Co-funded by the European Union

Programme: "CENTRAL MACEDONIA" 2021–2027
Action: "Innovation Investment Plans"

Project Title: «AE3nAO – Intelligent System for Assessment, Prevention, Smart Management, and Utilization of Biowaste»

Project Summary:

The Centre for Research & Technology, Hellas (CERTH) participates in the "Central Macedonia" Program under the NSRF 2021–2027 through the action "Innovation Investment Plans," which is co-funded by the European Union and National Resources.

The project titled "Intelligent System for Assessment, Prevention, Smart Management, and Utilization of Biowaste – AE3nAO" aims to develop a smart system for assessing, preventing, managing, and utilizing biowaste. This system consists of:

- An embedded system for user recognition and authentication for multiple users of a shared biowaste processor at the source. This enables personalized use via a mobile application.
- Advanced algorithms for error detection and predictive maintenance.
- Monitoring and management of food processors via a web-based platform.
- A smart dynamic gamification system to engage and raise awareness among participants in biowaste utilization.

The overall goals include: a) achieving waste sorting and eliminating food waste at the source, b) reducing operational costs for food waste transport and management, c) optimizing supply chain management for businesses, d) reducing maintenance resources and increasing uptime of biowaste processing devices, leading to lower energy consumption and increased profits for stakeholders/users, e) enhancing platform engagement through innovative gamification techniques to raise awareness among all involved parties (businesses, citizens).

Indicative expected benefits of this project through its interventions include:

1. Strategic advantage in cutting-edge technologies, strengthening the company against competitors by expanding the quality and range of offered services, leading to stabilized and increased turnover and profits in the domestic market.
2. Development of strong partnerships and synergies between the company and CERTH, contributing to continuous and active transfer of innovative technical knowledge to the sector.
3. Strengthening CERTH's position in intelligent embedded systems, deep learning for predictive maintenance, and personalized gamification techniques.

4. Applied research by CERTH aligned with real business needs in the waste and food waste management sector, along with testing and validation in real-world conditions.
5. Contributing to the transformation of food waste management and raising awareness among citizens and businesses for more sustainable consumption models, promoting source sorting of food waste to reduce organic waste in landfills, thus lowering greenhouse gas emissions and groundwater pollution, as well as reducing garbage truck routes and plastic bag usage for food waste collection.

Project Objectives:

- Objective 1: Design and development of an innovative waste management platform for intelligent prevention, evaluation, and rational management of biowaste.
- Objective 2: Integration of smart data analysis and edge computing for predictive maintenance of smart bins, using data (noise, energy, etc.) and unsupervised and progressive learning algorithms for real-time anomaly detection and failure prediction.
- Objective 3: Introduction of innovative gamification methods to raise citizen awareness, with a multi-level reward system for all involved parties (citizens, businesses) using innovative incentives that promote a green footprint for individuals/organizations/sectors.
- Objective 4: Introduction of intelligence in embedded systems to enable personalized waste management. User identification will utilize proximity technologies (e.g., Bluetooth, NFC), with support for multi-user recognition.
- Objective 5: Analysis and development of new business models for food waste sorting at source, positioning recycling as the primary option for cost-effective municipal and business waste management.
- Objective 6: Validation and evaluation of the system by end users during the pilot phase.

Total Project Budget: 336.885,00€

CERTH Budget: 190.185,00€