TEAM OVERVIEW

SMART GREEN ISLAND MAKEATHON 2024

Contents

Description of all worked out SGI MAKEATHON 2024 Challenges

1 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 to form decisions around irrigation, fertilization, and planting. 13 Teams worked on ideas to make farming more energy and labor efficient.

2 Smart Warehousing & Automation

Smart Warehousing focuses on enhancing logistics efficiency and accelerate order processing by streamlining the picking and packing process. 5 Teams took on the task to develop robots capable of safely and accurately picking and placing products from warehouse shelves. Furthermore 1 Team focused on the most energy-efficient trajectory.

3 Smart Production

Smart Production is essential for efficient and sustainable development of an enhancement of products. During the SMART GREEN ISLAND MAKEATHON 4 Teams worked on challenges to make production processes more efficient and optimize the products in the way of sustainability and digitalization.

4 Smart Recycling & Circular Manufacturing

Recycling is crucial for maintaining a healthy and sustainable environment. At the SMART GREEN ISLAND MAKEATHON 3 Teams formed about the topics of Smart Recycling & Circular Manufacturing. The students had various ideas to clean and protect the environment from Garbage using robots as well as to recycle batteries.

5 Smart Green Energy

Hydrogen and renewable energies are no buzzwords anymore, but key to a sustainable and ecofriendly future. At the SMART GREEN ISLAND MAKEATHON 4 Teams focused on sustainable resources and energies and developed applications for Hydrogen use and detection and learned about renewable wind and solar energy, as well as water collection from dew.

6 Smart Building

With the topic Smart Building 3 Teams worked on improving energetic efficiency in buildings. One group focused on the environment of a classroom, whilst the other groups worked on improvements in work spaces/offices and buildings in general. They used multiple sensors to scan different parameters like luminosity, temperature, and humidity.

7 Smart Green Mobility

By investing in Smart Mobility several aspects of transportation can be improved. This year 2 Teams took on the challenge to electrify an old tractor by harnessing the power of an electric motor, batteries, and a photovoltaic panel. Also, they implemented a Range Extender. The projects seek to reduce fossil fuels to mitigate environmental impact.

1 Smart Farming

At the SMART GREEN ISLAND MAKEATHON 13 Teams worked on ideas to make farming more energy and labor efficient by monitoring soil moisture, and nutrient contents. They determined the condition of local banana plants as well as urban gardening applications.

1.1 We need more spaces

Team Photo	Short Description
	The Team We need more spaces was part of the overall Beckhoff Team and Vertical Solutions Challenge, with the goal to develop an automated aeroponic system for home use and industrial farming. This mechanical team designed the whole structure and built the platform setup. They brought the design to life. They also merged three other teams into the overall aeroponic system.

1.2 Pump It Up

Team Photo	Short Description
	The Team Pump It Up was part of the overall Beckhoff Team and the Vertical Solutions Challenge, with the goal to develop an automated aeroponic system for home use and industrial farming. They built the aeroponic system with a pumping and electronic system. They also constructed planting units and wired the cooling system for the water system. They were also responsible for optimizing the pumping system.

1.3 SenseMates

Team Photo	Short Description
	SenseMates was a subgroup of the Vertical Solutions Team, responsible for sensing, automation, and control by measuring environmental factors such as temperature, humidity, and light intensity. A robot placed plants from shelves to a Beckhoff XTS with an AI controlled Camera. To unify all components into a cohesive system, they set up a server to collect data, control operations, and trigger interventions in case of failures.

1.4 iwBottleFarm

Team Photo	Short Description
	The Team iwBottleFarm was part of the Vertical Solutions Challenge. They installed a computer vision-based plant monitoring system for optimal fruit harvesting and to detect potential infections. The vision integrated with the hydration system, identifying plant types, and providing data for precise watering. The output serves as real time information for the other subsystems of the aeroponic farm.

1.5 Helix

Team Photo	Short Description
	The Team Helix worked on a separate aeroponic farm as well. The automated aeroponics system consisted of a multitude of sensors with the necessary software to track and record this data, a built frame to hold the aeroponic farm with plastic bottles, a water reservoir, and a pumping system to give the nutrients to the plants. For automation they used a robotic arm.

1.6 Minions

Team Photo	Short Description
	The Minions developed an innovative and low-cost sensor array capable of detecting the ripeness of a banana plant and measuring soil moisture so the farmer can detect where the soil requires watering and where the crops are ready to be harvested. The collected data provides a real-time overview of the plantation state. The collected data can enable data-driven optimization models to reduce watering costs for crop yield.

