TEAM OVERVIEW

SMART GREEN ISLAND MAKEATHON 2026

Team Overview

Description of all SGI MAKEATHON 2026 Challenges

1. Smart Automation

Smart Automation develops AI-based systems for automated waste detection, sorting, and collection. The goal is to improve efficiency and enable sustainable environmental processes through robotics and intelligent workflows.

2. Circular Economy

Circular Economy focuses on turning waste into reusable resources through recycling and smart systems. It aims to create closed loops that reduce waste and improve resource efficiency.

3. Smart Building

Smart Building uses sensors and data to optimize energy use and comfort in buildings. Automated systems enable more efficient and sustainable living environments.

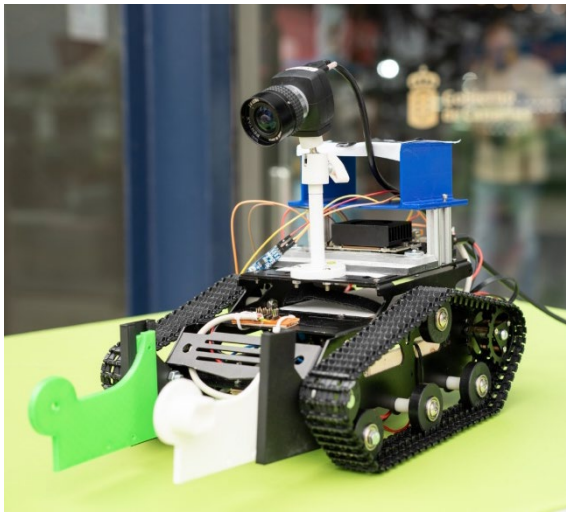
4. Smart Green Mobility

Smart Green Mobility develops autonomous and sustainable transport solutions using AI and sensors. The aim is to increase efficiency, safety, and environmental friendliness in mobility systems.

1. Smart Automation

1.1 Team Responsible Butt Detection, Platin Sponsor MVTec Software GmbH

Team: Responsible Butt Detection



Prototype

Project Abstract

This project focuses on developing an intelligent vision-based system for the automated detection of cigarette butts using modern deep learning techniques. The system was built using the industrial image processing software HALCON and the MVTec Deep Learning Tool to train and evaluate a custom object detection model.

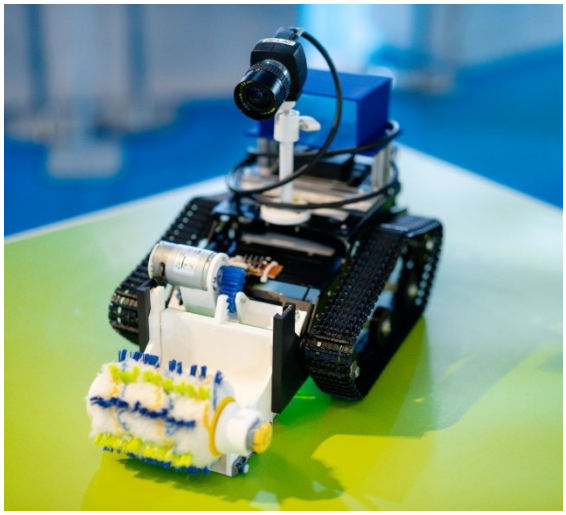
A dedicated dataset of 400 manually captured and annotated images was created under realistic conditions, enabling supervised training and robust detection despite variations in lighting, background, orientation, and object appearance.

A key aspect of the project is the integration of the trained model into an automated workflow. A Python-based interface was developed to enable seamless communication between the vision system and a robotic controller, allowing precise localization and automated handling of detected cigarette butts.

Overall, the project demonstrates the practical use of deep learning in machine vision and its potential for environmental cleanup and smart automation.

