies patterns and trends, aiding interpretation of large datasets. To develop this concept, we use generative AI as a coding companion.