1.7 Huertito

Team Photo	Short Description
	The Team Huertito wanted to improve farming with an early detection of plagues and the information about the best moment to harvest. The Team Huertito thought about a modular solution, able to be inserted in houses and in the industry. A Camera attached to a moving piece on a track checks the plants that have small black tags, and an AI analyses the status of the plant.

1.8 BravΩ

Team Photo	Short Description
 BravΩ	The Team BravΩ presented a mobile robotic platform with camera system. The platform was designed to autonomously navigate through banana plantations and reach individual banana trees for pest detection. By integrating advanced sensor technologies, including computer vision algorithms, the system can accurately identify pests on banana trees in real time.

1.9 Special Banana Delegation

Team Photo	Short Description
 Special Banana Delegation	The Team Special Banana Delegation also worked on the Banana Challenge. They created a digital dashboard to get a paperless ordering system, a smart filter system to get an endless water cycle and reduce the amount of water and did a simulation to increase efficiency in material flow. For the labor-intensive handwork, they worked with the help of a robot to increase efficiency and ergonomic.

1.10 Synthetic Tomatoes

Team Photo	Short Description
 Synthetic Tomatoes	The Team focused on producing synthetic images of tomato plants and weeds while simultaneously creating the appropriate labels to facilitate the training of a segmentation model. The objective was real-time detection of tomato plants and weeds. Thus, leveraging a refined image generation model, such as Stable Diffusion, capable of crafting images and their corresponding labels for a broad spectrum of applications.

1.11 GreenTech

Team Photo	Short Description
 GreenTech	The Columbian Team GreenTech participated remotely from Bogota, Colombia, at this year's MAKEATHON. The Team worked on a Smart Urban Farming Challenge and wanted to make gardening more sustainable. They developed an AgroBot to harvest the tomatoes and other fruit. They also used sensors to detect humidity. The Team delivered a video at the final presentations about their project.

1.12 Veggie XR

Team Photo	Short Description
 Veggie XR	The Team Veggie XR participated remotely from Bogota, Colombia, at this year's MAKEATHON. The Team worked on a Smart Farming Challenge by using AR technology. They developed a program for AR that playfully shows the farmer or any user which of the plants are weed and which are good crops. The Team delivered a video at the final presentations about their project.

1.13 Local Wellness Farm

Team Photo	Short Description
 Local Wellness Farm	The Team Local Wellness Farm participated remotely from Bogota, Colombia, at this year's MAKEATHON. The Team worked on a Smart Farming Challenge by using AR technology. They developed special flowerpots to optimize space. They also incorporated a program to form an emotional bond between the plant and the human. The Team delivered a video at the final presentations about their project.

2 Smart Warehousing & Automation

Smart Warehousing focuses on enhancing logistics efficiency and ordering processes. 5 Teams took on the task to develop robots capable of safely and accurately picking and placing products from warehouse shelves. Furthermore 1 Team focused on the most energy-efficient trajectory.

2.1 Hand of God

Team Photo	Short Description
 Hand of God	The Hand of God Team worked on a challenge to simplify the usage of an igus robot, as robots can be difficult to program and operate. It needs a lot of engineering time and expenses. They implemented real time hand gesture mimicking to control a gripper fixed at the robot and real time position mimicking. They developed a program to control the robot gripper via pinching motion of hands.

2.2 Fruit Ninjas

Team Photo	Short Description
 Fruit Ninjas	The Team Fruit Ninjas develop a multidisciplinary approach merging robotics, computer vision, machine learning, and fruit quality assessment, to revolutionize the way fruits are evaluated and distributed in the retail sector, thereby reducing waste, and improving customer satisfaction. A robot presses the oranges and analyzes their deformation characteristics to determine the freshness accurately.

2.3 Smart Shoppers

Team Photo	Short Description
 Smart Shoppers	The Smart Shoppers goal was to make a shopping experience easier, quicker, and greener. They wanted to eliminate long lines at cashier desks, minimize long shopping times, and automate packing using a cobot. They built a shelf containing four different products which the robot arm grips and puts them into boxes. Another task was to sort the items efficiently into the box.

2.4 Mumei

Team Photo	Short Description
 Mumei	The Team Mumei developed a smart grocery store which uses a camera to locate boxes on shelves and then sends a robot to pick up the box and bring it to the customer. The customer picks the items they want. Then the robot puts the box back on the shelf if there are items left or sends it to be restocked if it is empty. They implemented the system as a python program which interfaces with the robot directly using sockets.