1.2 Team BBC BeachBotty Crew, Platin Sponsor MVTec Software GmbH

Team: BBC BeachBotty Crew



Prototype

Project Abstract

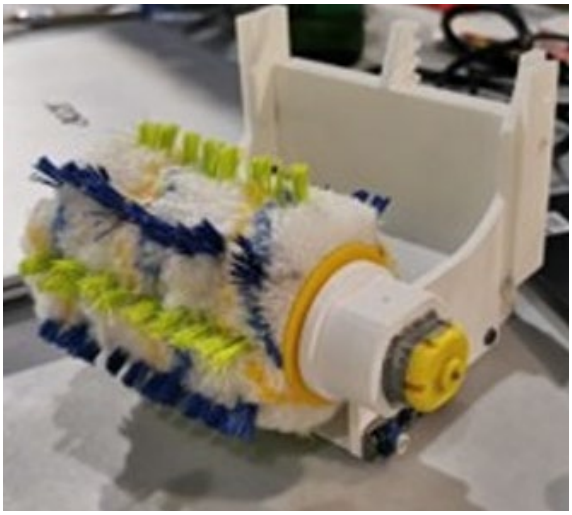
The aim of this project is to develop an autonomous navigation and system integration solution for the robot BeachBotty, designed to detect and collect cigarette waste on defined areas. The team focuses on intelligent driving algorithms and centralized interface management. The navigation system ensures autonomous area coverage of at least 95 percent, precise localization, and accurate target approach based on coordinates received from the vision system.

Robot localization is achieved using an externally mounted overhead camera that continuously scans the area and detects the robot's position. The camera transmits real time coordinates to the navigation system, enabling stable and precise positioning. These data, together with object coordinates from the vision system, are processed to calculate efficient driving paths.

The interface integrates all subsystems including vision, navigation, and collection mechanisms through clearly defined communication channels and a central state machine. This guarantees a fully autonomous workflow from patrolling to object pickup and drop zone disposal, contributing to environmental sustainability and practical autonomous robotics applications.

1.3 Team LECREA, Platin Sponsor MVTec Software GmbH

Team: LECREA



Prototype

Project Abstract

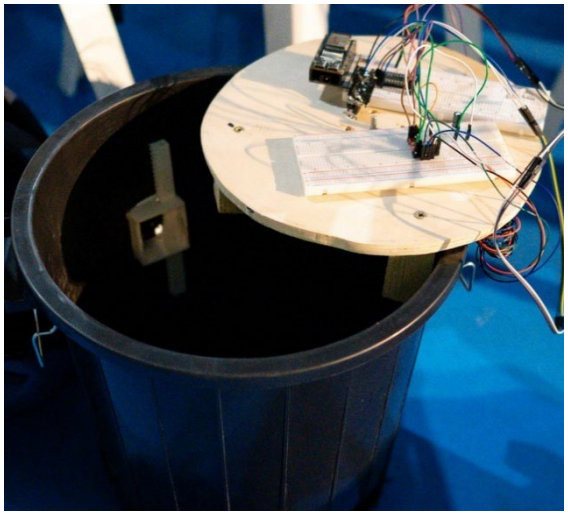
The aim of this project is to provide the MVTec Autonomous Robot with an out of the Box modular solution for picking up and disposing various types of Garbage and Litter. This solution comes in the form of the LECREA Shovel and Brush Module. To ensure a safe and regulated collection of trash, the Module is equipped with an exchangeable rotating Brush that moves Small to Medium waste into the collection

Bin before the Robot transports it to the disposal location. To face the ever-changing challenge of global pollution, the Brush can be dislocated and replaced by another module more suited for the task at hand.

Using a gear chain and a powerful motor the module can be lifted into the air to safely dispose of the collected Litter and ensure smooth compatibility with the autonomous disposal and sorting system.

1.4 Team The Softies, Platin Sponsor MVTec Software GmbH

Team: The Softies



Prototype

Project Abstract

Our goal is to create a bin that will automatically sort the main types of recyclable materials – this includes plastic, paper, glass and general waste. Utilizing MVTec's machine vision software, we have developed a system that detects these materials using a raspberry pi microcomputer. When an item is detected, a motion sensor connected to an ESP32 micro controller turns on the lights inside the bin and sends a BLE packet (low energy Bluetooth package) to a raspberry pi microcomputer. The raspberry will then turn on the camera and activate the machine vision software from MVTec, which we have trained to determine the item's material. Once the process is completed, the BLE packet is sent back to the ESP, which will interpret it and move the motors inside the bin accordingly to align the correct bin below the lid. The lid then tilts using a rack and pinion gear system, dropping the item into the compartment.