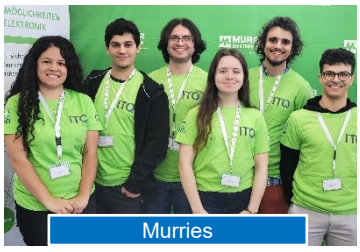
2.5 RoboEcoTron

Team Photo	Short Description
 RoboEcoTron	The Team RoboEcoTron tried to enhance the efficiency of robotic movements while picking and placing metal parts, with a focus on minimizing energy consumption. At its core, the challenge seeks to identify parts and relocate them from one point to another with as little energy as possible. Utilizing a camera integrated with software, the system can accurately recognize components, and facilitate economical movements.

3 Smart Production

During the SMART GREEN ISLAND MAKEATHON 4 Teams worked on challenges to make production processes more efficient and optimize the products in the way of sustainability and digitalization.

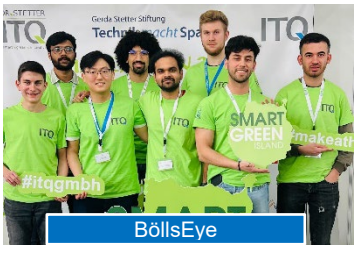
3.1 Murries

Team Photo	Short Description
 Murries	The Team Murries took on the Challenge by Murrelektronik to identify and find the required cable for workers time efficiently. Cable searching can consume 5 to 10 minutes each search in a messy environment. The idea mixed Augmented Reality with QR scanning so there is no effort on finding the material to work with. They fixed the cable on a mounted shoulder bag for better reachability.

3.2 Sächsischer Ruhrpott

Team Photo	Short Description
 Sächsischer Ruhrpott	The Team Sächsischer Ruhrpott took on the Challenge by Murrelektronik to identify and find the required cable for workers. They divided into 3 sub teams for robotics, cable detection and project management. They developed an automated presorting process, so technicians can focus on working progress instead of sorting cables. Their solution based on real-time cable detection and reduction of faults.

3.3 BöllsEye

Team Photo	Short Description
 BöllsEye	The Team BöllsEye worked on the Böllhoff challenge to support maintenance technicians by identifying and labeling components. Through AR and image-recognition software a component will be identified and then highlighted for the user. The user can choose a part and get information on the functionality, and tips for montage and maintenance leading to an efficient workflow and better understanding of the machine.

3.4 Failure Detection

Team Photo	Short Description
 Failure Detection	The Team Failure Detection developed a prototype to identify malfunctions in fans through machine learning. The primary focus is on sensors and pattern recognition algorithms to detect anomalies in fan operation. By integrating sensors into the fan, data is collected. This data then is processed using machine learning algorithms to identify patterns indicative of potential malfunctions, such as imbalance or bearing wear.

3.5 BrewTech

Team Photo	Short Description
 BrewTech	The Team BrewTech determined important parameters in the beer brewing process by using sensors. They then, analyzed the data and how it affects the process. The data is then sent via IoT to a Phone and/or Smart Watch so that the process can be monitored remotely. This helps to optimize the process and can in turn make it more sustainable. The project leveraged an Industry 5.0 replica of a brewing system.

4 Smart Recycling & Circular Manufacturing

At the SMART GREEN ISLAND MAKEATHON 3 Teams formed about the topics of Smart Recycling & Circular Manufacturing. The students had various ideas to clean and protect the environment from Garbage using robots as well as to recycle batteries.

4.1 B&R Battery Recycling

Team Photo	Short Description
 B&R Battery Recycling	7 Teams worked on battery, robotics, vision, hydrogen, automation, simulation, and wind turbine for the B&R Challenge. They had several prototypes resulting in a battery recycling station with 2 robots, and a conveyor belt. They checked the life of batteries. To make this whole process greener the energy of the battery cells was converted into hydrogen and new energy was produced by a wind turbine.

4.2 Trash Terminators

Team Photo	Short Description
 Trash Terminators	The Team Trash Terminators detected and collected trash using the power of AI. They built a self-driving system including a cobot. The systems scan the environment and searches for objects. Utilizing a vision system powered by a self-developed neural network, it identified the objects as trash or not, as well as plastic, paper, and metal pieces. Afterwards the cobot picks the trash and puts it into the correct bin.