We hope a system like this can be implemented in the future, as we believe it would encourage people to dispose of their waste correctly, as the bin helps passively, and saves you the time of having to think about the item's materials. This concept can easily be expanded on and more categories (glass, organic, etc.) could be implemented in the future.

1.5 Team Drop Off

Team: Drop Off

Prototype

Project Abstract

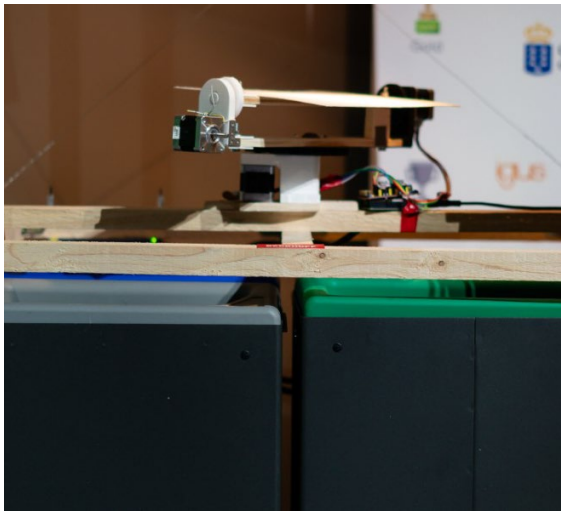
Within the Beach Botty Crew project, our team is responsible for designing and building the smart drop-off station for the beach-cleaning robot. While the robot focuses on collecting cigarette butts and small beach waste, our system ensures that the collected trash is properly stored and monitored. The drop-off point serves as a central collection unit where the robot deposits the gathered cigarette butts. To maintain efficient operation, we implemented a fill-level detection system using distance sensors to measure how full the container is.

Instead of multiple indicator lights, we simplified the design to use one red LED warning light. When the container reaches its maximum capacity, the red light turns on to signal that the drop-off station needs to be emptied. This streamlined approach makes the system easy to understand, energy-efficient, and reliable.

By preventing overflow and ensuring timely waste removal, our drop-off solution supports the overall mission of Beach Botty Crew: keeping beaches clean and reducing environmental pollution caused by cigarette waste.

1.7 Team Smart Green Rubbish System, Gold Sponsor Beckhoff Automation GmbH & Co. KG

Team: Rubbish System



Prototype

Project Abstract

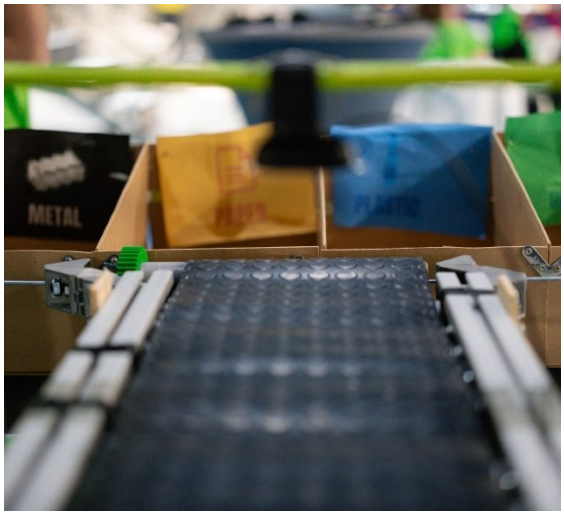
The Intelligent Buffet System is a project designed to monitor and optimize food management in Livvo Hotel Group buffets. Using sensors placed in a weight & temperature station, the system will track these parameters of buffet trays in real time. This data will be continuously transmitted to a kitchen display system via Python-based customs 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.

1.8 Team Frigopie, Gold Sponsor Beckhoff Automation GmbH & Co. KG

Team: Frigopie



Prototype

Project Abstract

The Frigopie project focuses on developing an innovative solution to reduce environmental contamination through improved recycling processes. As part of the SMART GREEN ISLAND MAKEATHON, the concept centers on a smart system that automatically sorts waste into different categories, increasing efficiency and accuracy in waste management.