4.3 The Great Garbage Gatherers

Team Photo	Short Description
 Great Garbage Gatherers	The Team Great Garbage Gatherers developed a system that gathers trash after major events, such as the Canarian Carnival. They created a prototype of a cleaning autonomous robot, with a shovel. To put it simply: a camera detects the position of trash, sends the information via an antenna to the robot, and with the help of an obstacle avoidance algorithm, the prototype makes its way to the trash, collects it, and returns.

5 Smart Green Energy

At the SMART GREEN ISLAND MAKEATHON 4 Teams focused on sustainable resources and energies and developed applications for Hydrogen use and detection and learned about renewable wind and solar energy, as well as water collection from dew.

5.1 HydrogenM

Team Photo	Short Description
 HydrogenM	The Team HydrogenM built boats powered with hydrogen and a moveable hydrogen zeppelin. Various boats were built to race them against each other. With the help of various motors, the zeppelin moved through the room. Through a C code the Arduinos get the information on which motors they must power. Via Gamepad the Zeppelin moves forward, backward, up, and down.

5.2 EduWindTech

Team Photo	Short Description
 EduWindTech	The Team EduWindTech created a versatile Educational Kit, like a "Workshop in a Box," to replace the LEGO Mindstorm Models currently used by ITQ in their Educational Workshops. This kit will teach students on Gran Canaria about renewable energies, engineering, and physical computing. They developed prototypes with a wind energy plant, and a pump storage power plant.

5.3 Hydrogen Sniffers

Team Photo	Short Description
 Hydrogen Sniffers	The Team Hydrogen Sniffers developed a concept proving cost-effective hydrogen detection device that acts as a warning of abnormal hydrogen presence in the operation environment. The goal was to protect test operators and consumers. The prototype had a visual and audible alarm and was design modular.

5.4 Isleco

Team Photo	Short Description
 Isleco	The Team Isleco created Educational Demonstrators on renewable resources and energies for teaching schoolchildren different ages. Three Demonstrators are proposed: one for dew water collection, another for solar energy capture, and a last one for wind energy. The Wind Demonstrator referenced the Canary Bird. A Solar Demonstrator referenced the Canary Island Pine.

6 Smart Building

3 Teams worked on energetic efficiency in buildings. One group focused on the environment of a classroom, whilst the other groups worked on improvements in workspaces and buildings. They used multiple sensors to scan parameters like luminosity, temperature, and humidity.

6.1 InnOvaTion

Team Photo	Short Description
 InnOvaTion	The Team InnOvaTion wanted to reduce electrical expenditure in the classrooms of schools, institutes, universities. They used presence sensors, luminosity sensors and temperature sensors to control and regulate these sections of a classroom. For the prototype they built a wooden classroom, with presence sensors on both sides of the door to control entry and exit of people and reduce energy consumption.

6.2 Proyecto Libélula

Team Photo	Short Description
 Proyecto Libélula	The Team Proyecto Libélula created an office environment where lighting adjusts dynamically based on real-time sensor data. Employees authenticate with their ID, triggering personalized lighting settings. Data is stored for analysis, and users can adjust lighting levels via a user-friendly interface. It's about enhancing productivity and comfort through intelligent design.

6.3 Building Enjoyers

Team Photo	Short Description
 Building Enjoyers	The Team Building Enjoyers focused on automation and energy savings in a school. For this they made a prototype with Waspmote and Arduino using sensors. The prototype is a room in a center that will have 3 sensors, one for presence, another for luminosity and another that includes another 3 sensors that detect temperature, pressure, and humidity. They were a part of the bigger Smart Buildings Team.

7 Smart Green Mobility

This year 2 Teams took on the challenge to electrify an old tractor by harnessing the power of an electric motor, batteries, and a photovoltaic panel. Also, they implemented a Range Extender. The projects seek to reduce fossil fuels to mitigate environmental impact.

7.1 E-Tractor

Team Photo	Short Description
 E-Tractor	The Team converted an old tractor into an electric vehicle – integrating sustainable mobility options like electric powertrain, photovoltaic panels, hydrogen cells, and IoT technology. They installed a new electric powertrain and batteries. They mounted 4 photovoltaic panels to the roof to extend range, while a hydrogen cell provides further mileage. Horn and LED lights were added to ensure safety and functionality.

7.2 Range Xtender

Team Photo	Short Description
 Range Xtender	The Range Xtender Team extended the range of the electric tractor by integrating a hydrogen fuel cell system to provide more capacity for the battery. They connected the fuel cell to a hydrogen tank and developed a robust control system to regulate its operation effectively. They designed a wooden structure for the hydrogen tank and implemented microcontrollers for precise control.