The project combines sustainable thinking with technological innovation, aiming to support cleaner environments and more effective resource utilization. By integrating automation and intelligent design, Frigopie addresses current limitations in recycling infrastructure and contributes to the advancement of smart, eco-friendly systems for future urban and industrial applications.

2. Circular Economy

2.1 Team NXT Box, Gold Sponsor Lorenz GmbH & Co.KG

Team: NXT Box

Prototype

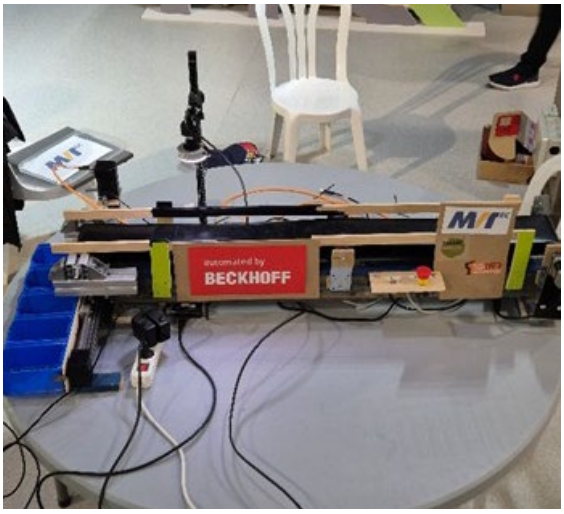
Project Abstract

The goal of this project is to develop smart and sustainable packaging for Lorenz water meters to replace the once used cardboard boxes. We defined the ideal state of this transport box to be unbreakable, minimally small and light in weight, it must not use any energy and store as many meters as possible. Our final solution contains of ten water meters per box that are stackable to increase the volume that fits on one standard palette by 20%. It is made of recycled polycarbonate which is already used in another part of the meters to support the circularity of the product. We included an RFID tag to store information about the contents of the box accessible to both the technicians and Lorenz.

Via an app the technician will be able to scan the box to get information about the number of meters inside, whether they are used or new or even if the box is empty. Lorenz will be able to integrate the application into their ERP-System to track the boxes and their contents. Our solution provides safe transportation to prevent damaging, sustainable packaging included in the circularity of the company and smart functions to improve efficiency.

2.2 Team TrashBeck, Gold Sponsor Beckhoff Automation GmbH & Co. KG with MVTec Software GmbH

Team: TrashBeck



Prototype

Project Abstract

During a Makeathon in Gran Canaria, we collaborated with Beckhoff to address a Circular Economy challenge. Our project, *"Waste Watchers,"* focused on developing a fully automated waste sorting prototype capable of identifying and separating materials such as plastic, paper, metal, and wood with high accuracy.

We built a conveyor system using an IGUS linear axis and a custom camera mount. A vision model, trained with MVTec software, was used to recognize specific items like wooden cutlery, paper packaging, metal caps, and plastic bags. Detection results were transmitted via MQTT to the control system.

The core of the system was a Beckhoff IPC running TwinCAT, where the control logic was implemented in SCL. By combining vision data with PLC control, the system accurately triggered sorting mechanisms to direct items into the correct bins.

This project provided valuable hands-on experience in integrating AI, mechanical design, and industrial control systems for sustainable automation.

2.3 Team T´SOS, Platin Sponsor MVTec Software GmbH

Team: T´SOS

Prototype

Project Abstract

To address the global waste crisis, Team T'SOS developed the "Trash Sorting Operations System," an automated solution for precision waste separation. Designed for energy efficiency, the system remains in standby until a manual "Start" button is pressed, activating a monitoring light curtain. When an object passes through this curtain, the central control system triggers the conveyor belt and the entire sorting cycle.

The operation is orchestrated by a B&R PLC, which synchronizes the conveyor belt, sensors, robotic arms and the vision system. Sorting is done in two phases. Initially, the system uses inductive sensors to differentiate between ferromagnetic and non-ferromagnetic materials. Based on these detections, the first robot directs the identified items into special collection containers, and the remaining materials are sent on. In the second stage, a camera station using the MVTec software identifies plastic, wood, and glass via a machine learning model. A second robot then performs the final sorting. By unifying industrial sensors with advanced computer vision under a central PLC, T'SOS provides a scalable framework to enhance recycling rates and support a circular economy.

2.4 Team Recycling with Fun

Team: Recycling with Fun

Prototype

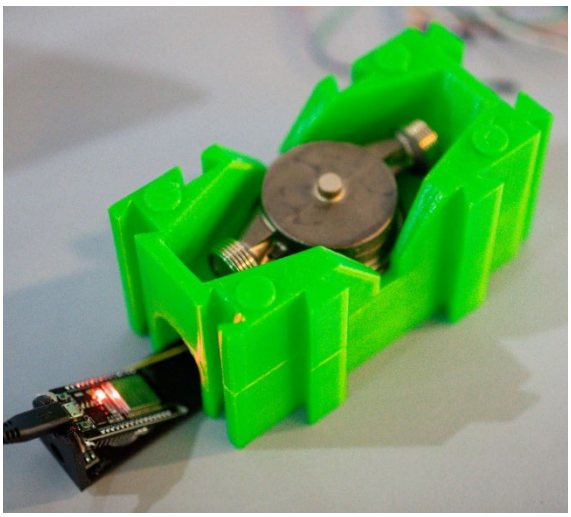
Project Abstract

Natural resources are finite, making effective waste management and correct recycling practices essential. To address this challenge, we developed an interactive educational game that combines hardware design, embedded programming and machine learning to teach proper waste sorting in an engaging way. The system uses a camera system with an integrated machine learning model which is trained to classify waste into four categories (paper, plastic, bio-waste, and general waste). Users place an image in a detection area and select the appropriate bin. In practice mode, a correct choice triggers the automatic opening of the corresponding bin with audio feedback, creating a rewarding and immersive learning experience.

If the selection is incorrect, users are encouraged to try again. While a learning mode reveals the correct answer and provides explanation, also serving as a hint feature in practice mode. The solution targets children as well as international students and adults adapting to European recycling systems. Additionally, the system can be delivered as a modular workshop kit that allows participants to build and program it within a one-day school or university workshop, thereby combining sustainability education with hands-on experience in embedded systems and introductory machine learning.

2.5 Team Green Transformers

Team: Green Transformers



Prototype

Project Abstract

The aim of this project is to create a new both Smart & Green idea for packaging. The reason why is because Lorenz, the company that was chosen to find a solution, has made the decision to come up with a new idea to start using a greener way of sending their water meters to their clients.

With the new packaging idea, it's possible to both follow the location through GPS and being able to see if the water meter is inside with our website. The design had the focus to use the space as useful as possible. That's why it's able to connect each package to another. Which can all be placed on a euro pallet.

2.6 Team Renzo-Box

Team: Renzo-Box

Prototype

Project Abstract

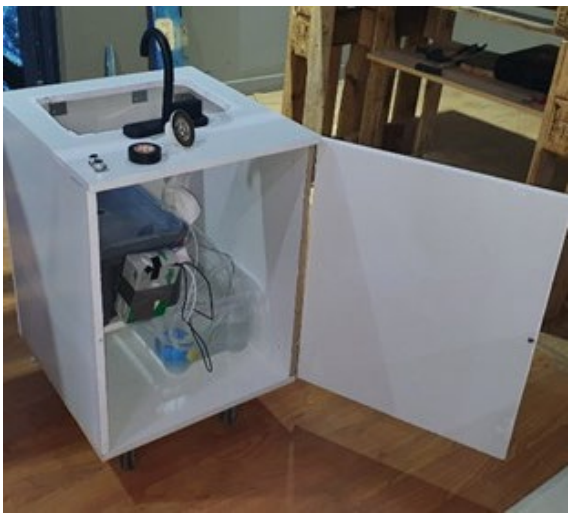
This project presents the development of a mobile web-based proof of concept designed to support the structured documentation of water meter handling in field operations. The solution is used in combination with a purpose-built transport box featuring numbered compartments for organized storage and controlled distribution of meters. Both the transport box and the individual meters are equipped with QR codes, allowing fast and reliable identification via smartphone.

Technicians can scan a box to display all compartments in a structured grid view, clearly distinguishing between occupied and empty slots. During installation or replacement activities, meters are scanned and documented directly within the application. In the case of a replacement, both the newly installed meter and the removed meter are recorded accordingly. Detailed information for each meter can be accessed through a dedicated information view.

In addition to displaying the current state of each box and meter, the system also allows status changes to ensure traceability. The proof of concept focuses on a mobile-first, streamlined workflow that reflects practical field procedures while enabling transparent and structured documentation.

2.7 Team Water Waste Monitor

Team: Water Waste Monitor



Prototype

Project Abstract

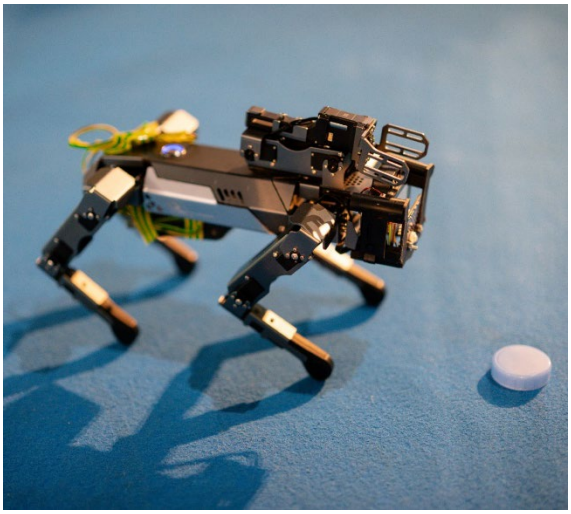
The aim of this project is to monitor and reduce water waste in various institutions, including schools, public restrooms, and companies, by implementing an intelligent and efficient water management system.

As part of the project, we independently designed and built the sink cabinet and a faucet. The faucet was custom-made using 3D printing technology, while the sink cabinet has been built using wood. The water dispenser will be controlled by a sensor, ensuring that water is only dispensed when an object or user is detected, thereby preventing unnecessary consumption and promoting responsible usage. In addition, the system will collect and analyze usage data in real time.

We aim to visualize the measured and recorded information through an online dashboard, allowing the administrators or even users to easily track the water consumption patterns. Furthermore, automatic notifications will be sent in case of technical issues, such as leaks or blocked pipes, enabling quick intervention, reducing maintenance time, and improving overall resource efficiency.

2.8 Team Litter Puppies

Team: Litter Puppies



Prototype

Project Abstract

We developed an intelligent, autonomous environmental cleanup system using the XGO Dog Robot, called LitterPuppy, to actively reduce plastic pollution. Our primary objective was to enable robots to find, identify, and collect discarded bottlecaps across various terrains and dynamic environments. The system utilizes the robot's integrated camera to capture a continuous video stream, which is processed in real time using a YOLOv8 object detection model to accurately identify bottlecaps. To enhance detection performance under varying lighting conditions, a custom made high-intensity LED lamp supports the video stream, improving image clarity and increasing the reliability of the model's predictions. Once a bottlecap is detected, the robot autonomously approaches the object, positions itself precisely, and uses its integrated gripping arm to securely grasp it.

The bottlecap is then properly discarded. The entire process, from detection to disposal, is fully autonomous, requiring no human intervention. By combining agile robotics, real-time computer vision, and intelligent object manipulation, our project demonstrates an innovative and practical approach to tackling small-scale plastic waste in complex real-world environments. Future work will include utilization of SLAM, proper environmental mapping and smart object avoidance.

3. Smart Building

3.1 Team The Smartest Buildings

Team: The Smartest Buildings

Prototype

Project Abstract

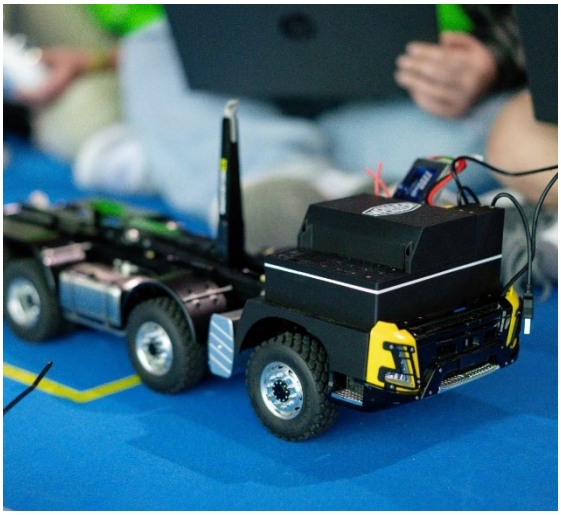
We are making a Smart Home system with a home garden. One part of the project is that it uses all kinds of sensors to make things easier at home by turning on or off lights and/or heaters when people are around or not, notifications on how many people have entered or excited a room, and more. The other part of the project is a Home Gardening System where it monitors light, moisture and temperature of the plant, then using the data that the user gives us to automatically water, apply light or notify the user through an extra website.

In the Smart Home System, you can see notifications for multiple sensors and add more if needed. In the Gardening System there will be a separate website to monitor, edit and add plants when needed. It will also show the data on an extra website. The sensors from the plants will be connected by MQTT with the light and water for the plants.

4. Smart Green Mobility

4.1 Team Meiller, Gold Sponsor F.X. MEILLER-Kipper GmbH & Co KG

Team: Meiller



Prototype

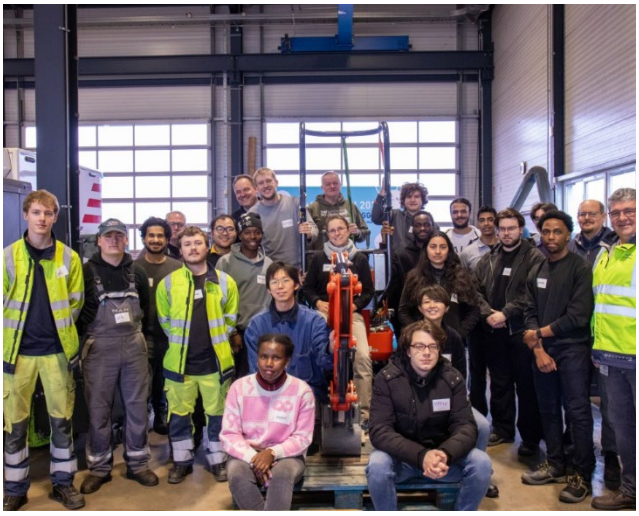
Project Abstract

This project, carried out in collaboration with F.X. MEILLER-Kipper GmbH & Co KG, focuses on developing an automated system for a normally remote-controlled model truck. The goal is to enable the truck to autonomously detect a container, approach it accurately, and load it without manual intervention.

The project combines both hardware and software development. Custom front and rear camera mounts were designed and manufactured using 3D printing to ensure reliable detection and precise maneuvering. On the software side, Python and OpenCV were used to implement image processing, control algorithms, and motion coordination for autonomous navigation and loading.

The team consists of members from mechanical engineering, information technology, and electrical engineering, providing a strong interdisciplinary foundation for successfully realizing the project.

4.2 Team Rhine-Waal University



Team: Rhine-Waal University

Prototype

Project Abstract

The hydrogen excavator project at Rhine-Waal University of Applied Sciences demonstrates an innovative approach to sustainable engineering education and regional collaboration. During a five-day MAKEATHON, students and apprentices worked together with industry partners to convert a cable-powered electric mini excavator into a hydrogen-powered machine. The project combined theoretical planning, CAD-based design, and hands-on implementation, including the integration of a fuel cell, battery system, and modified hydraulics.

Beyond technical feasibility, the initiative emphasized teamwork, problem-solving, and real-world experience. The resulting hydrogen excavator now serves as a teaching platform, supporting future projects and promoting low-emission mobility solutions. It is part of the broader TransRegINT initiative, which aims to drive sustainable transformation in the Lower Rhine region.